INDUCTION PROGRAM
ON
STUDENTS' ABC-ID CREATION AND CAREER COUNSELLING CELL
(2023-2024)

INTRODUCTION:

A program in India called the Academic Bank of Credit (ABC) aims to make higher education more accessible and flexible. It enables students to earn academic credits from different programs and institutions, which they may then exchange for degrees or other credentials.

This program is a component of India's larger educational reforms, which are meant to raise the standard, accessibility, and applicability of postsecondary education. It supports the objectives of the **National Education Policy (NEP) 2020,** which places a strong emphasis on adaptability and multidisciplinary education.

An induction programme for students regarding ABC-ID creation was carried out in Vivekananda Hall, Room no. 106 of Banwarilal Bhalotia College, under the aegis of IQAC, on 9th of August 2023.

The goal of this programme was a thorough, step-by-step guidance is to create an organized framework for the methodical creation of Academic Bank of Credits (ABC) IDs on several platforms.

In this program step by step guidelines were explained by Prof. Amitava Basu, principal of Banwarilal Bhalotia college. The tutorial covered every step of creating ABC IDs for students using a variety of platforms, such as the Academic Bank of Credits portal, DigiLocker, UMANG, academic institution portals, and the "UIDSE+" mode for bulk ID generation.

Students can create an ABC ID through a variety of enrollment channels.

They are free to choose from the many registration options, enter their academic data into the appropriate form, and then receive an ABC ID along with a shareable PDF document.

ADVANTAGES OF ABC-ID CREATION

There are many advantages to creating ABC IDs, such as:

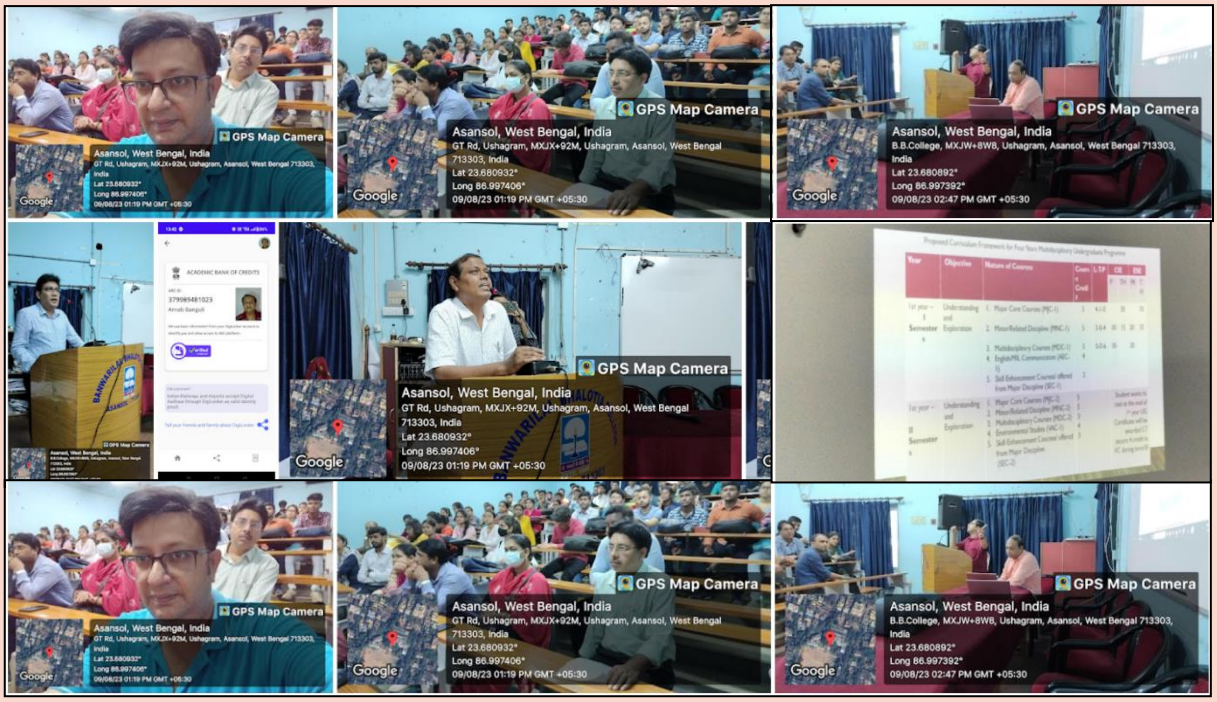
- **Credit Accumulation:** Courses taken at various establishments, including online and traditional universities, can earn credits for students.
- **Flexibility:** The method enables a more individualized educational path by giving students the freedom to select courses from a variety of institutions and fields.
- **Inter-Institutional Cooperation:** ABC encourages cooperation between academic establishments, enabling a more comprehensive method of instruction.
- **Degree Completion:** At a certain institution, students can use their accrued credits to finish their degree.
- **Unique Student ID:** Starting in Class I, each student is given a unique and permanent identity through the issuance of ABC IDs. This guarantees smooth academic progress over the course of their education.

- **Academic Progress Monitoring:** From the beginning, ABC IDs enable thorough and ongoing monitoring of students' academic performance.

- **Weakness Identification:** Teachers can identify subject-specific shortcomings in students' academic data associated with ABC IDs, allowing for more focused interventions to improve performance.

- **Simplified Documentation:** The ABC safely keeps students' academicrecords, easing administrative hassles and drastically lowering reliance on conventional paper-based recordkeeping.

  OUTCOME: Students were highly benefitted by this initiative taken by the college. The college office has also taken the responsibility of assisting the students facing difficulties in the creation of this unique ID.

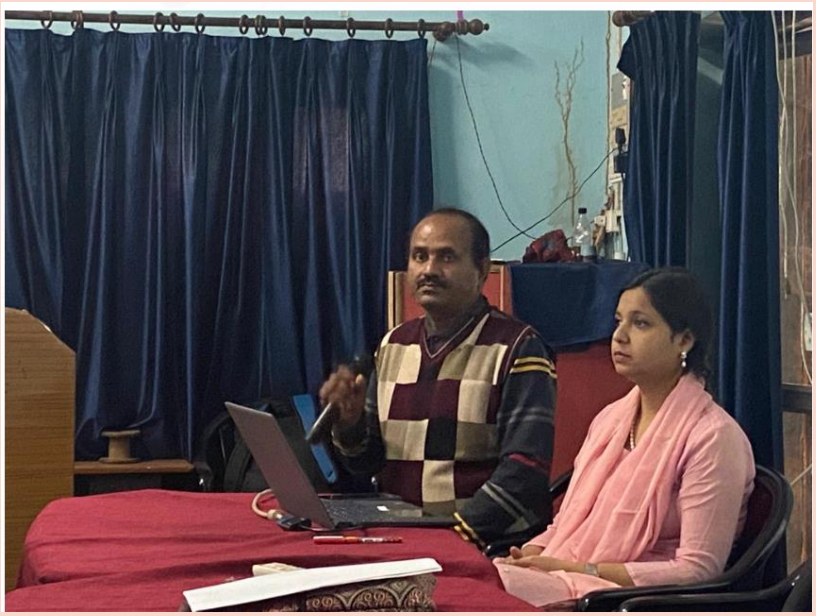


INDUCTION PROGRAM
OF
STUDENTS BY EQUAL OPPORTUNITY CELL
(2023-2024)

INDUCTION MEETING BY EQUAL OPPORTUNITY CELL

Date:13-12-2023

- The roles of the SC/ST/OBC Cell were explained to the respective students of SC, ST, and OBC, at an induction meeting held on **13-12-23.**
- A telegram channel for SC/ST/OBC Cell was introduced and the link was provided to the students to ensure that all information is shared faithfully to all students belonging to the above castes. A talk about available scholarships for the above students, was given by the convener of the equal opportunity cell.
- Information about different programs for the benefit of SC/ST students can be disseminated among them.



ADHAAR LINKING WITH MOBILE PHONE

Date: 19-12-2023

As a large number of college students rely on prepaid SIM cards for their mobile phones, switching their numbers often becomes quite challenging to register them for Academic Banks of Credits. To avoid hurdles, primarily stemming from the necessity for students to link their Aadhar cards to the mobile phones, the Equal Oppurtunity Cell took the initiative to get their adhaar numbers linked to their mobile phones by recruiting a bank professional.


'छात्रवृति के लाभ से वंचित हैं विद्यार्थी'

DEPARTMENTAL STUDENT INDUCTION PROGRAM

(2023-2024)

Induction Report: PG Department of Zoology, Banwarilal Bhalotia College, Asansol

Date: 07.08.2024

Time: 11.00 a.m.

Venue: Post Graduate Department of Zoology

Introduction:

The PG Department of Zoology, Banwarilal Bhalotia College, Asansol, organized an induction program for the newly admitted students, with a special focus on introducing the National Education Policy (NEP) 2020 curriculum. The event aimed to familiarize students with the department's academic and research environment, as well as provide an overview of the NEP curriculum.

Objective:

The primary objective of the induction program was to introduce students to the PG Department of Zoology, its faculty members, and the NEP curriculum. The program also aimed to create a conducive learning environment, foster interactions among students and faculty, and provide essential information about the department's academic and research activities.

Program Details:

The Head of the Department, Dr. Sangita Lahiry, welcomed the students and introduced the faculty members. She provided an overview of the NEP 2020 curriculum, its objectives, and its significance in the field of zoology. The faculty members presented an overview of the department's academic and research activities, highlighting the areas of specialization and research focus. The students were given an opportunity to interact with the faculty members, ask questions, and clarify their doubts. The program concluded with a vote of thanks, and the students were provided with a comprehensive brochure containing essential information about the department and the NEP curriculum.

Outcome:

The induction program was successful in introducing the students to the PG Department of Zoology and the NEP curriculum. The students showed keen interest in the program and actively participated in the interactive sessions. The faculty members were impressed with the students' enthusiasm and eagerness to learn.

Key Takeaways:

1. The NEP curriculum aims to provide a holistic education, focusing on interdisciplinary learning, critical thinking, and problem-solving.

2. The PG Department of Zoology, Banwarilal Bhalotia College, Asansol, is committed to implementing the NEP curriculum, with a focus on hands-on learning, research, and community engagement.

3. The department encourages students to participate in research projects, internships, and extension activities, to develop their skills and knowledge.

Conclusion:

The induction program was a success, and the students are now well-equipped to navigate the academic and research environment of the PG Department of Zoology, Banwarilal Bhalotia College, Asansol. The department looks forward to a productive and engaging academic year, with a focus on implementing the NEP curriculum and providing students with a holistic education.

NEP SYLLABUS

ODD EVEN

SEMESTER

NEP BBA SYLLABUS

SYLLABUS

Bachelor of Business Administration BBA

UNDER CURRICULUM AND CREDIT FRAMEWORK

KAZI NAZRUL UNIVERSITY

ASANSOL, WEST BENGAL

With effect from 2023-2024 Academic Session

Syllabus of Bachelor of Business Administration

BBA (1ST SEMESTER)

Course Name: Principles of Management and Organisational Behaviour

Course Code: BBAMJ101; Course Type: Major; Course Details: MJC-1;L-T-P: 4-1-0;
Course Credit: 5
Marks: Theory [100]: Continuous Assessment-30 & End Semester Examination-70

Course Objective

The objective of the course is to familiarize the learner with extant and emerging management theories and practices for reflective and holistic thinking on management principles andpractices. Also to acquaint the students with the fundamentals of managing business and to understand individual and group behavior at work place so as to improve the effectiveness of an organization. The course will use and focus on Indian experiences, approaches and cases.

Learning Outcomes

After completing the course, the student shall be able to:

1. Understand the evolution of management and apprehend its effect on future managers.
2. Analyse how organisations adapt to an uncertain environment and decipher decision making techniques managers use to influence and control the internal environment.
3. Comprehend the changes happening in organisation structure over time.
4. Analyse the relationship amongst functions of management i.e. planning, organizing, directing and controlling.
5. Appreciate the changing dynamics of management practice.
6. Develop understanding of different approaches to designing organizational structures.
7. Understand the role of personality, learning and emotions at work.
8. Discover and understand the concept of motivation, leadership, power and conflict.
9. Understand the foundations of group behaviour and the framework for organizationalchange and development.

Unit–I: **Nature, Scope and Process of Management:** Concept of Management, Role and Importance of Management, Functions and Levels of Management, Management – A Science and an Art; Evolution of Management Thought: Early Contributors to Management Thoughts;

Scientific Management, Administrative Theory of Management.

Unit-II: Planning and Organizing: Features of Planning, Importance, Steps, Types. Decision-making; Formal and Informal Organizations, Organization Structure: Line and staff, Delegation of Authority, Centralization and decentralization, Departmentalization: Concept and Types, Span of Management.

Unit-III: Leadership, Coordination and Control: Leadership, Functions and Importance, Qualities of a Good Leader, Leadership Styles. Concept and features of Coordination, Nature of Control, Relationship between Planning and Control, Elements of control system.

UNIT-IV: Introduction to Organisational Behaviour: Concept, Learning objectives, Challenges and Opportunities of Organisational Behaviour (OB), Issues in Developing an OB Model; Characteristics of Human Behaviour.

UNIT-V: Personality, Perception, Motivation & Group Dynamics: Personality: Concept and Types, Major determinants. MBTI, Type-A and Type- B Theory; Perception: Concept, Factors influencing Perception; Learning: Concept; Attitude: Concept, Different Job Attitudes; Motivation: Concept, Basic Theories of Motivation (Maslow, Herzberg, McClelland and McGregor); Group Dynamics: Concept of group, Stages of Group Development, Types of Groups, Work Teams Vs. Work Groups, Group Synergy.

Suggested Readings:

1. Essentials of Management: Weihrich and Koontz, et al, Tata McGraw Hill.
2. Management: Stoner J and Freeman RE, Prentice-Hall.
3. Management: Daft, RL, Thomson.
4. Management-Text & Cases: V.S.P Rao & Hari Krishna, Excel Books.
5. Principles of Management: Ramaswami, T, Himalaya Publishing.
6. Management: Robbins, SP, Prentice Hall.
7. Organizational behavior – Robins Stephen P; PHI.
8. Organizational behavior- Fred Luthans; McGraw Hill Inc.
9. Management of Organizational behavior – Harsey, Paul & Kennith H. Blancher; PHI.
10. Organizational Behaviour: Human Behaviour at Work - Davis and Newstrom, Tata McGraw-Hill.
11. Organizational Behaviour- Steers and Black, Harper Collins College Publishers.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Internal Examination (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (70 Marks): End Semester Written Examination, Duration 4 Hours

Course Name: Economics- I

Course Code: BBAMN101; Course Type: Minor; Course Details: MNC-1 L-T-P: 4 -1 -0; Course Credit: 5

Marks: Theory [100]: Continuous Assessment-30 & End Semester Examination-70

Course Objectives

The purpose of this course is to apply micro economic concepts and techniques in evaluating business decisions taken by firms. The emphasis is on explaining how tools of standard price theory can be employed to formulate a decision problem, evaluate alternative courses of action and finally choose among alternatives.

Learning Outcomes

After completing the course, the student shall be able to:

1. Apply the knowledge of the mechanics of supply and demand to explain working of markets.
2. Describe how changes in demand and supply affect markets. Understand the choices made by a rational consumer.
3. Explain relationships between production and costs.
4. Define key characteristics and consequences of different forms of markets.

5. Understand the functioning of Banks and issues related to public finance

UNIT-I: Introduction: Economic Terms and Basic concepts; Basic Economic problems; Meaning, Nature and Scope of Business Economics.

UNIT-II: Demand: Law of demand and its Exceptions; Elasticity of Demand- Concepts and Types, Measurement of Elasticity; Demand Forecasting – Importance, Methods ; Different Revenue Concepts, Relations Concerning AR, MR and Price Elasticity.

UNIT-III: Production and Cost: Production Function; Law of variable Proportions , Iso- quant, Iso-cost Lines and Choice of Optimum Input combination, Expansion Path ; Cost Function; Short-run and Long-gun Costs-Different Cost concepts and Costs Curves.

UNIT-IV: Market: Different Market Structures; Short-run and Long-run Equilibrium under Perfect Competition, Equilibrium under Monopoly, Price Discrimination.

UNIT-V: Banking and Public Finance: Function of Commercial Banks and Central Bank; Credit Creation and Credit Control in the Banking system; Direct and Indirect Taxes, Public Debt, Budget Deficit, Anti-inflationary measures. National Income Accounting: Methods, Limitations, Income determination by Simple Keynesian Model, Investment Multiplier.

Suggested Readings:

1. Economics – Samuelson and Nordhaus; McGrew Hill.
2. An Introduction to Positive Economics – Lipsey; ELBS.
3. Managerial Economics – Hague; Longman.
4. Managerial Economics – Varshney and Maheswari; Sultan Chand.
5. Modern Economic Theory – Mukherjee; Wishwa Prakashan

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Internal Examination (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (70 Marks): End Semester Written Examination, Duration 4 Hours

Course Name: E-Commerce

Course Code: MDC-1; Course Type: MD; Course Details: MDC-1; L-T-P: 3-0-0;

Course Credit: 3

Marks: Theory [50]: Continuous Assessment-15 & End Semester Examination-35

Course Objectives

The purpose of this course is provide an introduction to e-commerce for business and management. It will also help to understand the complexity of e-commerce and its many facets. Students will learn how e-business and e-commerce fit together. Also they will be able to identify the impact of e-commerce and recognise the benefits and limitations of e-commerce.

Learning Outcomes

After completing the course, the student shall be able to:

1. Identify the component parts of e-commerce.
2. Identify the benefits of selling online.
3. Know how to optimise and stay safe when selling online.
4. Understand the risks around Cyber Security when trading and doing business online.
5. Understand the basic concepts and technologies used in the field of management information systems.
6. Understand the processes of developing and implementing information systems.
7. Be aware of the ethical, social, and security issues of information systems.

Unit-I: Introduction: E-Commerce-meaning, nature, concepts, types; e-commerce business models B2B [concept, major activities, types of B to B market (independent, buyer oriented, supplier oriented, e-market place)], B2C [portals, e-tailer, content provider, transaction broker, real life examples of B2C], C2C, C2B, etc.; forces behind e-commerce, e-Governance [meaning, types, significance, real life examples].

Unit-II: E-CRM and SCM: E-CRM-definition, features, goals of E-CRM business framework, phases of E-CRM, types of E-CRM, Functional components of E-CRM, strategies for E-CRM solutions; SCM-definition, features,

types of supply chain.

Unit-III: Digital Payment: Methods of e-payments [Debit Card, Credit Card, Smart Cards, e-Money], electronic or digital wallet, digital signature (procedures, working and legal provisions), payment gateways [Core Banking Solution or CBS, Mobile Payment, UPI, NCPI, International Payments], Online banking [meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting], risks involved in e-payments.

Unit-IV: ERP: Definition, features, major characteristics, levels of ERP, benefits of ERP, enterprise potential of ERP, modules of ERP, phases of ERP implementation, limitations of ERP.

Unit-V: New Trends in E-Commerce: Social Commerce-concept, definition, features; Digital Marketing-definition, objectives, methods, limitations; Advertisement in Social Media-objectives, advantages and disadvantages, procedures.

Suggested Readings:

1. P. T. Joseph, E-Commerce: An Indian Perspective, PHI Learning
2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, E-Commerce: Fundamentals and Applications, Wiley.
3. Laudon, E-Commerce, Pearson Education India
4. Schneider G., E-Business, Cengage
5. Bhaskar, B., E–Commerce, McGraw Hill

Teaching Learning Process

Teaching learning process may be interactive classroom sessions. It includes theoretical discussion and numerical problems solving.

Assessment Methods

Internal Examination (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (35 Marks): End Semester Written Examination, Duration 4 Hours

Course Name: Business Statistics

Course Code: BBASE101; Course Type: SEC; Course Details: SEC-1

L-T-P: 2 -1 -0; Course Credit: 3

Marks: Theory [50]: Continuous Assessment-15 & End Semester Examination-35

Course Objective

To familiarize students with the basic statistical tools used to summarize and analyze quantitative information for business decision making.

Learning Outcomes

After completing the course, the student shall be able to:

1. Acquire a fair degree of proficiency in comprehending statistical data, processing and analysing it using descriptive statistical tools.
2. Gather knowledge about various measures of Central Tendency.
3. Understand the relationship between two variables using concepts of correlation and regression and its use in identifying and predicting the variables.
4. Develop an understanding of the different measures of dispersion and Skewness and Kurtosis

UNIT-I: Introduction: Definition of Statistics, Importance and scope of statistics, Limitations of Statistics; Types of Data, Important Sources of Secondary Data; Collection andPresentation of Data: Different Methods of collecting Primary Data: Text, Tabular and graphical Methods of Data presentation; Frequency Distribution, Diagrammatic Presentation of Frequency data.

UNIT-II: Measures of Central Tendency: simple and Weighted Arithmetic Mean – Properties, Merits and Demerits; Geometric Mean and harmonic Mean – Algebraic Properties, Merits and Demerits; Relationship among A.M., G.M. and H.M.; Median and Mode – Measures, Properties, Merits and Demits. Measures of Dispersion: Range, Quartile Deviation, mean Absolute Deviation and Standard Deviation – their Merits, Demerits and Properties.

UNIT-III: Concepts of Skewness and Kurtosis, Different Measures of Skewness and Kurtosis.

UNIT-IV: Analysis of Bivariate Data: Scatter Diagram, Pearson's Correlation Coefficient and

its Properties; Spearman's Rank Correlation (in case of no tie) Simple Linear Regression and its Properties.

UNIT-V: Index Number: Definition, Methods of Construction of Index Numbers, problems in Construction of Index Numbers, types of Index Numbers, tests of Index Numbers

Suggested Readings:

1. Statistics: Sancheti and Kapoor, Sultan Chand & Sons.
2. Basic Statistics: Goon, Gupta and Dasgupta, World press.
3. Fundamental of Statistics (vol. 1 and 2): Goon, Gupta and Dasgupta, World Press.
4. Statistical Methods (vol 1 and 2): N.G. Das.
5. Mathematical and Statistics: Ajay Goel and Alka Goel, Taxmann

Teaching Learning Process

Teaching learning process may be interactive classroom sessions. It includes theoretical discussion and numerical problems solving.

Assessment Methods

Internal Examination (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (35 Marks): End Semester Written Examination, Duration 4 Hours

SYLLABUS

Bachelor of Business Administration

UNDER CURRICULUM AND CREDIT FRAMEWORK

KAZI NAZRUL UNIVERSITY

ASANSOL, WEST BENGAL

With effect from 2023-2024 Academic Session

Syllabus of Bachelor of Business Administration

BBA (2ND SEMESTER)

Course Name: Financial Accounting for Managers

Course Code: BBAMJ201; Course Type: Major; Course Details: MJC-2;L-T-P: 4-1-0;
Course Credit: 5
Marks: Theory [100]: Continuous Assessment-30 & End Semester Examination-70

Course Objective

This course provides conceptual knowledge of financial accounting and the techniques for preparing accounts in different types of business organisations.

Learning Outcomes

After completing the course, the student shall be able to:

1. Understand the theoretical framework of accounting and to prepare financial statements.
2. Learn the system accounting system of Depreciation.
3. Learn the system of accounting for Partnership firm..
4. Learn the Company Accounts (as per Companies Act, 2013).
5. Understand the system of accounting for Non- Trading Concern.

Unit-I: Accounting: Objectives, Advantages and Limitations, Branches of Accounting, Accounting Equations, Types of Accounting Information; Users of Accounting Information and Their Needs. Basic Accounting Concepts and Conventions-Accounting Transactions - Double Entry Book keeping - Journal, Ledger, Preparation of Trial Balance - Preparation of Cash Book.

Unit-II: Depreciation - Meaning, Causes, Types - Straight Line Method - Written Down Value Method (Change in Method excluded). Reserves & Provision – Concept, Types & Purposes, Difference between Reserve & Provision; Adjustment Entries – Concept & Development of Adjustment Entries; Classification of Errors - Rectification of Errors - Preparation of Suspense Account.

Unit-III: Preparation of Final Accounts of Profit-oriented Sole-proprietorship (Trading Concerns only); Preparation of Receipts and Payments Account, Income & Expenditure Account and Balance Sheet of Non Trading Organizations (Simple Problems).

Unit-IV: Partnership Accounting: Features of Accounting of Partnership Firms; Maintenance of Capital Accounts – Fixed & Fluctuating; Profit & Loss Appropriation Account (Basic Problems); Admission, Retirement and Death of a Partner.

Unit-V: Company Accounts (as per Companies Act, 2013): Maintenance of Accounts u/s 128; Financial Statements - Definition u/s 2(40); Proforma of Statement of Profit & Loss and Balance Sheet [as per Schedule III Companies Act, 2013].

Suggested Readings:

1. Financial Accounting: S. Mukherjee & A. K. Mukherjee, Oxford University Press.
2. Financial Accounting: A Managerial Perspective: R. Narayanaswamy, Prentice Hall of India.
3. A Textbook of Accounting for Management: S. N. Maheshwari, S. K. Maheshwari, Vikas Publications.
4. Accounting for Managers – Ashish Kr. Bhattacharya; PHI.
5. Financial Accounting – Ashok Banerjee; Excel Books.
6. First Course in Financial Accounting for Business Managers- Asish Kr. Bhattacharya; Nonlinear Insights (OPC) Pvt. Ltd.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Internal Examination (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (70 Marks): End Semester Written Examination, Duration 4 Hours

Course Name: Marketing Management

Course Code: BBAMN201; Course Type: Minor; Course Details: MNC-2; L-T-P: 4 -1 -0;
Course Credit: 5
Marks: Theory [100]: Continuous Assessment-30 & End Semester Examination-70

Course Objectives

The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing and to provide knowledge about various developments in the marketing.

Learning Outcomes

After completing the course, the student shall be able to:

1. Develop understanding of basic concepts of marketing, marketing philosophies and environmental conditions and effecting marketing decisions of a firm.
2. Understand the dynamics of consumer behaviour and process of market selection through STP stages.
3. Understand and analyze the process of value creation through marketing decisions involving product development.
4. Understand and analyze the process of value creation through marketing decisions involving product pricing and its distribution.
5. Understand the need of effective communication and designing of appropriate marketing communication mix

Unit-I: Marketing– scope, nature, definition, core marketing concepts and marketing environment, recent trends in marketing in India. Tele Marketing, Marketing on Web. Green marketing-Importance, benefits and adoption.

Unit-II: Developing marketing opportunities and strategies, consumer and business buyer's behaviour; factors influencing buyer behaviour. Segmentation, Targeting and positioning (STP) for competitive advantage, Marketing Information System (MKIS) and Marketing Research.

Unit-III: Developing the concept of marketing mix, managing the product – types of consumer and industrial products. Product related decisions, product line, product mix, product life cycle (PLC), New product development, branding and packaging decisions.

Unit-IV: Pricing of products: Pricing considerations and approaches, strategies and methods. Managing marketing channels, channel design decisions, channel dynamics, managing retailing, wholesaling and market logistics.

Unit-V: The communication process, developing effective communication, deciding on the marketing communication mix, managing advertising, sales promotion and public relations. Managing sales force.

Suggested Readings:

1. Marketing Management – Kotler, Philip; Prentice Hall of India Publications, new Delhi.
2. Marketing Management Ramaswamy, V.S. and Namakumari, S; McMillan India Ltd., New Delhi.
3. Marketing Management Strategy and Cases – Dalyrample, J.D. and Parson, J.L.; John Wiley and Sons.
4. Contemporary concepts and Practices – Schoell, W.F.; Allwyn and Baycon Inc., New York.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Internal Examination (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (70 Marks): End Semester Written Examination, Duration 4 Hours

Course Name: Business Environment

Course Code: MDC-2; Course Type: MD; Course Details: MDC-2; L-T-P: 3-0-0; Course Credit: 3

Marks: Theory [50]: Continuous Assessment-15 & End Semester Examination-35

Course Objectives

To analyse the overall business environment and evaluate its various components in business decision making

Learning Outcomes

After completing the course, the student shall be able to:

1. Familiarize with the nature of business environments and its components.
2. Develop an understanding of the different economic system.
3. Develop conceptual framework of business environment and generate interest in International Business.
4. Understand the impact of different International Economic institutions on Indian Economy.

Unit-I: **Introductory Issues:** concept, nature and importance of business and business environment – Types of environment; general and task environment, internal and external environment, Basic elements of environment: socio-cultural, political, legal, economic and technological elements.

Unit -II: Socio-cultural Environment of Business: Concept and nature of culture – Impact of culture on business – cultural resources – Ethics and social responsibility of business – Arguments for and against social responsibility.

Unit -III: Economic Environment of Business: concept and elements of economic environment – Different economic systems: their meanings and characteristics – Economic reforms initiated in India – Liberalization, privatization and disinvestment: concepts and trends.

Unit -IV: International Environment of Business: Globalization as a part of the New Industrial Policy – concept and nature of globalization – Why companies go global – Strategies for entering foreign markets:

exporting, licensing and franchising, contract manufacturing, management contracting, joint venture, merger and acquisition, strategic alliance and counter trade – Merits and demerits of globalization – Globalization of Indian business.

Unit -V: India, WTO and Trading Blocks: Role and functions of WTO – Differences between WTO and GATT – Arguments for joining WTO – WTO Agreements binding on India: their impact on the Indian economy – International Economic institutions like World Bank and IMF: their importance and basic functions.

Suggested Readings:

1. Essentials of Business Environment – Aswathapa, K; HPH.
2. Business Environment – Cherunillam, Francis; HPH.
3. Economics Environment of Business – Misra and Puri; HPH
4. Business Environment – Gupta, C.B.; Sultan Chand.
5. Business Environment: Text and Cases – Paul, Justin; TMH.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions. It includes theoretical discussion and numerical problems solving.

Assessment Methods

Internal Examination (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (35 Marks): End Semester Written Examination, Duration 4 Hours

Course Name: Entrepreneurship Development

Course Code: BBASE201; Course Type: SEC; Course Details: SEC-2

L-T-P: 2 -1 -0; Course Credit: 3

Marks: Theory [50]: Continuous Assessment-15 & End Semester Examination-35

Course Objective

To inculcate the spirit of entrepreneurship among the learners to ensure materialization of entrepreneurial desire into a new venture.

Learning Outcomes

After completing the course, the student shall be able to:

1. Understand the concept of entrepreneurship in the context of Indian economic scenario.
2. Link the individual's capability and strength as a guiding factor towards entrepreneurial orientation.
3. Understand the role of the Government in Entrepreneurship Development.
4. Understand entrepreneurial process for initiating new venture creation and the various sources of finance.
5. Understand the procedure for setting-up a small-scale unit.

UNIT-I: Introduction: Concepts of entrepreneur, entrepreneurship and entrepreneur, Characteristics and competencies of a successful entrepreneur, General functions of an entrepreneur; Type of entrepreneurs; Role of entrepreneur in economic development; Distinction between an entrepreneur and a manager; Entrepreneur and Intrepreneur, growth of entrepreneurship-Economic and non economic factor for stimulating entrepreneurship development.

UNIT-II: Role of the Government in Entrepreneurship Development: Concept and meaning of entrepreneurship development; Need for entrepreneurship development programmes (EDPs), Objectives of EDP. McCelland theory of motivation. Women entrepreneursProblems, remedial measures, reasons for growth of woman entrepreneurs.

UNIT-III: Venture promotion and Project Formulation: Concept of projects classification of projects and project report; Project identification and selection; Constraints in project identification,

Techniques of Project Identification, Significance, contents, formulation of project report; Need for Project Formulation; Guidelines for formulating a project report; Concepts of project appraisal.

UNIT-IV: Financing of Enterprise: Need for financial planning, Sources of short-term and long-term finance to entrepreneurs, Commercial banks and financial institutions like IDBI, IFCI, ICICI, SIDBI, SIDCO and SFCs – their roles and activities.

UNIT-V: Small Scale Industries (SSIs) & Institutional Support to Small Enterprises: Definition, characteristics and scope of SSIs in India, Procedure for setting-up a small-scale unit.

Suggested Readings:

1. Management of Small Scale Industry – Vasant Desai; PPH.
2. Entrepreneurship and Small Business Management–C. B. Gupta and S. S. Khanka; Sultan Chand & Sons.
3. Entrepreneurial Development – S. S. Khanka; S. Chand.
4. Entrepreneurship – New Venture Creation – David H. Holt; PHI.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions. It includes theoretical discussion and numerical problems solving.

Assessment Methods

Internal Examination (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

External Examination (35 Marks): End Semester Written Examination, Duration 4 Hours

NEP BENGALI SYLLABUS

Syllabus For

B.A. IN BENGALI

বাংলা পাঠক্

Degree Programme :

3years Degree with Bengali /4 years Degree with Bengali Honours/4years Degree with Bengali Honours with Research

Under

Choice Based Credit System (CBCS)

and

Learning Outcome Based Curriculum Framework

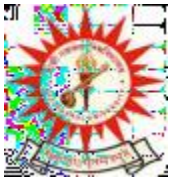
KAZI NAZRUL UNIVERSITY

Department of Bengali

Language and Literature

Asansol, Paschim Bardhaman, West Bengal

(2023-2024)



কাজী নজরল ববশববববিালয

আসানসসাল, পব্ু বর্্ান

বাংলা ভাষা ও সাবিতি ববভাগ

ব্বাবষ্ক ও চতু ব্াবষ্ক সামাবনক এবং সামাবনক- গসবষণা পাঠিক্

(২০২৩-২০২৪ বিকাবষ্ থেসক পসরাজি)

১ু থসস্সাট থেসক ৮ু থসস্সাসটট

অনুক্ উদুত ফল

(PROGRAM OUTCOME)

- বস.বব.বস.এস বসসসস্ট অরীসন বব.এ. বাংলা ভাষা ও সাবিসতিট থপোা্সক সাতক বিৌ, সাতক অনাস্ এবং সাতক অনাস্ গসবষণা থকাসস্ট জনি ববববভন অংসি ববভক কটা িসযসে। রোকস্- ১. থ্জট থকাস্, ২. ্াইনট থকাস্, ৩. ্াব্ বিবসন্নাবট থকাস্, ৪. ব্ল এনিিযস্স থকাস্, ৫. এববববলবি এনিিযস্স থকাট থকাস্ বা (বাংলা কব্উবনসকিন থকাস্) এবং ৬. ্িান্ ইব্যান লিাুসযজ (MIL) থকাস্ ৭. ভিালু অিাসিি থকাস্
- এই থকাস্ গবলসত সংু্ ত ও ইংসটবজ সাবিসতিট বনব্াবচত ইবতিাস ববষয জানাট সুসরাগ টসযসে। এট পাি্াপাবি বাংলা ভাষা ও সাবিসতিট ইবতিাস, েনিাশ, অলঙাটিাশ এবং ভাষাতত সমসক্ জানাট ববস্ত সুসরাগ টসযসে।

- এই থকাস্ একজন বিকাে্ীসক ভববষিসত পবর্তীবলত বাংলা থলখা, পড়া এবং কো বলাট বকতা অজ্ন কটসত সাি্ারি কটসব। এই থকাস্বি সম্ণ্ কটাট পট বিকাে্ী তাট বনজ ক্্সকস্ সফল ি্ওযাট সমাবনা কসযসে।
- অনাসস্ট ৩৯বি থকাসস্ট ্সরি পাচীন ও ্রিরুগীয বাংলা সাবিতি, আরুবনক বাংলা সাবিতি, বাংলা নাি্ক, বাংলা থোসিাগপ, বাংলা উপনিাস, বাংলা পবর, টবীন সাবিতি এবং বি্সনট ্সতা অসনক আকষ্ীয এবং জানবর্ক ববষয পাঠিস্বচসত টসযসে থরগবল অরিযন কসট বিকাে্ীটা ববষসযট স্প উপলব্ কটসত পাটব। বাংলা েোড়া অনিানি ববষসযট বিকাে্ীটা বাংলা ভাষা, সাবিতি, সং্ বত সমসক্ স্ি্ক রাটণা পাসব GE থকাসস্ট ্োরিস্।
- এই থপ্যাস্ট ্োরিস্ বিকাে্ীটা সাবিতি, স্াজ ও ্োনবজীবন সমসক্ ববস্ তজান লাভ কটসত সক্ ি্সব । থসই সসা ভাটতীয এবং বাঙাবল সং্ বত, ঐবতি্ সমসক্ তাসবট জানভাভাট স্্লাভ কটসব।

অনুক্ বনবব্ি উদু ত ফল

(PROGRAM SPECIFIC OUTCOME)

- বতন বেসটট সাতক /চাট বেসটট অনাস্ বিবো এবং চাট বেসটট অনাস্ গসবষণা বিবী (পে্ থেসক ৮্ থসস্সাট) অনুক্কি সফল স্াব্ট পট একজন বিকাে্ী বনমবলবখত উস্ি্গবল চবটতাে্ কটসত সক্ ি্সব।
- বাংলা সাবিসতিট বিকাে্ীটা এই অনুক্ পাসঠ পাচীন, ্রিরুগীয এবং আরুবনক বাংলা সাবিসতিট একবি স্ি্ক রাটণা পাসব।
- ভাষাচ্াট থক্ ববন ববন বাড়সে। বাড়সে কাসজট সুসরাগ। ফসল বাংলা ভাষাচ্াট থকস্ বিকাে্ীসবট ্সরি ভাষাতত ও ভাষাববজান সমসক্ জানলাভ সাে্ক ি্সয উঠসব।
- েন, অলঙাট, ্ালকাবি, পবাববল সাবিতি (ববষব ও ি্াক), অনুবাব সাবিতি, ইংটাবজ ও সং্ত সাবিসতিট তুলন্লক পাঠ বনসয সবঠক রাটণা এবং নীবতগবল পসযাগ কটসত বিখসব।
- গবি সাবিতি, কোসাবিতি, নাি্িসাবিতি , কববতা এবং সাবিতি স্াসলাচনা বিকাে্ীসবট ্সরি সাবিতিসবার গসড় তুলসব।
- নাি্ক, উপনিাস, থোসিাগপ, কববতাট পকটণগবল সমসক্ বিকাে্ীটা জানলাভ কটসব। এই অংি্ পাঠ বিকাে্ীসবট

  ্সরি নানবনকতাট থবার জাবগসয তুলসব।

  সসব্াপবট, সুববনিস এই অনুক্কি সামাবনক বিকাে্ীসবট ভববষিসত উচতট অরিযন ও গসবষণাকাসজ সাফলি অজ্সন সাি্ারি কটসব।

MJC- Major Course পরান থকাস্, (আববি িক পাঠক্)

MNC-Minor Course (বাংলা ে াড়া অনানি ববষসযট

ে া্ে া্ীসবট জনি) VAC - Value Added Course

MIL- MODERN INDIAN LANGUAGE (BENGALI)- আরুবনক ভাটতীয ভাষা (বাংলা), ববষযক পাঠক্

AECC(B) – ABILITY ENHANCEMENT COMPULSORY- (বাংলা ভাষাট বকতাব্বট আবিবিক পাঠক্)

SEC- SKILL ENHANCEMENT COURSE – ভাষাসবার ও টচনা িবকট বনপুনি ব্বট পাঠক্)

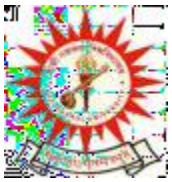
MD - Multi Disciplinary Course

SI - Summer Internship

CA- CONTINUOUS ASSESSMENT - (রাটাবাবিক অভিযটীণ

্্লিাযন) ESE- END SEMESTER EXAMINATION- (চ্ড়ায

থসস্সাট পটীকা)



কাজী নজরল ববশববিালয

আসানসসাল,পব্ বর্্ান

বাংলা ভাষা ও সাবিতি ববভাগ

ব্বাবষ্ক/চতু ব্াবষ্ক বাংলা পাঠক্ (২০২৩-

২০২৩ বিকাবষ্ থেসক পসরাজি) থ্াি

নমট - ২৩৫০/৩৩৫০

থ্াি থসস্সাট – ০৬/০৮

- ৮ বি থসস্সাসট থ্জট থকাস্ বা আববিিক আসে । পবতবি থকাস্ এট প্ণ্্ান ১০০ (বলবখত ৭০ এবং অভিযটীণ ্্লিাযন – ৩০)

- ৭ বি থসস্সাসট ্ঢাইনট থকাস্ আসে। পবতবি থকাসস্ট প্ণ্্ান ১০০(বলবখত ৭০, অভিযটীণ ্্লিাযন ৩০)
- ৮বি থসস্সাসটট ্সরি ১্, ৩য ও ৪েে্ থসস্সাসট একবি কসট টচনািবকট বনপুণি (SEC) পাঠক্ েেিাকসব। পবতবি থকাসস্ট প্ণ্্ান ৫০ (৩৫ + ১৫)
- ১্ ও ৩য থসস্সাসট কলা, ববজান ও বাবনজি িিাখাট েেিা্েেিা্ীসবট জনি AECCB (বাংলা কব্উবনসকিন)-এট একবি থকাস্ েেিাকসব। সব িিাখাট সামাবনক েেিা্েেিা্ীসবট বাংলা ভাষা, সাবিতি, অনুবাব ও পবতসববন সমসক্ এই পাঠক্ অনুসটণ কটসত িসব। থকাস্বিট প্ণ্্ান ৫০ (৩৫ + ১৫)
- বাংলা ববভাসগট েেিা্েেিা্ী েেিাড়াও অনিানি িিাখা ও ববষসয পাঠটত বিকাে্্ীসবট জনি প্ে্, ব্তীয, ত্ তীয থসস্সাসটট পবতবিসত একবি কসট Multi Disciplinary Course েেিাকসব। পবতবি থকাসস্ট প্ণ্্ান ৫০ (৩৫+১৫)
- Value Added Course ব্তীয ও চতুেে্ থসস্সাসট ১ বি কসট আসে। পবতবি থকাসস্ট প্ণ্্ান ৫০ (৩৫+১৫)।

SYLLABUS – BENGALI : DEGREE/ HONOURS DEGREE/HONOURS WITH RESEARCH DEGREE

পাঠক্ – বাংলা: সাতক বিৌ/ সামাবনক সাতক বিৌ/সামাবনক সাতক গসবষণা বিৌ (PROGRAM

LEARNING OUTCOME)

SEMESTER- 1ST

COURSE NAME: PRAGADHUNIK BANGLA SAHITYER ITIHAS O PADABALI SAHITYA

COURSE CODE- BABNGMJ101

COURSE TYPE-MJ	Course Details- MJC-1			L.T.P – 4-1-0	
Credit –5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -১ ।।

থ্জট থকাস্ -১

পাগারুবনক বাংলা সাবিসতিট ইবতিাস ও পবাবলী সাবিতি

PRAGADHUNIK BANGLA SAHITYER ITIHAS O PADABALI SAHITYA

েোে্েোে্ীটা এই থকাস্ থেসক বাংলা ভাষা ও সাবিসতিট জন ও ইবতিাস জানসত পাটসব। বি্ থেসক অিাবি
িতাবী পর্ষ বাংলাট ইবতিাস ও টাজননবতক পবটবত্সনট কো জানসত পাটসব। থবদ্, তু ক্ী, থ্ালল ও ইংসটজ রুসগট স্চনাট স্াজ-সং্্ বত ও সাবিতি পবণতাট পবটচয জানসত পাটসব। স্াজ ও সাবিসতি বচতনি সং্্ বত ও নবজাগটসণট স্সপট কো জানসত পাটসব। ্িাকাবি, গীবতকাবি, আখিানকাবি এবং জীবনীকাসবিট ্সরি কী পাে্কি টসযসে, থসবি বুঝসত বিখসব। র্্ীয থচতন্য সাবিসতিট ্রি থেসক বচটাযত ্্ানব জীবন ও সাবিতিসবাসরট পবটচয পাওয়া রাসব।

েোে্েোে্ীটা, ববষব তত ও বি্ন সমসক্ অববিত িসব। ভাটতীয সাবিসতিট ববষব ঐবতিি সমসক্ জানলাভ কটসব। ববিবিি ববষব কববসবট টচনাট ভাব ও ্প জানসব। ববষব সাবিসতিট সাবিত্িলি অনুরাবন কটসত পাটসব। পটবত্ী বিপ সাবিসতি পবাববলট পভাব সমসক্ েোে্েোে্ীটা অবগত িসব। ্রিরুসগ টবচত কাবি-কববতাট গবতপক্ বত অনুরাবন কটসত পাটসব। ্রিরুসগট সাবিসতিট থববভাবনা, স্াজভাবনা ও ্্ানবভাবনাট পবটচয পাসব।

িাকপবাববল পাসঠ েোে্েোে্ীটা ভাটতীয িবকতত ও িাকভাবনাট স্প জানসত পাটসব। বাংলা িাক সাবিসতিট উদসবট কাটণ ও কববসবট টচনাক্্ সমসক্ জান লাভ কটসব। অিাবি িতসকট ববপন স্াজ সং্্ বতট পবটচয জানসত পাটসব। ভাটতীয পুটাণ ও তনসারনা ববষসযও েোে্েোে্ীটা তাসবট জানভাভাটসক পুি কটাট সুসরাগ পাসব।

পাগারুবনক বাংলা সাবিসতিট ইবতিাস ও পবাবলী সাবিতি

ক. চর্াগীবত; তু ক্ীববজয, শক্ ষকীত্ন; ববিাপবত; চভীবাস; ্নসাল; ক্ বাস ওঝা, বাংলা বচতনিচবটত সাবিতি; চভীল, কাি্ীট্ বাস; আটাকান টাজসভাট সাবিতি; ভাটতচন, লালন ফবকট।

খ. ববষব পবাবলী – ক. বব. পকাবিত/ (বনব্াবচত পব) -

আজু িাে বক থপখলুঁ নব্ীপচন; নীটব নযসন নীট লন বসঞ্চসন; সই, থকবা শনাইল িিাে্না; লসটট বাবিসট বসভ

িতবাট; ্প লাবগ আঁবখ ঝু সট; রাঁিা রাঁিা বনকসসয তনু তনু থজাবত; িাকে বপ্ণ ্াকে ফু ল; কসক গাবড় ক্লস্ পবতল; ্বনট বাবিট কবঠন কপাি; এ থলাট টজনী থ্সলট লিা; ্ারব, বক কিব থট ববব বুবব্পাক; সুসখট লাবগযা এ লট বাঁবরনু; এ সবখ িাে্াবট বুসখট নাবিক ওট; অব ্েুটাপুট ্ারব থগল; আজু টজনী িাে ভাসগ থপাি্াযলুঁ; তাতল বসকত বাবটববনুস্।

গ. িাক পবাবলী – অ্সটন নাে টায সমাববত / ক. বব. পকাবিত (বনব্াবচত পব) -

বগবট এবাট উ্া এসল; বগবট থগদটী আ্াট এসলা বক?; আব্ বক থিবটল্ বনবিসপসন; বগবটটাজ থি, জা্সয এসনা থ্সযট সসা; বেল্ ভাসলা জননী থগা িসটটই লসট; ওসট নব্ী বনবি না িইও থট অবসান; থরও না টজনী আবজ লসয তাটাবসল; ওসি পাণনাে বগবটবট থি ভসয তনু কাঁবপসে আ্াট; বক িসলা নব্ী বনবি িইসলা অবসান থগা; বফসট চাও থগা উ্া থতা্ট ববরু ্ুখ থিবট; ভসবট আ্যা থখলব পাি্া; থকবল আসাট আ্যা ভসব আসা; আব্ তাই অবভ্ান কবট; তাটা থকা্ অপটাসর এ বীল্ থ্যাসব সংসাট গাটসব; ্া আ্ায লুটাসব কত, থবাষ কাসটা নয থগা

্া।

SEMESTER- 1ST

COURSE NAME: BENGALI COMMUNICATION

(MIL COMMUNICATION)

COURSE CODE- AECCB101

COURSE TYPE- AEC	Course Details- AECC-1			L.T.P – 4-1-0	
Credit – 4	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	15	--	35

।। থসস্সাট -১।।

BENGALI COMMUNICATION (MIL)

(কলা, ববজান ও বাবণজি িাখাট সাতক বিকাে্ীসবট জনি)

ববভন িাখাট ববভন ববভাসগট েোে্েোে্ীটা এই পাঠক্ থেসক আরুবনক ভাটতীয ভাষা বিসসসব বাংলাভাষা ও সাবিতি সমসক্ জান লাভ কটসব। এই থকাসস্ পবর পাসঠট ্যারিস্ থবারপটীকা, কববতাট ভাবসসদনর্ ববস্ষসণট

্যারিস্ নানবনকতা ও থোসিাগসপট সাবিত্্লি ববচাসটট ্যারিস্ বাংলা কোসাবিতি ও থলখক সমসক্ রাটণা িসব। এোড়াও ইংসটবজ থেসক বাংলা অনুবাব এবং সংবাবপস্ পবতসববন টচনাট ্যারিস্ ভববষিয জীবসন ক্্জগসত েোে্েোে্ীটা উপক্ ত িসব।

BENGALI COMMUNICATION (MIL)

ভাষা অংি

ক) থবার পটীকা – (পাঠি : আববিিক বাংলা সংকলন - ববশবরু ভটাচার্ , বর্্যান ববশববিালয)

১। জ্ীবাট-বাসবসিট ক্ ষক – ববঙ্চন চসটাপারিায

২। সসবী স্াজ- টবীননাে ঠাকু ট

৩। জনগণ ও বেসযিাট- ্সনাট্ন ভটাচার্

৪। কীত্ন- ববলীপকু ্যাট টায

খ) সংবাবপস্ পবতসববন টচনা ।

গ) ইংসটবজ থেসক বাংলায অনুবাব ।

সাবিতি অংি

ক) কববতাট ভাবসসদনর্ ববস্ষণ -

১। সাস্টে স্াব্ অপলাসত ,২। আলাত-সংলাত ্াসঝ ,৩। অরকাট গসত্ েসক অর সটীস্প ,৪। থি ভাটত, ন্পবতসট বিখাসযে তুব্ - (বনসববি - টবীননাে ঠাকু ট)

খ) থোসিাগসপট সাবিত্িলি ববচাট -

১। থপাস্াসাট ,২। বাবলযা ,৩। বান-পবতবান ,৪। ্ালিবান, - (টবীননাে ঠাকু ট)

SEMESTER- 1st

Skill Enhancement Course (SEC)

।। টচনাবিকট বনপুণি বব্ ।।

COURSE NAME: RACHANA SHAKTIR NOIPURNYA

থকাস্ [SEC-1]

টচনা িবকট

বনপুণি

RACHANA SHAKTIR NOIPUNYA

এই থকাস্বিট ্াটা েসা্েসা্ীটা স্বিিীল, থ্দবলক থলখা টচনা কটসত বিখসব। নানা রটসনট প্ বলখসত পাটসব। পবতসববন বলখসত বিখসব। অনুস্ব টচনা কটসত বিখসব। ভাবাে্ ও ভাবসমসাটণ বলখসত পাটসব। এই থকাস্বি তাসবট বিবিাবটক জীবন ও জগসতট নানাসকস্ থ্াকাববলা কটসত সাি্ারি কটসব। একই সসা েসা্েসা্ীসবট ববববভনসকস্ চাকবট পাবাট বিপাসট সাি্ারি কটসব ।

COURSE CODE- BABNGSE101

COURSE TYPE- SEC	Course Details- SEC-1			L.T.P – 2-0-0	
	Full	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
Credit – 3	Marks: 50	--	15	--	35

ক. বিবকগত, বিবিাবটক এবং পাবততাবনক প্বলখন ।

খ. অনুস্ব টচনা।

গ. ভাবা্ ও ভাবসমসাটণ

টচনা। ল. স্জন্্লক টচনা ।

SEMESTER - 1st

MD (Multi Disciplinary Course)

COURSE NAME - BANGLA SAHITYA O SANSKRITI

COURSE CODE - MDC110

COURSE TYPE- MD	Course Details- MDC-1			L.T.P – 3-0-0	
Credit – 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	15	--	35

প্ থসস্সাট

্াব্বিবসসপনাটী থকাস্ (MDC-1)

বাংলা সাবিতি ও সং্্ বত

Bangla Sahitya O Sanskriti

১। পাচীন সাবিতি - টবীননাে ঠাকু ট (বনব্াবচত

পবর) টা্যন, থ্লব্ত, িকু যলা, কাসবিট উসপবকতা

২। থববী(একাঙ)- তুলসী লাবিড়ী

৩। বাাালীট সং্্ বত - সুনীবত কু ্াট চসটাপারায (বনব্াবচত পবর),পব্্বা বাংলা

আকাসবব্ - জাবত, সং্্ বত ও সাবিতি ; বাাালীট ইবতব্্ : জাবত গঠসন; থগদড়বা ; পাচীন বসাট

পুষটণা জনপব।

SEMESTER- 2ND

COURSE NAME: SANSKRITA - INGREJI SAHITYER ITIHAS EBONG BANGLA BHASHATATTWA

COURSE CODE- BABNGMJ201

COURSE TYPE- MAJOR	Course Details- MJC-2			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -২।।

থ্জট থকাস্/২ [MJC-2]

সং্্ ত - ইংসটবজ সাবিসতিট ইবতিাস এবং বাংলা ভাষাতত

SANSKRITA - INGREJI SAHITYER ITIHAS EBONG BANGLA BHASHA TATTWA

েoা্েoা্ীটা সং্্ ত সাবিসতিট উদব ও ববকাি সমসক্ অবগত িসব। সং্্ ত নাি্ক সমসক্ জানসত পাটসব। পাচীন ভাটত ও বাংলাট স্াজ সভিতা ও সং্্ বত সমসক্ জাত িসব। সং্্ ত সাবিতিটীবত ও টসতত সমসক্ পবটচয লাভ কটসব। পটবত্ী সাবিসতি সং্্ ত সাবিসতিট পভাব সমসক্ জানসত পাটসব। েoা্েoা্ীটা, ইংসটবজ সাবিসতিট স্যকাল ও ববব্চ্ি সমসক্ জানসত পাটসব। প্াতি সাবিতিতত সমসক্ জানসত পাটসব। আরুবনক গঠনবাব সমসক্ জানসত পাটসব। সাবিসতিট নানা টীবতট তাবতক লকণ সমসক্ জানসত পাটসব। প্াতি সাবিসতিট ববব্ভন ্সপট সসা পবটবচত িসত পাটসব। বাংলা সাবিসতি ইংসটবজ সাবিসতিট পভাব সমসক্ জানসত পাটসব।

েoা্েoা্ীটা, ভাষা কী ও থকন তা জানসত পাটসব। ভাষাট সংজ্া, স্প ও ববববিি জানসব। কেি ভাষা ও থলখি ভাষাট স্প জানসত পাটসব। ভাষা ববচাট কটসত বিখসব, সারু ও চবলত ভাষাট পাে্কি বুঝসত সক্ িসব। ভাটতীয আর্ভাষাট উযপব্, ইবতিাস ও ববকাসিট স্প ববষসয জানসব। বাংলা ভাষাট উদব ও ববকাসিট ইবতিাস জানসত পাটসব। িাজাট বেসটট বাংলা ভাষাট ববব্চ্ি, ববববিি ও ব্িায জানসত পাটসব। ভাষাচচ্াট বু 'বি পরান রাটা ঐবতিাবসক ও তু লন্্লক ভাষাববজাসনট ববববিি জানসব। ধবনতত, ্পতত, পববববর, বাকিতত ও অে্তত বুঝসত পাটসব। ধবনতত, ্পতত এবং বাকিতসতট নানা উপাবান সমসক্ জানলাভ কটসব। ভাষাট গঠন ও ববব্চ্ি বুঝসত পাটসব। উচাটণ ববজান অনুরাবন কটসত পাটসব। আঞ্চবলক ভাষা ববস্ষণ, ভাষাসক্-স্ীকা ইতিাবব সমসক্ অবগত িসব। চবলত ভাষা, কাসবিট ভাষা, গসবিট ভাষা ও সাবিসতিট ভাষাট পাে্কি বন্পণ কটসত স্ে্ িসব। বত্্ান ববসশ ভাষাট গবতপক্ বত সমসক্ও জানসব।

(১)

ক. সং্্ ত সাবিসতিট ইবতিাস – টা্যণ, ্িাভাটত, কাবলবাস, ি্দক, জযসবব।

খ. ইংসটবজ সাবিসতিট ইবতিাস – চসাট, থিকবপযট, ওযাি্সওযাে্, থকালটীজ, থিলী,্ি, ি্্াস িাবি্, চাল্স বিসকয, এবলযি, ইসযিস। (জীবন ও সাবিতি)

(২) বাংলা ভাষাতত -

ক. বাগরন ও বাংলা ধবনগবলট উচাটণ তত; ধবন পবটবত্ন (কাটণ ও পক্ বত); বাংলা িবভাভাট; বাংলা িবাে্তত; বাকিগঠনতত।

খ. বাংলা ভাষাট উদব ও ক্রবকাি; পাচীন–্রি–আরুবনক বাংলাট ্পতাবতক ও ধবনতাবতক ববববিিি; বাংলা উপভাষা; সারু ও চবলত বাংলা।

SEMESTER- 2ND

MULTI DISCIPLINARY COURSE

COURSE NAME: ADHUNIK BANGLA SAHITYA

COURSE CODE- MDC210

COURSE TYPE- MD	Course Details- MDC-2			L.T.P – 3-0-0	
Credit – 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	15	--	35

থসস্সাট - ২

্াব্বিবসন্নাবট থকাস্ (MDC-2)

আরুবনক বাংলা সাবিতি

ADHUNIK BANGLA SAHITYA

১. থোিগপ : ত্সা- তাটাি ঙট বসনিাপারিায

্র ও সংল - িটববনু বসনিাপারিায

বেন্সা - আ্যাপ্্ণ্া থববী।

২. **কববতা** : র্ুনাবতী - িঙ থলাষ

থরসত পাবট বকন থকন রাব - িবক চসটাপারিায

ফু ল ফু িু ক না ফু িু ক - সুভাষ

্ুসখাপারায

্য্ট পাখায চাঁব - তাটক থসন

৩. বাংলা সাবিতি এবং বাংলা চলবচ্ ভাবনা

ববষয চলবচ্ - সতিবজয টায (বনব্াবচত)

অতীসতট বাংলা েবব, বাংলা চলবচস্ট আস্িট ববক, চলবচ্ টচনা, আবাক, ভাষা ও ভবা, চলবচস্ট সংলাপ পসসা, আবিসীত পসসা, অপুট সংসাট পসসা, ওটসফ ইবনট ঠাকরণ

.৪. বাংলা সাবিতি ও ইংসটবজ সাবিসতিট তুলন্্লক আসলাচনা : (ক)থিকবপযাট ও বাংলা নাি্ক (খ) ব্্ন ও ্রুস্বন (গ) ওযাি্্সওযাে্্ ও টবীননাে (ল) এবলযি ও ববষু থব (ঙ)ইসযিস ও জীবনানন (চ) ওযা্যাট ্ি ও ববঙ্চন (ে) চান্স বিসকয ও িটিযচন (জ) ি্্াস ি্াবি্ ও তাটাি্ঙট

SEMESTER- 2ND

Skill Enhancement Course (SEC)

।। বনপুণি বা বকতা ব্ব্ ।।

COURSE NAME: BYABOHARIK BANGLA CHARCHA

থকাস্ [SEC-2]

বিবিাবটক বাংলা চচ্া

BYABOHARIK BANGLA CHARCHA

COURSE CODE- BABNGSE201

COURSE TYPE- SEC	Course Details- SEC-2			L.T.P – 2-0-0	
Credit – 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	15	--	35

এই থকাসস্ট ্রি ববসয েoiেoiীটা, ববজাপসনট খসড়া বতবটট কাজ বিখসব। ববজাপসনট কাসজট খুঁবিনাবি সমসক্ জানলাভ কটসব। েoiাপাট কাসজট থকদিল বিখসব। পফ সংসিারসনট বনয্াববল সমসক্ জানসব। পফ সংসিারন কটসত বিখসব। সংবাবপস্ পবতসববন বলখসত বিখসব। এই ববষযগবল েoiেoiীসবট ববববভনসকস্ চাকবট পাবাট বিাপাসট তাসবট সিাযতা কটসব।

ক. ববজাপসনট খসড়া টচনা।

খ. পফ সংসিারন।

গ. পবটভাষা (আববিিক বাংলা সংকলন , ববশবরু ভটাচার্ সমাববত, বর্ান ববশববববিালয পকাবিত)।

ল. বানান ববর (প. ব. বাংলা আকাসবব্ বাংলা বানান ববর) ।

SEMESTER- 3RD

COURSE NAME- MANGALKAVYA - CHARIT SAHITYA EBONG **CHHANDA-ALANKAR**

COURSE CODE- BABNGMJ301

COURSE TYPE- MAJOR	Course Details- MJC-3			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -৩।।

থ্জট থকাস্/৩ [MJC-3]

্ালকাবি - চবটতসাবিতি এবং েন - অলঙাট

MANGALKAVYA - CHARIT SAHITYA EBONG CHHANDA - ALANKAR

্ালকাবি ্রিরুসগট বাংলা সাবিসতিট একবি গররপ্ণ্ সং্প । বিকাে্ীটা ্ালকাসবিট কাবিবন ও কববসবট সমসক্ জানসত পাটসব। ্ালকাসবিট টচনানিবল সমসক্ জানসত পাটসব। ্ালকাসবিট রাটায ববববভন

্ালকাসবিট সাতনি বুঝসত পাটসব। ্ালকাবি টচনাট সা্বজক কাটণ অনুরাবন কটসত সসচি িসব। স্সা্বযক বাংলাসবসিট র্-বি্ন ও সা্বজক, টাজননবতক, অ্েননবতক ইবতিাসসট সসা েো্েো্ীসবট পবটচয কটাসনাই এট উস্ি। এই পসব্ ্রিরুসগট সা্বজক ববব্সনট ইবতিাস জানসত পাটসব। রুগসবরট স্প জানসত পাটসব। ্রিরুসগট সাং্ বতক ঐবতি ও সাং্ বতক আবান-পবাসনট ইবতিাস ববষসয ওযাবকবিাল িসব। এই পসব্ ্রিরুসগট বাংলাট টাজননবতক উতান-পতসনট ইবতিাস ও সাবিতি স্বিট পবটচয জানসত পাটসব। বচতনিসবসবট অববান বাংলা সাবিতিসক স্ কসটসে। বাংলাট স্াজ ও সাবিসতি বচতনিসবসবট পভাব সমসক্ জানসত পাটসব। বচতনি জীবনী সাবিসতিট সসা পবটচয লিসব। বচতনি-জীবনীকাটসবট বচতনি-জীবনী েো্ অবলমসন বচতনি-জীবনী ও তযকালীন নব্ীসপট ্্য স্াসজট কো শনসত পাসব। বাংলাট ববষব সং্ বতট পবটচয পাসব। বচতনি-জীবনী পাসঠট ্রি ববসয বচতনিসকবনক বাংলা ভবকবাবী পটমটাট পবটচযবানই এট উস্ি।

সাবিসতি েন ও অলংকাসটট একবি উস্থসরাগি ভ্ ব্কা আসে। ববসিষ কসট বলখননিবল, কবব ও কবব পবতভাট সাকট বিন কসট েন ও অলংকাট। েসনট থকস্ েো্েো্ীটা কাসবি বিবল সমসক্ অববিত িসব। কাসবি বা

কববতায েসনট আববিিকতা সমসক্ জানসত পাটসব। সং্ত ও বাংলা কাবিসাবিসতি েন ববববচ্ি সমসক্ অববিত

িসব। কববতাট েন বনণ্য কটসত বিখসব। বাংলা েসনট ববববচ্ি ও ববসাট সমসক্ জানসব। ববববভন েনবসকসবট

েননিবল জানসত পাটসব। েন ও েনীিনতাট পাে্কি বুসঝ কববতাট ্প বুঝসব। অলংকাসটট থকস্, অলংকাট কী ও থকন বিবিাট কটা িয তা বিখসব। পাচি ও পা্তি সাবিসতিট অলংকাসটট স্প জানসত পাটসব। বাংলা অলংকাসটট ববববচ্ি সমসক্ জানসত পাটসব। পাচি অলঙাট িাশ এবং পাসচিট আলংকাবটকসবট সমসক্ জানসত পাটসব। কববতায অলংকাসটট ববসিষর সমসক্ জানসত পাটসব। েো্েো্ীসবট এই স্ত পটমটাট সসা পবটচয কবটসয থবওযাট উস্সিি এই পাঠক্ টাখা িসযসে।

ক. চভী্ল (আসখবিক খ্) – কববকঙণ ্ুকু ন / ক. বব. পকাবিত

খ. বচতনিভাগবত (আববখভ) – ব্নাবন বাস / সুকু ্াট থসন সমাববত (সাবিতি সংসব)

গ. েন - ধবন ও বণ্; অকট (বল); ্া্া (কলা); শাসালাত(পসট); থেব; রবত; পব্; পব্াা; অবতপব্; চটণ ও পংবক; ব্ল।

েসনট গঠন ববভাগ- একপবী, ব্পবী, ব্পবী, থচদপবী; পযাট, ্িাপযাট, পবি্ন পযাট; অব্াকট, ্ুকক, সসনি; গবি কববতা।

েসনট বতনটীবত - ব্শকলাব্ (তানপরান); কলাব্ (ধবন পরান); বলব্ (শাসালাত

পরান)। ল. অলঙাট – িবালঙাট ও অ্েলঙাট – সংজা, স্প ও ববববিিি।

িবালঙাট – অনুপাস; র্ক; থ্ষ; বসকাবক।

অ্েলঙাট – উপ্া; উযসপকা; ্পক; অপহ্ন বত; সসনি; বন্য; ভাবয্ান; বিবতসটক; স্াসসাবক; অবতিসযাবক; ববষ্; অসাবত; ববসটারাভাস; বাজজবত ।

- ববববভন অলঙাসটট ্সরি তুলন্া্লক আসলাচনা ।
- অলঙাট বনণ্য ।

SEMESTER- 3rd

COURSE NAME- UNISH-BISH SHATAKER NATAK

COURSE CODE- BABNGMJ302

COURSE TYPE- MAJOR	Course Details- MJC-4			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -৩।।

থ্জট থকাস্/৪ [MJC-4]

উবনি - ববি িতসকট

নাি ক

UNISH - BISH SHATAKER NATAK

বাংলাট আরুবনক ও থ্দবলক নাি ক থলখাট রোে্ স্্পাত লসি উবনি িতসক। ে্াে্ে্ীটা এই থকাসস্ বাংলা নাি ি সাবিসতিট উদব ও ইবতিাস সমসক্ জানসব। নাি সকট সংজা ববববি ি ও নাি িতত (পাচি ও পা্তি) সমসক্ জানসব। উবনি িতসকট বাংলা নাি ক ও নাি ি্সঞট ইবতিাস জানসত পাটসব। পা্তি নাি িসাবিসতিট অবভনয কলা সমসক্ জানসব। ্সঞ অবভনয কটসত উযসাি ী িসব। থপদটাবণক, সা্বজক, ঐবতিাবসক নাি ক ও পিসসনট স্প সমসক্ জানসত পাটসব। উবনি িতকীয স্াসজট কো জানসব। উবনি িতসকট ব্তীযাসর্ বাংলা নাি ক টচনাট রুগগত পিভ্ ব্ জানসত পাটসব। সা্বজক কু সং্াট, টীবতনীবত ও নবি বিবকত বাংলাট রুবস্াসজট পবটচয পাসব। স্কালীন স্াজ ও পটারীন বাংলাট বুব্াট কো জানসব। বাংলা নাি সকট জাতীযতাসবার উপলব্ কটসব। স্কালীন নাি ি অবভনয এবং নাি িববসদাি সমসক্ অববিত িসব। বাংলা কস্বি টচনাট ববষয ও বিবল সমসক্ রাটণা পাসব। উবনি িতসকট বাংলা নাি ক একই সসা সা্বজক এবং ঐবতিাবসক ববলল। তাই ববষযবি পাঠিস্বচসত টাখা িসযসে।

ববি িতসকট বাংলা নাি ক ববষয ববববচস্ি, লিনা পটমটায ্তাবস্ ও আবাসক খুবই স্্। এই ববসিষ স্্ থক্কি বাংলা সাবিসতিট অতীব গররপ্ণ্ সমব। বিকাে্ীটা ববি িতকীয নাি িকাট ও নাি িভাবনা সমসক্ অ্যাি ী
িসব। তত্্লক নাি সকট আবাক সমসক্ জানসব। ববি িতকীয নাি ক ও বাসববাব সমসক্

জানসব।

জাতীযতাবাবী আসনালসনট থপবকত ও বব্সবট তত সমসক্ জানসব। আরুবনক বাংলা বেসযিাসটট পবটচয পাসব। গণনাসিকট পবটচয পাসব ও নবনাসিকট পবটচয পাসব। পবতবাবী থচতনাট কণসট বচনসত পাটসব। জব্বাবট

িাসসনট অবসান ও পঞ্চাসযতটাসজট পবটচয লাভ কটসব। বুই ববশরু্ ও থসই অবভলাসত স্ি সাবিসতিট গবতপক্ বত জানসব। থবিভাগ ও সারীনতা উ্ট স্াজ পবটবত্সনট পিভ্ ব্ জানসব। উপবনসবি ও সাবিসতিট গবতপক্ বত বুঝসত সক্ িসব। উপবনসবসি্ট ্্লিসবাসর সাবিতি ববস্ষণ কটসত বিখসব। ্াক্সীয স্াজতাবতক আসনালন, তত ও ফসযিীয ্সনাববসকালনতসতট তসতট বভব্সত সাবিতিববচাট কটসত বিখসব। আরুবনক নাি্িনিবলট কো জানসত পাটসব। আরুবনক নাি্িববচাট ও অবভনসয উযসাি্ী িসব। ্াল্্াল্্ীসবট এইসব ববষসযট পবত সসচতন কসট থতালাট জনি এবি পাঠিস্বচট অযভু ্ক কটা িসযসে।

।। থসস্সাট -৩।।

থ্জট থকাস্/৪ [MJC-4]

উবনি - ববি িতসকট

নাি্ক

UNISH - BISH SHATAKER NATAK

ক. নীলবপ্ণ – বীনবরু

ব্্। খ. পফু ্ – বগবটিচন

থলাষ।

ক. টককটবী – টবীননাে ঠাকু ট।

খ. সওবাগসটট থনদকা– অবজসতি বসনিাপারিায।

ত্তীয থসস্সাট

SEMESTER - 3rd

COURSE TYPE- MINOR	Course Details- MNC-3			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -৩।।

্ওাইনট থকাস্/৩ [MNC-

3] SEMESTER-

3RD

COURSE NAME- **CHHANDA-ALANKAR EBONG BANGLA CHHOGOLPO**

েন - অলঙাট এবং বাংলা থোসাগপ

COURSE CODE- BABNGMN301

সাবিসতি েন ও অলংকাসটট একবি উস্খসরাগি ভ্ বকা আসে। ববসিষ কসট বলখননিবল, কবব ও কবব পবতভাট সাকট বিন কসট েন ও অলংকাট। েসনট থকস্ েওা্েওা্ীটা কাসবি বিবল সমসক্ অববিত িসব। কাসবি বা কববতায েসনট আববিিকতা সমসক্ জানসত পাটসব। সং্্ ত ও বাংলা কাবিসাবিসতি েন ববববচ্ি সমসক্ অববিত
িসব। কববতাট েন বনণ্য কটসত বিখসব। বাংলা েসনট ববববচ্ি ও ববসাট সমসক্ জানসব। ববববভন েওানবসকসবট
েননিবল জানসত পাটসব। েন ও েনীনতাট পাে্কি বুসঝ কববতাট ্প বুঝসব। অলংকাসটট থকস্, অলংকাট কী ও থকন বিবিাট কটা িয তা বিখসব। পাচি ও পা্াতি সাবিসতিট অলংকাসটট স্প জানসত পাটসব। বাংলা অলংকাসটট ববববচ্ি সমসক্ জানসত পাটসব। পাচি অলঙাট িাশ এবং পাসচিট আলংকাবটকসবট সমসক্ জানসত পাটসব। কববতায অলংকাসটট ববসিষর সমসক্ জানসত পাটসব। েওা্েওা্ীসবট এই স্্্ পটমটাট সসা পবটচয কবটসয থবওযাট উস্সিি এই পাঠক্ টাখা িসযসে।

এই পসব্ েোে্েোে্ীটা, থোসিাগসপট ববববিিি ও স্প সমসক্ জানসব। থোসিাগসপট উদব ও ববকাি সমসক্ জানসব। তাটািিঙট বসনিাপারিায, ্াবনক বসনিাপারিাসযট,পভাত কু ্াট ্ুসখাপারিায, ববভ্ বতভ্ ষণ বসনিাপারিায,

িটববনু বসনিাপারিায, িটযচন চসটাপারিায,বনফু ল, নাটাযন গস্যাপারিায -এট থোসিাগসপট ববববিিি ও স্প সমসক্ জানসব। এসবট থোসিাগসপট তত, স্াজভাবনাট কো জানসত পাটসব। বাংলা গসপট বন্্াণ বিবল সমসক্ সসচতন িসব, থোসিাগসপট স্য ও গসপট ববষয সমসক্ জানসব। পে্ ববশরুস্াে্ট স্াজ সংকিসক অনুভব কটসব। গপকাসটট ্ানস পক্ বত থবাঝাট থচা কটসব। ্ানব চবটস্ট ব্ত স্াট পবটচয পাসব।

ক. েন - ধবন ও বণ্; অকট (বল); ্াে্া (কলা); শাসালাত(পসট); থেব; রবত; পব্; পব্াা; অবতপব্; চটণ ও পংবক; ব্ল।

েসনট গঠন ববভাগ- একপবী, ব্পবী, ব্পবী, থচদপবী; পযাট, ্িাপযাট, পবি্ন পযাট; অব্্াকট, ্ুকক, সসনি; গবি কববতা।

েসনট বতনটীবত - ব্শকলাব্্ (তানপরান); কলাব্্ (ধবন পরান); বলব্্ (শাসালাত

পরান)। খ. অলঙাট – িবালঙাট ও অ্েলঙাট – সংজা, স্প ও ববববিিি।

িবালঙাট – অনুপাস; র্ক; থ্ষ; বসকাবক।

অ্েলঙাট – উপ্া; উযসপকা; ্পক; অপহ্ব বত; সসনি; বন্য; ভাবয্ান; বিবতসটক; স্াসসাবক; অবতিসযাবক; ববষ্; অসাবত; ববসটারাভাস; বিাজজবত ।

- ববববভন অলঙাসটট ্সরি তুলন্্লক আসলাচনা ।
- অলঙাট বনণ্য ।

গ. থোসিাগপ : আববটণী - পভাত কু ্াট ্ুসখাপারিায; িাইনী - তাটািিঙট বসনিাপারিায; বুঃিাসনীয - ্াবনক বসনিাপারিায; বকনটবল - ববভ্ বতভ্ ষণ বসনিাপারিায; অব্তাভ - িটববনু বসনিাপারিায; অভাগীট সগ্ - িটযচন চসটাপারিায; শপবতস্য - বনফু ল ;থিাপ - নাটাযন গস্যাপারিায ।

Semester - 4th

COURSE CODE - BABNGMJ401

COURSE NAME - UNISH SHATAKER KAVYA EBONG KAVYA NATYA O NATYA KAVYA

COURSE TYPE- MEJOR	Course Details- MJC-5			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -৪।।

থ্জট থকাস্/৫ [MJC-5]

SEMESTER- 4TH

COURSE NAME-- UNISH SHATAKER KAVYA EBONG KAVYA NATYA O NATYA KAVYA
উবনি িতসকট কাবি এবং কাবিনাি◌ি ও নাি◌িকাবি

COURSE CODE- BABNGMJ401

উবনি িতক বাংলা সাবিসতি নানা ি◌াখাসক স্◌্ কসটসে। উবনি িতসকট কাবি, থসইস্সযট ◌্নন ও বচযসনট থ্দবলকতা ববসিষভাসব রটা পসড়। উবনি িতসকট পা্তি অবভলাত ও নবজাগটসণট ফসল থর সাং◌্ বতক পবটবত্ন তা জানসত পাটসব। সা্বজক আসনালন ও সং◌্াট সমসক্ জানসত পাটসব। উবনি িতসকট কববগণ ও তাসবট কববরস্◌্ট স্প জানসত পাটসব। উবনি িতসকট আরুবনক রুগ্◌ানসসট স্প জানসব। গীবতকববতাট উস্◌ি◌ি ও সমাবনাট ◌্া◌্াগসলা অনুরাবন কটসত বিখসব। গীবতকববতা ও আখিান কাসবিট স্প ও পা◌ে◌্কি বুঝসব। উবনি িতসকট ◌্বিলা কববসবট সমসক্ জানসব। উবনি িতকীয প্কাবিটীবত ববচাট কটসত বিখসব।

◌ে◌া◌্◌ে◌া◌্◌ীসবট এই স্◌্ সাবিসতিট সসা পবটচয কবটসয থবওযাট উস্সি◌ি এই অং◌িবি সংরুক কটা ি◌সযসে।

এই পসব্ েোা্েোা্ীটা, কাবিনাি্ি ও নাি্িকাবি সমসক্ জানসব। নাি্িকাবি ও কাবিনাসি্িট স্প ও ববববি্ি জানসব। নাি্িকাবি স্বিট ববববচ্ি সমসক্ জানসব। কাবিনাি্ি স্বিট ববববচ্ি সমসক্ জানসব। কাবিনাি্ি ও নাি্িকাসবিট তত, সতি, গঠন ও বিবল সমসক্ জানলাভ কটসব। নাি্িকাবি ও কাবিনাসি্িট বিপ্ল সমসক্ জানসব।

(ক) উবনি ি্তসকট কাবি

বীটানা কাবি – ্োইসকল ্রুস্বন ব্ (বনব্াবচত)

বুষসযট পবত ি্কু যলা; থসাস্ট পবত তাটা; বিটসেট পবত থককযী; পুরটবাট পবত উব্ি্ী; নীলধসজট পবত জনা

সাটবা্াল – ববিাটীলাল চকবত্ী।

(খ) কাবিনাি্ি ও নাি্িকাবি

কণ্কু যী সংবাব - টবীননাে ঠাকু ট

গারাটীট আসববন– টবীননাে ঠাকু ট

অনী্ অানা – বুসবব বসু।

Semester - 4th

COURSE CODE - BABNGMJ402

COURSE NAME - UNISH SHATAKER PRABANDHA O GEETI KAVITA

COURSE TYPE- MEJOR	Course Details- MJC-6			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/৫ [MJC-6]

SEMESTER- 4TH

COURSE NAME-- UNISH SHATAKER PRABANDHA O GEETI KAVITA
উবনি িতসকট পবর ও গীবতকববতা

COURSE CODE- BABNGMJ402

এই পসব্ েোি্েোি্ীটা, উবনি িতসকট বাংলা পবসরট ইবতিাস জানসত পাটসব। থফাি্ উইবলয্ কসলজ থেসক টবীননাে থেসক বাংলা পবসরট ববববচ্ি জানসব। উবনি িতসকট পবর টচনাট ববববিি অবগত িসব। উবনি
িতসকট পবর সাবিসতিট স্প জানসব। পবর থলখাট অবভজান লাভ কটসব। উবনি িতসকট পবসরট বিবল ও ভাষা সমসক্ অববিত িসব। উবনি িতকীয স্াসজট কো জানসব। উবনি িতসকট ব্তীযাসর্ বাংলা পবর-বনবর টচনাট রুগগত পিভ্ ব্ জানসত পাটসব। সা্বজক কু সং্াট, টীবতনীবত ও নবি বিবকত বাংলাট রুবস্াসজট পবটচয পাসব। স্কালীন স্াজ ও পটারীন বাংলাট বুব্িাট কো জানসব। পবর টচনাট থকদিল বিখসব। সাবিতি ববষযক পবসরট বাি্বনক ভাবনা ও স্াজসচতনাট পবটচয পাসব। উবনি িতসকট পবর টচনাট ববষয ও টচনাটীবত সমসক্ জানলাভ কটসব।

এই পসব্ েোি্েোি্ীটা, গীবত কববতাট স্প, ববববিি ও থশবণববভাগ সমসক্ জানসব। গীবত কববতাট বিবল ও গীবতকাসবিট তু লি্লি ববচাট কটসত পাটসব। কাসবিট ভাষা, েন-অলংকাট সমসক্ ববস্ষণ কটসত পাটসব। গীবতকাসবিট কাবিবন সংসরাগ ও সাতনি বচনসত পাটসব। গীবত কববতাট ্সরি কববরস্্ট স্প খুঁসজ পাসব। বাংলা গীবত কববতাট ্সরি থট্াি্াবসক থচতনা, নাটীসচতনা, সাসববিকতা থবার ও পা্াতি পভাসবট কো জানসত পাটসব। গীবত কববতাট উস্িি ও সমাবনাট ্াি্াগসলা অনুরাবন কটসত বিখসব। গীবত কববতা ও আখিান কাসবিট স্প ও পাে্কি অনুরাবন কটসব। বাংলা আখিানকাবি ও গীবত কববতাট ইবতিাস জানসত সসচি িসব। বাংলা সাবিসতি উবনি
িতসকট আখিান কাসবিট থর রাটাবি বেল তাট ্সরি নবীনচন থসসনট ‘পলাি্ীট রু’ একবি গররপ্ণ্ অরিায। এই থকাসস্ থস ববষযবি জানাট সুসরাগ টসযসে।

উবনি িতসকট পবর

ক. ক্লাকাসযট ব্ট- ববঙ্চন চসটাপারিায (বনব্াবচত)

্নুষিফল, ববড়াল, বসসযট থকাবকল, ক্লাকাসযট থজাবানবনী, বড়বাজাট

খ. পঞ্চভ্ত – টবীননাে ঠাকু ট (বনব্াবচত)

পবটচয, ্ন, থকদতু কিাসি, গবি ও পবি, নটনাটী

গ. গীবত কববতা

ঈশটচন গ্ : সসবি; থপদষপাব্ন

থ্চিন বসনিাপারিায : ভাটতববলাপ; বাঙালীট থ্সয

থবসবননাে থসন : পক্ বত; অদু ত অবভসাট

্রুস্বন ব্ : বাভাষা; ববজযা বি্

অকয কু ্াট বড়াল: শাবসণ;

্রিাসহ বগটীন থ্াবিনী বাসী : শাবসণ;

্াত্ সস্া্

Semester - 4th

COURSE CODE - BABNGMN401

COURSE NAME - BANGLA KAVITA O BANGLA PRABANDHA

COURSE TYPE- MINOR	Course Details- MNC - 4			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

্ইনট থকাস্/৪

[MNC-4]

SEMESTER- 4TH

COURSE NAME-- BANGLA KAVITA O BANGLA PRABANDHA
বাংলা কববতা ও বাংলা পবর

COURSE CODE- BABNGMN401

এই পসব্ েোি্েোি্ীটা উবনি িতসকট কববতা ভাবনা এবং ববি িতসকট পে্ ববশরু্ পটবত্ী বাংলা কববতাট গবতপক্ বত সমসক্ জানসত পাটসব। বাংলা কাসবি কস্াল রুগ স্াত বাসবতা-পবতবাবী থচতনাট পবটচয জানসত পাটসব। সাবিবতিক আসনালন ও ্তবাসবট পবটচয পাসব। কববতাট বিবল সংকায নানা আরুবনক ববিবিি জানসত পাটসব। গবি-কববতাট বনয্ জানসব। রুগগত ি্নিতাট স্প জানসত পাটসব। েোি্েোি্ীটা আরুবনক কববতা টচনাট থপটণা পাসব।

এই পসব্ েোি্েোি্ীটা, পবর টচনা, ট্িটচনাট স্প এবং ববিবিি অবগত িসব। বাংলা গবিসাবিতি ও পবর সাবিসতিট স্প জানসব। পবর থলখাট অবভজান লাভ কটসব। পবসরট বিবল ও ভাষা সমসক্ অববিত িসব। পবর টচনাট থকদিল বিখসব। আরুবনক বাংলা সাবিসতিট কালসী্ ও রুগলকণ জানসব। সাবিতি ববষযক পবসরট বাি্বনক ভাবনা ও স্াজসচতনাট পবটচয পাসব। বাংলাট সং্ বত ও আরুবনক সাবিসতিট পবটচয পাসব। পবর টচনাট ববষয ও টচনাটীবত সমসক্ জানলাভ কটসব।

বাংলা কববতা

ক. সবঞতা - নজরল ইসল্

ববসদাি্ী, নাটী(স্াি্বাবী),ফবটযাব,কাভাটী হঁবিযাট, থগাপন বপযা।

খ.আরুবনক কববতা সঞযন (ব.বব পকাবিত)

বনলতা থসন– জীবনানন বাি; সংগবত - অব্য চকবত্ী, ি্াবটসয - থপন্ন ব্, একখানা ি্াত - বুসবব বসু, উলা টাজা - নীসটননাে চকবত্ী, বপযত্াসু - সুকায ভটাচার্, বাবসটট পাে্না - ি্ঙ থলাষ।

গ. বাংলা পবর (বর্্ান ববশববববিালয পকাবিত)

থলাক বিকা - ববঙ্চন চসটাপারিায, অ্াসবট ভাষাসঙি - প্ে থচদরুটী, পাবটবাবটক নাটী স্সিা - অনবাি্ঙট টায, সয পসা - ্ীট ্ি্াটটফ থিাসসন, বাংলাট বত - অবনীননাে ঠাকু ট।

SEMESTER- 4TH

SKILL ENHANCEMENT COURSE (SEC)

COURSE NAME- **ANUBAD CHARCHA (ENGREGI THEKE BANGLA)**

COURSE CODE- BAHBNGSE402

COURSE TYPE-SE	Course Details- SEC-2			L.T.P – 4-0-0	
	Full	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
Credit – 4	Marks: 50	--	10	--	40

থকাস্/৩ [SEC-3]

SEMESTER- 4TH

SKILL ENHANCEMENT COURSE (SEC)

COURSE NAME- **ANUBAD CHARCHA (ENGREGI THEKE BANGLA)**

COURSE CODE- BABNGSE401

COURSE TYPE-SE	Course Details- SEC-3			L.T.P – 2-1-0	
	Full	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical

Credit – 3	Marks: 50	--	15	--	35

থকাস্/৩ [SEC-3]

অনুবাব চচ্া (ইংসটবজ থেসক বাংলা)

ANUBAD CHARCHA (ENGREGI THEKE BANGLA)

এই থকাসস্ট ্রি ববসয েোে্েোে্ীটা, অনুবাসবট উপসরাবগতা সমসক্ জানসব। বাংলা সাবিসতি অনুবাসবট ইবতিাস সমসক্ জানসব। অনি ভাষা থেসক (ইংসটবজ থেসক বাংলায) অনুবাব কটসত বিখসব। ্্ল পাসঠিট আকবটক অনুবাসবট সসা ভাবানুবাসবট প্বতও বিখসব। এই থকাস্বি তাসবট বিবিাবটক জীবন ও জগসতট নানাসকস্ থ্াকাববলা কটসত সাি্ারি কটসব। একই সসা েোে্েোে্ীসবট ববববভনসকস্ চাকবট পাবাট বিাপাসট সাি্ারিকাটী ভ্ ব্কা থনসব।

অনুবাব চচ্া (ইংসটবজ থেসক বাংলা)

ক. অনুবাব তত

খ. ্্লানুগ

অনুবাব গ.

ভাবানুবাব

SEMESTER- 5TH

COURSE NAME- UNISH-BISH SHATAKER KAVITA

COURSE CODE- BABNGMJ501

COURSE TYPE- MAJOR	Course Details- MJC-7			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

।। থসস্সাট -৫।।

থ্জট থকাস্/৭ [MJC-7]

উবনি-ববি িতসকট

কববতা

UNISH-BISH SHATAKER KOVITA

বাংলা কববতা শর্ক্া্ ভাটতবসষ্ট ইবতিাসস নয, ববশসাবিসতিট ইবতিাসসও সান বখল কসটসে। উবনি-ববি িতসকট বাংলা কববতা স্্বট বিখসট থপঁোয। উবনি িতসকট কাবির্্ ও কববরস্্ট স্প জানসত পাটসব। উবনি িতসকট কাসবি নাটীসচতনা ও পা্াতি পভাব জানসত পাটসব। উবনি িতসকট কাসবি অব্্াকট েসনট সসা রুবকট ভাষা ও পবতবাবী থচতনাট স্প বচনসব। উবনি িতসকট আরুবনক রুগ্্ানসসট স্প বচনসব। গীবতকববতাট উস্্িি ও সমাবনাট ্্া্্াগসলা অনুরাবন কটসত বিখসব। কাবিবচযাট থকস্ থপদটাবণক ও থট্া্িাবসক ভাবনাট পবটচয লাভ কটসব। ববি িতসকট কববতায ববর্ত ্্ানববচযা, পক্ বত ও থসদনর্বচযা, ঈশটবচযা ও আবসকিসবাসরট স্প জানসত পাটসব। ববি িতসকট কববতাট ্সরি তত, সতি, ববববচ্ি ও বিবল সমসক্ জানলাভ কটসব। এই পসব্ েো্েো্ীটা, ববি িতসকট কববতাট ্সরি জীবন ও ববশসসতিট িাশত পবটচয জানসত পাটসব। আরুবনক কববতাট স্প জানসত পাটসব। পাচি ও পা্াতি কাবিভাবনাট গবতপক্ বত বুঝসত পাটসব। কববতা ববস্ষণ কটসত বিখসব। ববশরু্ ও ্্ানবসভিতাট সংকি সমসক্ জানসত পাটসব। কববতাট বিবল ও তাট ববববত্ন অনুরাবন কটসত পাটসব। এই বুই িতসকট বাংলাট কবব ও তাসবট কববতাট গবতপক্ বতট সসা পবটচয কবটসয থবওযাট উস্সিি এবিসক পাঠিস্বচসত সংরুক কটা িসযসে।

উবনি-ববি িতসকট কববতা

ক. সঞ্চবযতা – টবীননাে ঠাকু ট (বনব্াবচত কববতা)

থসানাট তটী, ববাায অবভাপ, অবভসাট, ক্ পণ, ভাটততীে্, বাঁবি, েবব, িাজাি্ান, ্ানবপু, সুটবাসসট পাে্না,ঝু লন, উব্ি্ী, বুঃস্য, এক গাঁসয, থিষ বচবঠ।

খ. আরুবনক কববতা সঞ্চযন – বর্্ান ববশববিালয পকাবিত (বনব্াবচত)

আিবেট আসগট একববন– জীবনানন বাি; আ্াট বকবফযয – কাজী নজরল ইসল্; িাশতী – সুরীননাে ব্; সংগবত-অব্য চকবত্ী,জং - থপন্ন ব্্, টবীননাে - অবচযিকু ্াট থসনগ্, একখানা িাত - বুসবব বসু, থলাড়সওযাট - ববষু থব, রত ব্সটই রাই - সুভাষ ্ুসখাপাারিায, রুস্ট ববরস্ - বীসটন চসটাপাারিায, কলকাতাট রীশ– নীসটননাে চকবত্ী, বপযত্াসু - সুকায ভটাচার্, থরসত পাবট বকন থকন রাব? – িবক চসটাপাারিায; টারাচ্ড়া– িঙ থলাষ, রবব বনব্াসন বাও - সুনীল গস্যাপাারিায।

SEMESTER- 5TH

COURSE NAME- SAHITYA-TATTWA EBONG UNISH-BISH SHATAKER UPONYAS

COURSE CODE- BABNGMJ502

COURSE TYPE-MAJOR	Course Details-MJC-8			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/৮ [MJC-8]

সাবিতিতত এবং উবনি-ববি িতসকট উপনিাস

SAHITYATATTWA EBONG UNISH - BISH SHATAKER UPONYAS

এই পসব্ েোা্েোা্ীটা, কাসবিট স্প ও লকণ বচনসব। ভাটতীয অলংকাটবাসবট বববচ্ি জানসব। কাসবিট পাণ অনুসরান কটসত পাটসব। কাবিববচাট কসট তাট ্্লর্্ বনণ্য কটসত বিখসব। কাসবিট প্ণ্তা অনুরাবন কটসত বিখসব। কাবিতসতট নানা পসান- ধবনবাব, টসবাব, টীবতবাব সমসক্ অববিত িসব। টসববচাট কটসত বিখসব। কাবিনিবল ববচাট কটসত বিখসব। ভাটতীয অলংকাটতসতট ববকাসিট ইবতিাস জানসব। পা্াতি সাবিতি পসান সমসক্ জানসব। পা্াতি টীবত বাংলা সাবিসতি কী পভাব থফসলসে জানসত পাটসব। আরুবনক সংসকত ও পতীক্য সাবিসতিট বব্্ত্ সতি উপলব্ কটসব। সাবিসতি উপাবান, অনয ও ববব্ন্্াণ ববস্ষণ কটসব। পা্াতি কাবিতত সমসক্ অববিত িসব। ্িোকাবি ও অনিানি কাবিনিবল সমসক্ জানসব। টাসজবি তত সমসক্ জানসব। অনুকটণ তত সমসক্ জানসব। পা্াতি নাি্িতত সমসক্ জানসব। সাবিসতিট নানা সাইসলট লকণ বচনসত পাটসব। সাবিতিতত সাবিতিপাসঠ সিাযক ও গররপ্ণ্ তত। ভাটতীয ও পা্াতি সাবিতিতসতট নানা ্তাব্ি ও
্তবাবসক েোা্েোা্ীসবট জানাসনা বসল খুবই জরবট বসল ্সন িয। থসই উস্্িিসক স্াসন থটসখ ববষযবিসক পাঠিস্বচসত টাখা িসযসে। উপনিাসসট স্চনা পসব্ট ইবতিাস পসড় স্্্ িসব। উপনিাসসট সংজা, ববববি্ি, থশবণববভাগ ও পাচি-পা্াতি উপনিাসসট ্পসটখা জানসব। বাংলাট বচটাচবটত স্াসজ পা্াতি সং্্ বতট পভাব সমসক্ জান অজ্ন কটসব। ববি িতসকট বাংলা উপনিাসসট স্াজ বচযাট ্পসটখা সমসক্ জানসত পাটসব। বাংলাট প্ীজীবসনট তো িহসটজীবসনট জবিল গবতপক্ বত- ্্ানসপক্ বত গঠসনট ববববচ্ি বচযাভাবনাট সী্বতা জানসত পাটসব। বাংলা উপনিাসসট কালসচতনা সমসক্ জানসত পাটসব। উপনিাস পাসঠ জীবন থচতনা ও বচটাযত জীবনসবাসর পুি িসব বিকা্েী্ন। আরুবনক উপনিাসসট বিবল সমসক্ বিখসব।

সাবিতিতত

ক. কাবিবজজাসা – অতু লচন গ্

(বনব্াবচত) ধবন, টস

খ. সাবিসতিট ্প ও টীবত - কাবসবসজি; থটা্বসবসজি; বসমবলজি; এবপক; টাসজবি; কস্বি; ফাস্, সুটবটযাবলজি।

উপনিাস

ক. ক্ ষকাসযট উইল - ববঙ্চন চসটাপারিায

খ. চাট অরিায - টবীননাে ঠাকু ট

SEMESTER- 5TH

COURSE NAME- Rabindranather Galpo Ebong Rabindrottor Chhotogalpo

COURSE CODE- BABNGMJ503

COURSE TYPE- MAJOR	Course Details-MJC-9			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/৯ [MJC-9]

টবীননাসেট গপ এবং টবীসন্ট থোসিাগপ

Rabindranather Galpo Ebong Rabindrottor Chhotogalpo

এই পসব্ েোে্েোে্ীটা, থোসিাগসপট ববববিিি ও স্প সমসক্ জানসব। থোসিাগসপট উদব ও ববকাি সমসক্ জানসব। থোসিাগসপট ববববিিি ও স্প সমসক্ জানসব। থোসিাগসপট তত, স্াজভাবনাট কো জানসত পাটসব।

বাংলা গসপট বন্্াণ বিবল সমসক্ সসচতন িসব। থোসিাগসপট স্য ও গসপট ববষয সমসক্ জানসব। প্ে্ ববশরুস্াি্ট স্াজ সংকিসক অনুভব কটসব। গপকাসটট ্ানস পক্ বত থবাঝাট থচিা কটসব। ্ানব চবটস্ট ব্ত স্াট পবটচয পাসব।সোসিাগসপট ববব্চ্ি, তত, বন্্াণ, স্াজভাবনা ও বচটাযত আসববন অনুভব কটসত পাটসব। বাংলা থোসিাগসপট বন্্াণ বিবল সমসক্ জানসব। আরুবনক কাসলট স্য ও রুগলকণ সমসক্ অববিত িসব। আরুবনক রুসগট ববপনতা ও সংকিসক বুঝসত বিখসব। ঔপবনসববিকতা ও উ্ট উপবনসবিবাব সমসক্ অববিত
িসব। একাসলট স্য থচতনা ও স্াজতত সমসক্ জানসব। আরুবনক গসপট ববষয ববব্চ্ি জানসব। থচতনাপবাি্র্ী থলখা বচনসত বিখসব। উপবনসবি উ্ট রুসগট লকণ বচনসত পাটসব। বাংলা গপপাসঠট ্রি ববসয বাংলা গসপট স্প উদাবন কটসত পাটসব। েোি্েোি্ীটা গপ থলখাট থপটণা পাসব। একাবরক আযজ্াবতক ্াসনট থোসিাগপকাসটট আববভ্াব িসযসে বাংলা সাবিসতি। এই থোসিাগপকাট ও তাসবট থোসিাগসপট সসা েোি্েোি্ীসবট পবটচয কবটসয থবওযাট জনি ববষযবি সংরুক কটা িসযসে।

ক. গপগ্– টবীননাে ঠাকু ট : (বনব্াবচত)

কঙাল, িোবস, এক টাব্, স্াব্, গ্রন, বুটাোিা, অবতবে, শীট প্, ্রিববত্নী ,

্াসাট্োিাই **খ. একাসলট গপ- বর্্ান ববশববিালয পকাবিত : (বনব্াবচত গপ)**

পুঁই্াচা- ববভ্ বতভ্ ষণ বসনিাপারিায; ফবসল– সুসবার থলাষ; টস– নসটননাে ব্; থিাপ– নাটাযণ গস্াপারিায; আবাব– স্সটি বসু; সাঁঝ সকাসলট ্া– ্িাসশতা থববী; অশস্সরট থলাড়া- বীসপননাে বসনিাপারিায; ইঁবুট– থসান্ন চন, থতসলনাসপাতা আববষাট - থপন্ন ব্, চ্ড়্বণ উপাখিান - সুনীল গস্াপারিায ।

SEMESTER- 5TH

COURSE NAME-Bangla Uponyas O Natak

COURSE CODE- BABNGMN501

COURSE TYPE- MINOR	Course Details-MNC-5			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

্াইনট থকাস্/৫ [MNC-

5] বাংলা উপনিাস ও

নাি

BANGLA UPONYAS O NATAK

বাংলা উপনিাস অবত স্্ ও গররপ্ণ্। এই পসব্ েোা্েোা্ীটা, আরুবনক উপনিাসসট সংজ্া, ববববিি, থশবণববভাগ সমসক্ জানসত পাটসব। বাংলা উপনিাসসট জসনট ইবতিাস জানসব। বাংলা উপনিাস পাসঠট সসা সসা প্াতি উপনিাসসট ্পসটখা ববষসযও জানসব। বাংলা উপনিাসসট উদব ও ববসাসটট কো জানসব। স্কালীন নকিা জাতীয টচনাট পট আরুবনক বাংলা উপনিাসস তযকালীন স্াজভাবনা, বাংলাট জীবনটীবতট পবটচয পাসব। বাংলাট বচটাচবটত স্াসজ প্াতি সং্ বতট পভাব সমসক্ জান অজ্ন কটসব। আরুবনক বাংলা উপনিাসস স্াজবচযাট
্পসটখা বন্্াণ সমসক্ জানসত পাটসব। ববববিি রুসগট সংকসিট কো জানসব। থলখসকট জীবন-বিসনট কো জানসব। আরুবনক বাংলা উপনিাস পাসঠ থবিকাল ও সাবিতি সমসক্ সসচতন িসব।

বাংলা নাি ও নাি্সঞট ইবতিাস জানসত পাটসব। প্াতি নািিসাবিসতিট অবভনয কলা সমসক্ জানসব। ্সঞ অবভনয কটসত উযসাি্ী িসব। থপদটাবণক, সাবজক, ঐবতিাবসক নাি ও পিসসনট স্প সমসক্ জানসত পাটসব। উবনি িতকীয স্াসজট কো জানসব। উবনি িতসকট ব্তীযাসর্ বাংলা নাি টচনাট রুগগত পিভ্ ব্ জানসত পাটসব। সাবজক কু সং্াট, টীবতনীবত ও নবি বিবকত বাংলাট রুবস্াসজট পবটচয পাসব। স্কালীন স্াজ ও পটারীন বাংলাট বুব্িাট কো জানসব। বাংলা নািসকট জাতীযতাসবার উপলব্ কটসব। স্কালীন নাি্ি অবভনয এবং নাি্িববসদাি সমসক্ অববিত িসব। ববি িতসকট বাংলা নাি ববষয ববববচস্ি, লিনা পটমটায
্তাবস্ ও আবাসক খুবই স্্। গণনািসকট পবটচয পাসব ও নবনািসকট পবটচয পাসব। পবতবাবী থচতনাট কণসট বচনসত পাটসব। জব্বাবট িাসসনট অবসান ও পঞাসযতটাসজট পবটচয লাভ কটসব। বুই ববশরু ও থসই অবভলাসত স্ি সাবিসতিট গবতপক্ বত জানসব। থবিভাগ ও সারীনতা উট স্াজ পবটবত্সনট পিভ্ ব্ জানসব। উপবনসবি ও সাবিসতিট গবতপক্ বত বুঝসত সক্ িসব।

উপনিাস :

ক. ব্া - িটযচন চসটাপারিায

খ. পসেট পাঁচাবল - ববভ্ বতভ্ ষণ বসনিাপারিায

নাি:

ক. ্াবলনী - টবীননাে ঠাকু ট

খ. থববী গজ্ন - ববজন ভটাচার্

SEMESTER- 6TH

COURSE NAME Adhunik-Bangla Uponyas

COURSE CODE- BABNGMJ601

COURSE TYPE- MAJOR	Course Details-MJC-10			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১০ [MJC-10]

আরুবনক বাংলা উপনিাস

Adhunik Bangla Uponyas

ববি িতসকট বাংলা উপনিাস অবত স্ ও গররপ্ণ্। এই পসব্ েো্েো্ীটা, আরুবনক উপনিাসসট সংজা, ববিবিি, থশবণববভাগ সমসক্ জানসত পাটসব। বাংলা উপনিাসসট জসনট ইবতিাস জানসব। বাংলা উপনিাস পাসঠট সসা সসা প্াত্তি উপনিাসসট ্পসটখা ববষসযও জানসব। বাংলা উপনিাসসট উদব ও ববসাসটট কো জানসব। স্কালীন নকা জাতীয টচনাট পট আরুবনক বাংলা উপনিাসস তযকালীন স্াজভাবনা, বাংলাট জীবনটীবতট পবটচয পাসব। বাংলাট বচটাচবটত স্াসজ প্াত্তি সং বতট পভাব সমসক্ জান অজ্ন কটসব। আরুবনক বাংলা উপনিাসস স্াজবচযাট ্পসটখা বন্াণ সমসক্ জানসত পাটসব। ববিবি রুসগট সংকসিট কো জানসব। থলখসকট জীবন-

ব্িসনট কো জানসব। আরুবনক বাংলা উপনিাস পাসঠ থবিকাল ও সাবিতি সমসক্ সসচতন িসব। টাঢ় বাংলাট জীবসনট ববব্ত্ন সমসক্ জানসব। োাো্ বাংলা তো আটণি জীবন এবং নাগবটক জীবসনট জবিল গবতপক্ বত-

্ানসপক্ বত গঠসনট ববব্চ্ি বচযাভাবনাট সী্বতা জানসত পাটসব। স্াযতসনট পট স্াজতসনট উপ বাংলা উপনিাসসট কালসচতনা সমসক্ জানসত পাটসব। উপনিাস পাসঠ জীবন থচতনা ও বচটাযত জীবনসবাসর পুি িসব বিকাে্ী্ন। আরুবনক উপনিাসসট বিবল সমসক্ বিখসব। আরুবনক উপনিাসসট ভাষাটীবত সমসক্ অোি্ী িসব। ববি িতকীয উপনিাস বচযাট পবটচয পাসব। ববি িতসকট উপনিাস বন্্াসণ ঔপনিাবসসকট বিবকসাতসনিট পবটচয পাসব। আব্িাসবট সসা থভাগবাসবট বচনসত বিখসব। িাশত জীবনসবাসরট রাটণা লাভ কটসব। ববি িতসকট বাংলা উপনিাসসট নানা অবভ্ুখ ও থলখসকট সসা াোটৌ্সবট পবটচয কবটসয থবওযাট ববষযবি পাঠিস্বচসত অযভু ্ক কটা িসযসে।

আরুবনক বাংলা উপনিাস

ক. শকায (৪ে্ পব্)– িটিযচন

চসটাপারিায **খ. আটণিক–** ববভ্ বতভ্ ষণ

বসনিাপারিায

গ. িাম - কালক্ি

ল. টহ চ্াসলট িাড় - অবভবজয থসন

SEMESTER- 6TH

COURSE NAME - Tarashankar O Manik Bandyapadhyayer Nirbachit Galpo

COURSE CODE- BABNGMJ602

COURSE TYPE-MAJOR	Course Details-MJC-11			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১১ [MJC-11]

তাটাি◌ঙট ও ্াবনক বসনিাপারিাসযট বনব্াবচত গপ

Tarashankar O Manik Bandyapadhyayer Nirbachit Galpo

এই পসব্ েোা্েোা্ীটা, থোসিাগসপট ববববিি ও স্প সমসক্ জানসব। থোসিাগসপট উদব ও ববকাি সমসক্ জানসব। তাটাি◌ঙট ও ্াবনক বসনিাপারিাসযট থোসিাগসপট ববববিি ও স্প সমসক্ জানসব। তাটাি◌ঙট ও ্াবনক বসনিাপারিাসযট থোসিাগসপট তত, স্াজভাবনাট কো জানসত পাটসব। বাংলা গসপট বন্্াণ বিবল সমসক্ সসচতন

িসব। তাটাি◌ঙট ও ্াবনক বসনিাপারিাসযট থোসিাগসপট স্য ও গসপট ববষয সমসক্ জানসব। প্ে্ ববশরুস্াা্ট স্াজ সংকিসক অনুভব কটসব। গপকাসটট ্ানস পক্ বত থবাঝাট থচিা কটসব। ্ানব চবটস্ট ব্ত স্াট পবটচয পাসব।

ক. তাটাি◌ঙসটট গপ – (তাটাি◌ঙসটট থশিগপ- জগবীি ভটাচার্ সমাববত) বনব্াবচত

জলসালট, থবসবনী, খাজাঞ্চীবাবু, না, নাটী ও নাবগনী, িাইনী, অোবানী,তাবটনী ্াববঝ, থববতাট বিাবর, আখড়াই এট ববববল ।

খ. ্াবনক বসনিাপারিাসযট গপ– (্াবনক বসনিাপারিাসযট থশতগপ - রুগাযট চকবত্ী সমাববত) বনব্াবচত

পানগবতিাবসক, কু তসটাগীট বউ, সটীস্প, ি ীচাট, িলুবসপাড়া, বিপী, ি াটাসনট নাতজা্ই,থোিবকু লপুসট রী্, আতিতিাট অবরকাট।

SEMESTER- 6TH

COURSE NAME - Patra Sahitya O Atmajiboni

COURSE CODE- BABNGMJ603

COURSE TYPE- MAJOR	Course Details-MJC-12			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১২ [MJC-12]

প্সাবিতি ও আতজীবনী

Patra Sahitya O Atmajiboni

প্ সাবিতি ও আতজীবনী, বাংলা সাবিসতি এক স্্ি িাখা। প্ বকভাসব সাবিসতিট ্াা্া পায তা বাংলাট অসনক সাবিবতিসকট বলবখত পস্ট ্সরি ববসয তাট পবটচয পাওযা রায। ববসিষ কসট টবীননাসেট বলবখত প্ – অবতস্্ি ও সাবিতিগসণ ভাসট। এই স্্ি সাবিতি িাখাট সসা েোা্েোা্ীসবট পবটচয কটাসনা আবিক বসল ্সন
িয। তাোড়া বাংলা ভাষাট বলবখত আতজীবনী সাবিতি স্সা্বযক থবিকাল পিভ্ ব্ট অ্ ববলল। এই স্্ি বুই িাখাট সসা েোা্েোা্ীসবট পবটচয কবটসয থবওযাট জনি ববষযবি পাঠিস্বচট অযভু ্ক কটা িসযসে।

প্সাবিতি ও আতজীবনী

ক. বেনপ্ – টবীননাে ঠাকু ট (বনব্াবচত ৬বি প্) ২০, ৩০,৩৬, ৪৩, ৬৪, ৬৭ সংখিক

প্। **খ. থেসলসবলা** - টবীননাে ঠাকু ট

গ. সকাল থবলাট আসলা - িঙ থলাষ

SEMESTER- 6TH

COURSE NAME - Loksanskriti - Loksahitya Ebong Moimonsingha Geetika

COURSE CODE- BABNGMJ604

COURSE TYPE- MAJOR	Course Details-MJC-13			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৩ [MJC-13]

থলাকসং্ বত - থলাকসাবিতি এবং ব্নবসংি গীবতকা

Loksanskriti - Loksahitya Ebong Moimonsingha Geetika

এই পসব্ েলা্েলা্ীটা, থলাকসং্ বত ও থলাকসাবিতি বাংলাট ঐবতিি, পটমটা ও সং্ বতট গররপ্ণ্ উপাবান। বাংলাট থলাকসং্ বত ও থলাকস্াসজট অববান বাংলা সাবিসতি সুসিভাসব পবটলবকত িয। এই সুস্ ঐবতিি, আচাট, অনুতান, প্জা-পাব্ন, সংগীত, রা্ বাংলাট ক্ বিসক তু সল রসট। েলা্েলা্ীসবট সসা এই স্ পটমটাট সসা থরাগ লবিসয থবওযাট জনি এই ববষযবি পাঠিস্বচট অযভু ্ক কটা িসযসে।

থলাকসং্ বত - থলাকসাবিতি এবং ব্নবসংি

গীবতকা ক. থলাকসং্ বত : সংজা, স্প, ববিবিি ও ববভাজন

ভাবু, িু সু, ভাওযাইযা,ঝু ্ুট,

ভাবিযাবল। **খ. থলাকসাবিতি** : সংজা,

স্প ও ববববিিি

েড়া, রাঁরাঁ, পবাব-পবচন, থলাককো, থলাকগাোো।

গ. থলাকনাি্ক : আলকাপ, থলসা, থেদ, নাি্ু যা, ্ুাোোবন।

ব্্নবসংি গীবতকা (বীসনিচন থসন সমাববত) : চনাবতী, কঙ ও লীলা .।

SEMESTER- 7TH

COURSE NAME - Bish Shataker Gadya O Probandha

COURSE CODE- BABNGMJ701

COURSE TYPE-MAJOR	Course Details-MJC-14			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৪ [MJC-14]

ববি িতসকট গবি ও পবর

Bish Shataker Gadya O Probandha

এই পসব্ েোো্েোো্ীটা, গবি সাবিসতিট ইবতিাস সমসক্ জানসত পাটসব। গবি সাবিসতিট উদব ও ইবতিাস সমসক্ জানসত পাটসব। গবি টচনাট স্প ও ববববিিি সমসক্ জানসত পাটসব। উবনি িতসকট গবি টচনাট পব্ থপবটসয এসস ববি িতসকট গবি টচনাট স্প ববসলট ইবতিাস জানসব। গবি বিবল সমসক্ অবগত িসব। গবিসাবিসতিট ববববভন পর্াসযট সসা পবটবচত িসব।

এই পসব্ েোে্েোে্ীটা, পবর পড়সত বিখসব। পবর ববস্ষণ কটসত বিখসব। পবর বলখসত বিখসব। বাংলা পবর সাবিসতিট উদব ও ববকাি পসব্ট কো জানসব। পবসরট ্রি ববসয স্কাসলট স্াজ, সাবিতি ও সং্্ বতট পবটচয পাসব। বাংলা পবর টচনাট স্চনা পব্ থেসক বত্্ান স্য পর্য বাংলা পবর টচনাট বিবলট সসা পবটবচত িসব। পাববরকসবট পবর টচনাট টচনাটীবত ও ববষয সমসক্ জানসব। উবনি িতসকট পবসরট ববব্চি সমসক্ জানসব। ববি িতসকট পবসরট ববব্চি সমসক্ জানসব।

ক. টাজকাবিনী– অবনীননাে ঠাকু

ট খ. চাচাকাবিনী– বসযব ্ুজতবা

আলী

গ. বাংলা পবর – (বর্্ান ববশববিালয পকাবিত) বনব্াবচত

আ্াসবট ভাষা সংকি- প্ে থচদরুটী, পাবটবাবটক নাটী স্সা– অনবাি্ঙট টায, সয পসা- ্্ীট ্িাটটফ থাসসন, বাংলাট বত– অবনীননাে ঠাকু ট, জাবত, সং্্ বত ও সাবিতি– সুনীবতকু ্্াট চসটাপারায।

SEMESTER- 7TH

COURSE NAME -Bangla Shishu Sahitya O Aloukik Galpo

COURSE CODE- BABNGMJ702

COURSE TYPE- MAJOR	Course Details-MJC-15			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৫ [MJC-15]

বাংলা বিশসাবিতি ও অসলদবকক গপ

Bangla Shishu Sahitya O Aloukik Galpo

বাংলা সাবিসতিট ্্ল রাটা গবলট সসা অনি রাটাট গপ-উপনিাসসট পাচু র্ লকি কটা রায। এগবলট ্সরি উস্খসরাগি িসলা অসলদবকক গপ এবং কপকাবিনী। এই পসব্ টবীননাে, পটশট্ , িটববনু এবং সতিবজয টাসযট অসলদবকক গপ গবল বিকাে্্ীসবট ্সরি কপনাি্বক বা ই্াবজসনিন বাড়াসত সাি্াির কটসব। থকবল্াে্ সা্বজকতা, পাবটবাবটক কো, টাজনীবত , গভীট ্সনাস্ীকণ বাসবতা , জীবন সংোোে্ ইতিাবব গরতট ভাবনাট পাি্াপাবি অবসান কসটসে এক অসলদবকক কপজগত। কবঠন বাসবতাট ্সরিও এই জগয উঁবক ববসয রায। অনুভ্ বত পবন ্ন কখসনা কখসনা থসই জগতসক েুঁসয থফসল, পসবি কসট এক অসচনা জগসত , থসখাসন িযসতা

েোসক পাচীন ইবতিাসসট র্সটতা , জনাযট পসা , েোসক এই জীবসনই অনি জীবসনট েোযাপাে অেবা থভদবতক পবটসবি। কখসনা আবাট ফিাসাবস টচনা কটসত চায ্ন , অসলদবকক ক্ কাটখানাট কো ববশাস কটসত চায এই রুবকবাবী আরুবনক ্সনট ্্ানুষটাও। একিা টিস্িয েোয্য ্্ায্য কু সিবলকা েবড়সয পড়সত চাই কখসনা।

্্ানব ্সনট এই অর্সচতন অবসায এই রটসনট কপকাবিনী অসলদবকক গপ বা ফিাসাবসট উব্ট ভ্ ব্। বাংলা সাবিসতিট পবেতরিা সাবিবতিকটা থর্ন অসলদবকক গপ বলসখসেন থত্বন ফিাসাবস বা কপকাবিনী বলসখসেন

ি্ীসষ্নু ্্ুসখাপারিায ও বল্ল কট । এ সমসক্ এই পসব্ বিকাে্্ীটা স্িক অববিত িসব। তাটা বাংলা সাবিসতিট

ববসয টস ও অদুত টস সমসক্ রাটণা লাভ কটসব। কপনা িবকট চচ্ায টচনা বনপুণি ব্ব্ পাসব।

বাংলা বিশসাবিতি গসড় উসঠসে ্পকো, উপকো, ঙ্গিসপট গপ, কপকাবিনী, জাতসকট গপ, পঞ্চতসনট গপ ইতিাববসক অবলমন কসট। টবীননাে থেসক ববকণাট্ন ব্্ ্জুবাট, উসপনবকসিাট টাযসচদরুটী, সুকু ্্াট টায, লীলা ্জুবাট, সতিবজয টায বাংলা আরুবনক বিশ সাবিসতিট রাটাসক পবটপুি ও স্্্ কসটসে। বিকাে্্ীটা বিশ

্নসত ও বিিসবট নানা থখযাল-খুবি, বিিসবট ট্রনু এবং কপন্য অনি ভু বসনট সাব পাসব এই পর্াসয। বিশসাবিসতিট রাটাবাবিক ইবতিাস, ববববিি, ববববি গবিনিলী সমসক্ েোে্েোে্ীটা স্িক রাটণা পাসব। বাসবতাট কবঠন বতকতা ও রনণা থেসক বিশসবট কপজগত অসনক ব্সট। তাসবট অ্ল, বনষলুষ ্ন ফু সি উসঠসে খিাতন্া বিশ সাবিবতিকসবট টচনায। েোে্েোে্ীটা তাট পবটচয পাসব, আট বনসজসবট বসযাব্বট সসা সসা পবটণত

্নষতাট পাি্াপাবি বিশ্নবিও ববব্ পবটসবসিট ্সরি বাঁবচসয টাখাট থপটণা পাসব এই

থকাসস্। **ক. বিশ সাবিতি :**

আসবাল তাসবাল – সুকু ্্াট টায

িলসব পাবখট পালক – লীলা ্জুবাট

গপী গাসযন ও বালা বাসযন – উসপনবকসিাট টাযসচদরুটী

বুসড়া আংলা – অবনীননাে ঠাকু ট

খ. অসলদবকক গপ :

ভু ি্ীট ্াসঠ – পটশট্

্াযা কু টী – িটববনু

বসনিাপারিায খগি - সতিবজয

টায

থবণী স্টট ্ুভু - সুনীল গস্যাপারিায

SEMESTER- 7TH

COURSE NAME - Kalpokahini O Goyenda Kahini

COURSE CODE- BABNGMJ703

COURSE TYPE-MAJOR	Course Details-MJC-16			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৬ [MJC-16]

কপকাবিবন ও থগাসযনা কাবিবন

Kalpokahini O Goyenda Kahini

কখসনা আবাট ফিাসাবস টচনা কটসত চায ্ন , অসলদবকক কা্ কাটখানাট কো ববশাস কটসত চায এই রুবকবাবী আরুবনক ্সনট ্াানুষটাও। একিা টিস্যি েোয্যায ্াায্য কু সিবলকা েবড়সয পড়সত চাই কখসনা।

্ানব ্সনট এই অর্সচতন অবসায এই রটসনট কপকাবিনী অসলদবকক গপ বা ফিাসাবসট উব্ট ভ্ব্। বাংলা সাবিসতিট পবেতরিা সাবিবতিকটা থর্ন অসলদবকক গপ বলসখসেন থত্বন ফিাসাবস বা কপকাবিনী বলসখসেন

িীসষ্নু ্ুসখাপারিায ও বল্ল কট । এ সমসক্ এই পসব্ বিকাে্্ীটা স্িক অববিত িসব। তাটা বাংলা সাবিসতিট ববসয টস ও অদুত টস সমসক্ রাটণা লাভ কটসব। কপনা িবকট চচ্ায টচনা বনপুণি ব্ পাসব।

অনিববসক থগাসযনা কাবিনী সব থশণীট ্ানুষসক বহকাল থেসক আক্ ি কসট আসসে। সিাট আ্াট থকানান ভসযল, আলসফি বিচকক, বাংলায িটববনু বসনিাপারিায, সতিবজয টায, নীিাটট্ন গ্, অদীি বর্ন, থপন্ন ব্, থিন্নকু ্াট টায প্ুখ থলখকসবট রাটাবাবিক থগাসযনা কাবিবনট ইবতিাস ে্াে্ে্াে্ীটা জানসত পাটসব। অপটাসরট রটণ, অপটাসরট বপেসন কাটণ, অপটারীট ্নসত, অপটারীসক বচবহত কটাট থকদিল ইতিাববট জনি তীক বুব্্া, স্াজজান, ্নঃস্ীকণ -এই জাতীয ববিবিিগবল থগাসযনাসবট পসক একায পসযাজন। বিকাে্্ীটা থগাসযনা কাবিনীট ্সরি ববসয ্ানব ্নসত অপটার পবণতা, অপটাসরট ববচাট ববস্ষণ এবং তীক বুব্ চচ্ায অপটারীসক রসট থফলাট বিকা থপসত পাসট, রা তাসবট ভববষিয পাতিবিক জীবসন ও জীববকায সাি্ারি কটসব।

কপকাবিবন : সযং পসফসট িঙু – সতিবজয টায

্সনাজসবট অদুত বাবড় – িীসষ্নু ্ুসখাপারিায

অসলদবকক – বল্ল কট

থগাসযনা কাবিবন : িজারট কাঁি্া - িটববনু বসনিাপারিায

SEMESTER- 7TH

COURSE NAME - Adhunik Oitihasik Uponyas

COURSE CODE- BABNGMJ704

COURSE TYPE-MAJOR	Course Details-MJC-17			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৭ [MJC-17]

আরুবনক ঐবতিাবসক উপনিাস

Adhunik Oitihasik Uponyas

এখাসন পাঠসকট ইবতিাসসট উপাবান অনুসরানই এক্াে্ কাজ িসয উঠসব না থসই সাসে ্ানব জীবন ও স্াজ জীবসনট সাসে ্ানুসষট সমক্ অনুসরান এবং তাট ববব্ কার্ কাটণ সমক্ সাপনও সসচতন পাঠসকট আোি বতবট কটসব। ্ানব স্াজ, নট নাটীট সমক্ ও টাষ বিবসাট ববব্ অবভ্ুখ েোে্সবট জান স্্ কটসব।

ক. থগদড্্াট - িটববনু

বসনিাপারিায খ. টারা - তাটাি্ঙট

বসনিাপারিায

গ. নীল্্সটট থরদবন - থসবলনা থিাসসন

ল. লালবাঈ - ট্াপব থচদরুটী

SEMESTER- 7TH

COURSE NAME - Dinalipi O Bangla Gadya Sahity

COURSE CODE- BABNGMN701

COURSE TYPE- MINOR	Course Details-MNC-6			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

্াইনট থকাস্/৬ [MNC-6]

ববনবলবপ ও বাংলা গবিসাবিতি

এই পসব্ েোা্েোা্ীটা, গবি সাবিসতিট ইবতিাস সমসক্ জানসত পাটসব। গবি সাবিসতিট উদব ও ইবতিাস সমসক্ জানসত পাটসব। গবি টচনাট স্প ও ববিবিি সমসক্ জানসত পাটসব। উবনি িতসকট গবি টচনাট পব্ থপবটসয এসস ববি িতসকট গবি টচনাট স্প ববসলট ইবতিাস জানসব। গবি বিবল সমসক্ অবগত িসব। গবিসাবিসতিট ববববভন পর্াসযট সসা পবটবচত িসব।ববনবলবপ পাঠসকট সাবিতি ভাবনাসক নতু ন অবভ্ুসখ পবাবিত কটসব।তাটা বিবক জীবসন এই ভাবনাট অনুসাটী িসয ববনবলবপ টচনায উযসাবিত িসব। ফসল তাসবট সাবিসতিট স্জনী বকতা ব্ব্ পাসব।

ক. **গবি সাবিতি** : িকু যলা - অবনীননাে ঠাকু ট

চাচাকাবিনী - বসযব ্ুজতবা আলী

খ. **ববনবলবপ :**

স্বত থটখা - ববভ্ বতভ্ ষণ বসনিাপারিায (বনব্াবচত) :

২৭অস্াবট১৯২৪; ৩০এবপল১৯২৫; ২৯জুলাই১৯২৫; ৯অস্াবট১৯২৫; ৪থফবযাবট১৯২৬; ৬থফবযাবট১৯২৭; ৪থসস্মট১৯২৭; ১৬থসস্মট১৯২৭; ১৯নসভমট১৯২৭;৩০নসভমট১৯২৭;১লা ববিাখ১৩৩৫সন; ১লা ্োচ্১৯২৮

পব্ ্ রী্টি িাযাবট - টবীননাে ঠাকু ট (বনব্াবচত):

২৫থসস্মট, ২৬থসস্মট, ২৭থসস্মট, ২৮ থসস্মট, ৩০থসস্মট, ২ অস্াবট, ১১ থফবযাবট, ১২থফবযাবট, ১৩থফবযাবট, ১৫থফবযাবট

SEMESTER- 8th

COURSE NAME - Bangali Jatir Itihas O Sahitya Bhabna

COURSE CODE- BABNGMJ801

COURSE TYPE- MEJOR	Course Details-MJC-18			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৮ [MJC-18]

বাঙাবল জাবতট ইবতিাস ও সাবিতি ভাবনা

Bangali Jatir Itihas O Sahitya Bhabna

বাঙাবল জাবত এবং তাট ইবতিাস ও সাবিতি ববষসয েোৃেোৃীসবট স্িক রাটণা থবওযা এই পস্ট ববসিষ উ্িি। বাঙাবলট সাবিতি ববষসয বভন্ুখী পবনতা ও অবভ্ুখ েোৃেোৃীসবট ্সরি জোত িসব এবং পাসঠট অ্যাি ব্ব্ পাসব। সাবিতি ববষসয তাসবট সসচতনতা বতবট িসব।

ক. বাঙাবলট ইবতিাস - সুভাষ ্ুসখাপারিায

খ. সাবিতি ভাবনা : (১)সাবিতি - টবীননাে ঠাকু ট (বনব্াবচত)

সাবিসতিট তাযপর্, সাবিসতিট সোী্, কাবি : সি এবং অসি, সাবিসতিট উস্িি, সাবিতি ও সভিতা

(২)কাসলট পুতু ল - বুসবব বসু (বনব্াবচত)

থলখাট ই্ু ল, প্ে থচদরুটী ও বাংলা গবি, জীবনানন বাি -এট সটসণ, নজরল ইসল্ ,কাসলট পুতু ল

(৩)কববতাট কো - জীবনানন বাি (বনব্াবচত)

কবতাট কো, টবীননাে ও আরুবনক বাংলা কবতা, কবতাট আতা ও িটীট, কবতা পাঠ, বাংলা কবতাট ভববষিয

SEMESTER- 8th

COURSE NAME - Pramatha Choudhurir Nirbachita Probandha O Bhraman Kahini

COURSE CODE- BABNGMJ802

COURSE TYPE-MEJOR	Course Details-MJC-19			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/১৯ [MJC-19]

প্ে থচদরুটীট বনব্াবচত পবর ও ভ্ণ কাবিবন

Pramatha Choudhurir Nirbachita Probandha O Bhraman Kahini

বাংলা গবিসাবিতি ও পবর সাবিসতিট স্প জানসব। পবর থলখাট অবভজান লাভ কটসব। পবসরট বিবল ও ভাষা সমসক্ অববিত িসব। পবর টচনাট থকদিল বিখসব। আরুবনক বাংলা সাবিসতিট কালসী্ ও রুগলকণ জানসব। সাবিতি ববষযক পবসরট বাি্বনক ভাবনা ও স্াজসচতনাট পবটচয পাসব। বাংলাট সং্ বত ও আরুবনক সাবিসতিট পবটচয পাসব। পবর টচনাট ববষয ও টচনাটীবত সমসক্ জানলাভ কটসব। এোড়া ভ্ণ কাবিবন েোি্েোি্ীসবট সাবিতি ববষসয কপ-ববলাবস িসত সাি্াবি কটসব।

ক. **পবর সংোি** : প্ে থচদরুটী

ভাটতচন, বীটবল, বইপড়া,কাসবি অ্ীলতা, আলঙাবটক ্ত,বত্্ান বাংলা

সাবিতি খ. **ভ্ণ কাবিবন :** পসে পবাসস - অনবাি্ঙট টায

করণা থতা্াট থকান পে ববসয - নবনীতা থববসসন

SEMESTER- 8th

COURSE NAME - Bangla Saras Galpo Ebong Anugalpo

COURSE CODE- BABNGMJ803

COURSE TYPE- MEJOR	Course Details-MJC-20			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/২০ [MJC-20]

বাংলা সটসগপ এবং অনুগপ

Bangla Saras Galpo Ebong Anugalpo

ববশসাবিসতি বাংলা সটসগপ ও অনুগসপট ্পসটখা সমসক্ জানসব। বাংলা সাবিসতি সটগপ ও অনুগসপট উদব পসসা পড়সব। সটসগসপট ববব্চ্ি, তত, বন্্াণ, স্াজভাবনা ও বচটাযত আসববন অনুভব কটসত পাটসব। বাংলা গসপট বন্্াণ বিবল সমসক্ জানসব। আরুবনক কাসলট স্য ও রুগলকণ সমসক্ অববিত িসব। আরুবনক রুসগট ববপনতা ও সংকিসক বুঝসত বিখসব। ঔপবনসববিকতা ও উট্ উপবনসবিবাব সমসক্ অববিত িসব। একাসলট স্য থচতনা ও স্াজতত সমসক্ জানসব। আরুবনক গসপট ববষয ববব্চ্ি জানসব। থচতনাপবাি্র্ী থলখা বচনসত বিখসব। উপবনসবি উট্ রুসগট লকণ বচনসত পাটসব। বাংলা গপপাসঠট ্রি ববসয বাংলা গসপট স্প উদাবন কটসত পাটসব। েোে্েোে্ীটা গপ থলখাট থপটণা পাসব। একাবরক আযজ্াবতক ্াসনট গপকাসটট আববভ্াব িসযসে বাংলা সাবিসতি। এই সটসগপকাট ও অনুগপকাট ও তাসবট গসপট সসা েোে্েোে্ীসবট পবটচয কবটসয থবওযাট জনি ববষযবি সংরুক কটা িসযসে।

ক.সটস গপ

পভাতকু ্াট ্ুসখাপারিয - বাজীকট, টস্যীট টবসকতা, পনণয - পবটণ্া, বলবান জ্াতা

পটশট্ - ববববটবঞবাবা, বাঁড়কাগ , শ শ বসস্শটী বলব্সিি, গণযকাট , কব্্-থ্খলা

খ. অনুগপ

বনফু সলট থশত গপ - আতপট, কিানভাসাট, ববষব- িাক , পাঠসকট ্তুি , বজববক বনয্, থোিসলাক , সংসকসপ উপনিাস, তাজ্িল, তপন

SEMESTER- 8th

COURSE NAME - Bangla Ekanka Natak Ebong Gananatya

COURSE CODE- BABNGMJ804

COURSE TYPE- MEJOR	Course Details-MJC-21			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

থ্জট থকাস্/২১ [MJC-21]

বাংলা একাঙ নাি্ক এবং

গণনাি্ি

Bangla Ekanka Natak Ebong Gananatya

এই পসব্ েোা্েোা্ীটা, বাংলা একাঙ নািসকট ইবতিাস সমসক্ জানসত পাটসব। বাংলা একাঙ নাি্ক টচনাট স্প ও ববববিি্ি সমসক্ জানসত পাটসব। একাঙ নািসকট নানাববর ববববচ্ি সমসক্ পড়াট সুসরাগ পাসব। একাঙ নাি্ক ্ঞস কটাট অোাি পাসব। একাঙ নাি্ক পড়াট সসা সসা নািসক অবভনয কটাট সুসরাগ পাসব।

গণনািসকট পবটচয পাসব ও নবনািসকট পবটচয পাসব। পবতবাবী থচতনাট কণসট বচনসত পাটসব। জব্বাবট িাসসনট অবসান ও পঞ্চাসযতটাসজট পবটচয লাভ কটসব। বুই ববশরু্ ও থসই অবভলাসত স্ি সাবিসতিট গবতপক্ বত জানসব। থবিভাগ ও সারীনতা উ্ট স্াজ পবটবত্সনট পিভ্ ব্ জানসব। উপবনসবি ও সাবিসতিট গবতপক্ বত বুঝসত সক্ িসব। উপবনসবস্িট ্্লিসবাসর সাবিতি ববস্ষণ কটসত বিখসব। ্াক্সীয স্াজতাবতক আসনালন, তত ও ফসযীয ্সনাববসকালনতসতট তসতট বভব্সত সাবিতিববচাট কটসত বিখসব। আরুবনক নাি্িনিবলট কো জানসত পাটসব। আরুবনক নাি্িববচাট ও অবভনসয উযসাি্ী িসব।

একাঙ নাকি :

থববী– তুলসী লাবিড়ী ,টাজপুটী – ্নে টায, সুনট– থ্াবিত চসটাপারিায ,অশতা্- ্সনাজ

ব্্ গণনাকি/ নবনাকি :

জবানবনী - ববজন ভটাচার্, অাাট - উযপল ব্

SEMESTER- 8th

COURSE NAME - Goyenda Kahini O Abhijan Kahini

COURSE CODE- BABNGMN801

COURSE TYPE- MINOR	Course Details-MNC-7			L.T.P – 4-1-0	
Credit – 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

্াইনট থকাস্/৭ [MNC-7]

থগাসযনা কাবিবন ও অবভরান কাবিবন

Goyenda Kahini O Abhijan Kahini

সাসযয বফকিন এবং বিসিকবিভ উপনিাস েোি্েোি্ীটা অোসিট সসা পসড়। সাবিতি শরু বসল না , বক িয; বক
িসত পাসট, ত্রিাও সাবিসতিট ববষয। ববজাসনট গসবষণা প্বেবীসত অসনক অসারি সারন কসটসে। কপববজাসনট থলখসকটা

ববজাসনট ্সরি বক্কে সমব অসমব কপনা স্্ থরাগ কসট ববজাসনট রুবকবুব্ট ্সরিও ই্াবজসনিন বা কখসনা উদাবনী বচযা জাবগসয তু লসত চান। সতিবজয টাসযট িঙু কাবিনী এ্ন এক রটসনট কপববজান থরখাসন ববজান কপনা টসস জাবটত িসয পাঠসকট ্সন অনুসবরযসা স্বি কসট। বিকাে্ীসবট ্সরি এই থকদতু িল জাবগসয থতালা এবং কলা ববভাসগট েোি্ েোি্ীসবট ্সরি ববজাসনট অনুষা কপনা টসস জীবয কসট থতালাই এই থকাসস্ট লকি।

অনিববসক থগাসযনা কাবিনী সব থশণীট ্ানুষসক বহকাল থেসক আক্ ি কসট আসসে। সিাট অ্াট থকানান ভসযল, আলসফি বিচকক, বাংলায িটববনু বসনিাপারিায, সতিবজয টায, নীিাটট্ন গ্, অদীি বর্ন, থপন্ন ব্্, থিন্নকু ্াট টায প্ুখ থলখকসবট রাটাবাবিক থগাসযনা কাবিবনট ইবতিাস েেি্েেি্ীটা জানসত পাটসব। অপটাসরট রটণ, অপটাসরট বপেসন কাটণ, অপটারীট ্নসত, অপটারীসক বচবহত কটাট থকদিল ইতিাববট জনি তীক বুব্্া, স্াজজান, ্নঃস্ীকণ -এই জাতীয ববিবিিগবল থগাসযনাসবট পসক একায পসযাজন। বিকাে্ীটা থগাসযনা কাবিনীট ্সরি ববসয ্ানব ্নসত অপটার পবণতা, অপটাসরট ববচাট ববস্ষণ এবং তীক বুব্ চচ্ায অপটারীসক রসট থফলাট বিকা থপসত পাসট, রা তাসবট ভববষিয পাতিবিক জীবসন ও জীববকায সাি্ারি কটসব।

থগাসযনা কাবিবন : টসযল থবাল টিসি - সতিবজয টায

থচাটাবাবল - িটববনু বসনিাপারিায

অবভরান কাবিবন : চাঁসবট পাি্াড় - ববভ্ বতভ্ ষণ বসনিাপারিায

SEMESTER- 8th

COURSE NAME - Research Methodology and Ethics

COURSE CODE- BABNGRP801

COURSE TYPE-RP	Course Details-RPC-1			L.T.P – 4-0-0	
Credit – 4	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	30	--	70

SEMESTER- 8th

COURSE NAME - Research Project / Dissertation

COURSE CODE- BABNGRP802

COURSE TYPE-RP	Course Details-RPC-2			L.T.P – 0-0-16	
Credit – 8	Full Marks: 200	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		120	--	80	--

Hons. With Research থকাস্ ত্ে্াষ রাটা Viii থসস্ বটসাচ্ থপপাট থনসবন তাসবট Viii Sem Hons. এট MAJOR - BABNGMJ801 (বাঙাবল জাবতট ইবতিাস ও সাবিতি ভাবনা) প্বি বনসত িসব। MAJOR - I - এ 100 নমট, Research Paper এ - 300 নমট, Minor - I এ 100 নমট ত্ে্াষ থ্াি ৫০০ নমট ে্াকসব।

NEP SYLLABUS
BOTANY

SUBJECT - BOTANY

4 yr. UG Degree Syllabus
According to NEP2023
(For the Colleges affiliated to Kazi Nazrul University, Asansol, West Bengal)
Subject- Botany (Single Major)

SEMESTER - 1

MAJOR PAPER

Course Name: Plant Groups and Microbial World

Course Code: BSCBOTMJ101

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Core**	Course Details: **MJC-1**			L-T-P: **3-0-4**	
Credit: **3**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

***Course Learning Outcomes**:*

1. Combination of theoretical and practical components of this paper will provide comprehensive information and insight into the fascinating world of microbes and plants.
2. Hands on training will help students to learn use of microscope, various instruments handling, mounting, section-cutting and staining techniques for the study of bacteria and plant materials.
3. Making drawings in practical records will enhance understanding morphological and structural details and related functional aspects in diverse plant and microbial groups.
4. After the completion of the course the students will be able to develop understanding about the classification and diversity of different plants, microbes and their economic importance.
5. The students will develop conceptual skill about identifying plants and microbes.
6. The students will gain knowledge about developing commercial enterprise of the microbial products.

Detailed Syllabus -

Unit I: Plant Groups (Basic Concepts):

- Kingdom systems (*Two* kingdom, *Three* kingdom and *five* kingdom system), Classification of Plant Kingdom (By Eichler, 1883); Historical development of the discipline Botany (Contributions of Aristotle, Theophrastus, Dioscorides, Parasara, Sushruta, Charak, Carrolus Linnaeus, Engler and Prantl and Sir J.C Bose); General and Comparative account of plant group; Scope and prospects in Botany (include Archaeobotany, Astrobotany and Dendrology also); Alternation of Generations and concept of gametophyte and sporophyte; Origin and evolution of life on planet Earth, Geological Time Scale and Major events of plant lives.
- General Features and Classification: Engler and Prantl's Classification (upto Classes); General characteristics and classification of groups upto classes (Aglae By Fritsch (1935), Fungi By Gwenny-Vaughani and Barnes (1937), Bryophytes by Proskauer (1957), Pteridophytes by Sporne (1965), Gymnosperm by Bierhorst (1971).

- General features, systematic position and life cycle of the genera – *Spirogyra, Mucor, Riccia, Pogonatum, Pteris* and *Pinus*. Methods of collection, preservation, storage and recording of each of these plant groups.
- Lichens: Classification, thallus organization, internal anatomy, reproduction; ecological and economic significance.
- Phytochemistry – Structures, classifications and physiological roles of Carbohydrates (excluding derivatives), proteins, amino acids, lipids, terpenes, phenolics and alkaloids; Concepts of optical isomerism (L and D form), mutarotation, Different types of bonds (Glycosydic bond, ester bond and peptide bond), Zwitterion and pI.

Unit II: Introduction to microbial world

- Historical development in the field of microbiology - (contributions of Antoni van Leuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch and A. Fleming); Microbes and their types.
- Polyphasic approaches in bacterial taxonomy, General idea about Bergey's Manual, Three domain system by C. Woese (1991).
- Microbial nutrition: nutritional types, growth and Reproduction of bacteria.
- Economic importance of bacteria with reference to their role in agriculture, fermentation industry and medicine (This will include only a general list of microbial products and the microorganisms involved).
- Medical Microbiology – Epidemiology, pathogenesis, causal organism and control of air borne disease (influenza), water borne disease (Cholera) and food borne disease (Staphylococcal food poisoning).

Unit III: Bacteria and Viruses

- General Bacteriology: Size, shape and arrangement of bacteria; Structures and functions of – Bacterial Capsule, flagella, pili, cell wall (chemical composition and characteristics), plasma membrane, ribosomes, cytoplasmic inclusions, Plasmids and bacterial chromosome; endospore (structure, formation and germination).
- General characteristics of the domain Archaea and wall-less forms (Mycoplasmas, L-forms, Protoplasts and Spaheroplasts).
- Mechanism of gene transfer in bacteria: Transformation, Conjugation and Transduction.
- Viruses: General characteristics of viruses (size, symmetry, culture characteristics, general structure including concept of capsomere and peplomere, chemical composition).
- Structure of TMV, T_2 phage, HIV and SarsCov2.
- Viral multiplication – Lytic cycle and Lysogeny cycle (excluding regulation),
- Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics anb as causal organisms of plant diseases.
- General characteristics and diseases due to Prions and Viroids.

Unit IV: Basic immunology (only outline) – Innate and acquired immunity, active and passive immunity, humoral (antibody mediated) and cellular (cell mediated) immunity, primary and secondary response, general structure of antibody and its types, Vaccines and their types.

Practical – 30 (CA) and 20 (ESE), Total = 50

- Microscopic examination of genera – *Spirogyra (*whole mount), *Mucor* (whole mount), *Riccia* (t,s of mature thallus), *Pogonatum* (l.s of Capsule), *Pteris* (t.s of mature leaf) and *Pinus* (t.s of needle and stem).
- Qualitative tests of carbohydrates (reducing, non-reducing sugar, starch (Molisch test, Fehling's test and Iodine test), protein (biuret test), lipid (Sudan III test) from natural sources.
- Demonstration of the functioning of Autoclave, Hot-air oven, Laminar air-flow, Filtration, Incubator and tools like inoculating loops/needles, petriplates, spreader, culture tubes etc.
- Preparation of standard bacteriological media (Nutrient agar and Nutrient broth).
- Demonstration of Sub-culturing technique.
- Enumeration of soil/food microorganisms by serial dilution technique.
- Microscopic examination of bacteria from natural habitats: curd and root nodules of leguminous plants (simple staining only)

Bibliography –

1. College Botany Vol. –II.- Gangulee and Kar, New Central Book Agency, Kolkata.
2. Studies in Botany, Vol. I. - Mitra, Mitra, Choudhury. Moulik Library, Kolkata.
3. Text Book of Botany, Voli-1, Hait, Ghosh and Bhattacharya, New Central Book Agency
4. Advanced Botany Vol-1 and Vol-2, By Sanjeev Pandey, Books and Allied (P) Ltd.
5. Morphology of Vascular Plants, By George H. M. Lawrence, 1951, Oxford & IBH Publishing Co.

MINOR PAPER

Course Name: Plant Groups and Microbial World

Course Code: BSCBOTMN101

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Core**	Course Details: **MNC-1**			L-T-P: **3-0-4**	
Credit: **3**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

SYLLABUS SAME AS MAJOR

SEC (Skill Enhancement Course)
Course name: Mushroom technology
Course code – BSCBOTSE101
L-T-P = 2-1-0 (Theory: 15 (CA), 35 (ESE))

Course Type: **Core**	Course Details: **SEC-1**			L-T-P: **2-1-0**	
Credit: **3** **L-T-P=2-1-0**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**15**	-	**35**

Course Learning Outcomes:

On completion of this course, the students will be able to:

- Recall various types and categories of mushrooms.
- Demonstrate various types of mushroom cultivating technologies.
- Examine various types of food technologies associated with mushroom industry.
- Value the economic factors associated with mushroom cultivation
- Device new methods and strategies to contribute to mushroom production.

Detailed Syllabus -

Unit 1:

Introduction and history. Types of edible mushrooms available in India - *Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*; Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms.

Unit 2:

Methods of cultivation of edible mushrooms (Oyster, Button and Paddy straw mushrooms). Diseases of Mushroom fungi and methods of remedy. Methods of Mushroom span production. Equipments and Tools required for mushroom as well as spawn production.

Unit 3:

Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

Unit 4:

Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

Suggested Readings

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.

2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.

4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

ID/MD Paper -
Course name – Introduction to Local Flora
Course code: MDC118

Course Type: **Core**	Course Details: **MDC-1**			L-T-P: **3-0-0**	
Credit: **3**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**15**	-	**35**

Detailed Syllabus -

- What is Life? Criteria and features of life; Five kingdom concept.
- Plants groups, basic classification and general features of individual plant groups.
- Different types of ecological interaction among different plant groups. (Root nodules of legumes, Mycorrhiza, Parasitic Angiosperms).
- Ecological roles of Algae, Fungi, Bryophyta and vascular plants to maintain ecological balance and sustainability of ecosystem.
- Economic importance and future prospects of all plant groups; Traditional Knowledge about economic and medicinal use of important plants.
- Survey based Field study of local flora (Documentation and Report submission in the form of texts, photographs, tables and graphs).

SEMESTER – 2

Paper Name: Cryptogamic Botany & Palaeobotany

Paper Code – BSCBOTMJ201

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Core**	Course Details: **MJC-2**			L-T-P: **3-0-4**	
Credit: **3**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

***Course Learning Outcomes**:*

1. Combination of theoretical and practical components of this paper will provide comprehensive information and insight into the fascinating world of cryptogams and plant fossils.
2. After the completion of the course the students will be able to develop critical understanding on morphology, anatomy and reproduction of Algae, Bryophytes, Pteridophytes & Gymnosperms and also an understanding of the plant evolution and their transition to land habit.
3. The students will learn the major patterns of diversity among cryptogams along with their characters.
4. The students will develop an understanding by observation and table study of representative members of phylogenetically important groups to learn the process of evolution in a broad sense.
5. The students will understand morphology, reproduction and developmental changes therein through typological study and create a knowledge base in understanding the basis of lower group of extant plants and fossil members'. They will also get acquainted to the diversity and economic values of such plants.

Detailed Syllabus -

Unit I: Algae:

- Introduction; Habitat and distribution; thallus organization; origin and evolution of sex in algae.
- Criteria for algal classifications; Broad outline of classification of Lee (2008) up to family and its basis.
- Comparative account and evolutionary relationship of: Cyanophyceae, Chlorophyceae, Charophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae, Rhodophyceae.
- Cell structure and reproduction of Cyanophyceae and Diatoms.
- Life histories of *Nostoc*, *Oedogonium*, *Chara*, *Vaucheria*, *Ectocarpus* and *Polysiphonia*.
- Economic importance of algae; Algal cultivation methods, Commercial cultivation and production of algal food.

Unit II: Bryology:

- Origin and phylogeny of Bryophytes; Habit and distribution; Broad outline of Classification of Giffinet (2009), Crandall-Stotler (2009) and Renzaglia (2007), Comparative study of Hepaticopsida, Anthocerotpoida and Bryopsida.
- Morphology, anatomy, reproduction and evolutionary trends of *Riccia, Marchantia, Pellia, Porella, Anthoceros, Sphagnum* and *Funaria*.
- Ecological and economic importance of bryophytes with special reference to *Sphagnum*.

Unit III: Pteridophytes- Introduction and Classification

- Introduction to Pteridophyta – Concept of Vascular Cryptogams; Land habit; stellar organization and its evolution; General features of Pteridophytes; Apogamy and apospory; Telome theory, Enation Theory.
- PPG1 (2016) classification of pteridophytes up to Suborder.
- Geological history and morphoanatomical and reproductive features of *Rhynia, Psilophyton* and *Zosterophyllum*; *Lepidodendron (Lepidodendron, Lepidocarpon), Calamites* (stem and strobilus-*Calamostachys* and *Palaeostachya*).
- Distribution, morphoanatomical and reproductive features of *Psilotum,. Lycopodium, Selaginella, Equisetum, Pteris* and *Marsilea.*

Unit IV – Palaeobotany

- Introduction to Palaeobotany – Important terminologies and definitions; Types of fossil on the basis of modes of preservation; Nomenclature, Conditions suitable for fossilization; Importance of fossils and their study; Stratigraphy – Law of superposition, Stratigraphic correlation and stratigraphic deduction based on megafossil and microfossil assemblages.

Practicals – 30(CA), 20 (ESE), Total = 50

- Micrometry-Standardization of compound microscope and measurement of cell size.
- Study of the vegetative and reproductive structures of the following genera using camera lucida: *Gloeotrichia, Scytonema, Zygnema, Oedogonium* and *Chara*.
- Study of the gametophytic and sporophytic structures of the following genera: *Riccia, Marchantia, Anthoceros and Funaria.*
- Study of external morphology and anatomical features of the following: *Lycopodium* (stem and strobilus), *Equisetum* (stem and strobilus) and *Marsilea* (Sporocarp).
- Macroscopic and microscopic identification of specimens of all genera included in the theoretical syllabus of Algae, Bryophytes and Pteridophytes.
- Study of the diagnostic features, geological time and mode of preservation of the following fossil members: *Lepidodendron,* (stem in T. S.), *Calamites* (stem in T. S.), *Bucklandia* (stem, specimen), *Glossopteris* (leaf, specimen), *Vertebraria* (root, specimen).
- Field Study: Specimen collection, identification and submission of collected and preserved materials with proper documentation.

- Preparation and Submission of permanent slides (with DPX/Canada balsam mount) of workout specimens.

Suggested Readings

1. College Botany Vol. –II.- Gangulee and Kar, New Central Book Agency, Kolkata.
2. Studies in Botany, Vol. I. - Mitra, Mitra, Choudhury. Moulik Library, Kolkata.
3. Text Book of Botany, Voli-1 and 2, Hait, Ghosh and Bhattacharya, New Central Book Agency.
4. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
5. Vashishta B.R., Sinha A.K. and Singh V. P. (2008). Botany for Degree Students. Algae. S Chand and Co, New Delhi.
6. Vashishta B.R., Sinha A.K. and Singh V. P. (2008). Botany for Degree Students. Fungi. S Chand and Co, New Delhi.
7. Cryptoganic Botany Vol-1 By G. M. Smith
8. Algae By O.P. Sharma.
9. A Text Book of Botany: Lower Plants (2nd edition) Part-I: Bryophta. Singh, Pandey and Jain. 1999. Rastogi Publications. Merut.
10. A Text Book of Botany, Pandey, S. N., Trivedi, P. S. and Misra, S. P. 1989. VikasPublishing House Pvt. Ltd.
11. Bryophytes, a broad perspective. Puri, P. 1973. Atma Ram & Sons. New Delhi.
12. The structure and life of Bryophytes, Watson, E. V. Hutchinson University Library, London.
13. Cryptogamic Botany Vol. II. GM Smith,Bryophtes and Pteridophytes (2nd edition). Mc.Graw Hill Book Co. New York.
14. E. M. Gifford and A. S. Foster. 1988. Morphology and Evolution of Vascular Plants.
15. N. S. Parihar: An Introduction to Embryophyta Vol-I and II. Central Book. Allahabad.
16. K. R. Sporne : The Morphology of Pteridophytes. B. S. Publications. Calcutta
17. P. C. Vasistha. 1980 Botany for degree student Pteridophyta. S. Chand & Company Pvt. Ltd. Rashid. 1976. An Introduction to Pteridophyta. Vikas Publishing . New Delhi.
18. S. SundarRajan. 1994. An introduction to Pteridophyta. New Age International Publishing Limited and Willey Eastern Ltd.

MINOR PAPER

Course Name: Cryptogamic Botany & Palaeobotany

Course Code: BSCBOTMN201

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Core**	Course Details: **MNC-2**			L-T-P: **3-0-4**	
Credit: **3**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

SYLLABUS SAME AS MAJOR

SEC (Skill Enhancement Course)
Course name: Biofertilizer
Course code – BSCBOTSE201
L-T-P = 2-1-0 (Theory: 15 (CA), 35 (ESE))

Course Type: **Core**	Course Details: **SEC-2**			L-T-P: **2-1-0**	
Credit: **3** **L-T-P=2-1-0**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**15**	-	**35**

Course Learning Outcomes:

On the completion of this course, the students will be able to;

- Develop their understanding on the concept of bio-fertilizer
- Identify the different forms of biofertilizers and their uses
- Compose the Green manuring and organic fertilizers
- Develop the integrated management for better crop production by using both nitrogenous and phosphate bio fertilizers and vesicular arbuscular mycorrhizal (VAM).
- Interpret and explain the components, patterns, and processes of bacteria for growth in crop production

Detailed Syllabus -

Unit-1:

- General account about the microbes used as biofertilizer; Isolation, mass production and application of Rhizobia, *Azospirillum* and *Azotobacter* as a biofertilizer; Actinorrhizal symbiosis (Organisms, hosts and general features).

Unit -2:

- General idea about Plant growth promoting rhizobacteria (PGPR) and Phosphate solubilizing bacteria (PSB); PGPR traits; Stress hormone Ethylene and PGPR.

Unit- 3:

- Cyanobacteria (blue green algae/ BGA) and *Azolla* as biofertilizer; Blue green algae and Azolla production; Application of BGA and *Azolla* in rice cultivation.

Unit -4:

- Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution; VAM fungi, and their influence on growth and yield of crop plants. (6 lectures)
- Organic farming – Green manuring and organic fertilizers; Organic Compost and Vermicompost - production and application.

Suggested Readings -

1. Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.

3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad

ID/MD Paper –

Course Name: Herbal Home Remedies
Course Type: MD
Course Code: MDC217

Course Credit: 3	Total Marks:	CA Marks		ESE Marks	
Sem Credit: NA	50	Practical	Theoretical	Practical	Theoretical
L - T – P: 2 - 1 - 0		--	15	--	35

Course outcome:

1. Develop conceptual skill about traditional Indian medicinal system, herbal medicines, their processing, storage and marketing.
2. Gain knowledge about developing commercial enterprise of herbal medicines.
3. Learn the basic tools and techniques for phytochemical analysis and propagation of the medicinal plants.

Unit	Topic	No. of lectures/ hrs (45)
1	**Herbal medicines**: **History and scope** - Definition of medical terms – History and Prospect of Ayurveda and Siddha systems of medicine.	5
2	**Herbal remedies for common ailments** – Blood sugar (Diabetes), Blood Pressure, Piles, Common cough and cold sore, Viral or other chronic fever, irritable bowel syndromes, skin diseases, psoriasis etc.; Memory boosters; Nerve Stimulants.	10
3	**Herbal preparation Methods** – Infusion (svarasa), decoction (kwatha), Arishta (fermented herbal decoction), tincture (Solvent based infusion or decoction), poultices (Upanaha), salves (Lepa) etc. Techniques of harvesting and drying herbs. Quality control and storage. Dose and ill effect of overdose.	10
4	**Plants with healing properties** – (parts, their uses in medicine andmethods of uses) Trees – *Saraca asoka* (Ashoka), *Terminalia arjuna* (Arjuna), *Terminalia*	20

	chebula (Hartaki), *Terminalia bellerica* (Bahera), *Emblica officinale* (Amla), *Alstonia scholaris* (Chhatim), *Moringa oleifera* (drumstick/sajina plant), *Azadirachta india* (Neem), *Morinda citrifolia* (Noni), *Carica papaya* (Papaya) Shrubs – *Holarhena antidysenterica* (Kurchi), *Costus speciosus*, *Justicia adhatoda* (Basak), *Calotropis procera* (Arka/Akanda), *Datura metel* (Dhutra) Herbs – *Aloe vera, Aloe barbadense*, *Ocimum sanctum* (Tulsi), *Catharanthus roseus* (Nayantara), *Rauwolfia serpentina* (Sarpagandha), *Withania somnifera* (Aswagandha), *Clerodendron phlomoides* (Bamanhati), *Centella asiatica* (Thankoni), *Opium poppy* (Opium/Aphim), *Andrographis paniculata* (Kalmegh), *Senna alata*. *Achyranthes aspera* (Apang), *Eclipta alba* (Kesut), *Boerrhaavia repens* (Punarnava), *Baccopa monieri* (Brahmi), *Hygrophila spinosa* (Kulekhara). Spices – *Zingiber officinale* (Ada), *Curcuma longa* (Turmeric/Halud/Haldi), *Cinanamomum zeylanicum* (Darchini), *Foeniculum vulgare* (Fennel/sounf/Mouri), *Piper nigrum* (Pepper), *Ferula foetida* (Asafoetida/Hing), *Cuminum cyminum* (Cumin), *Coriandrumsativum* (Coriander). Climber – *Hemidesmus indicus* (Indian Sarsaparilla/Anantamul), *Cissus quadrangularis* (Harjoda). *Tinospora cordifolia* (Giloy), *Coccinia grandis* (telakuchu). [NB. Precautionary instructions must be associated with each drug]	

SEMESTER – III

MAJOR PAPER

Course Name: Gymnosperms, Mycology and Plant Pathology-I

Course Code: BSCBOTMJ301

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Major**	Course Details: **MJC-3**			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

***Course Learning Outcomes**:*

1. The concept of progymnosperms and its significance in plant evolutionary history will be determined.
2. General characteristics of gymnospermous plant group with special reference to their classification, morphology, reproduction, distribution and ecology will be described.
3. True fungi will be identified and the principles and application of plant pathology in the control of plant disease will be demonstrated.
4. The common plant diseases according to geographical locations will be identified and devices to control measures will be known.

Unit I:

Gymnosperms (Theory):

- General features of Gymnosperms and comparisons with pteridophyte and angiosperms; Comparative account of Cycadophyta, Coniferophyta, Ginkgoales and Gnetophyta. Outline Classification of gymnosperm by Stewart and Rothwell (1993) up to order.
- Progymnosperms; concept of the group emphasizing on overall description of *Archaeopteris*.
- General account of fossil members: Pteridospermales: *Lyginopteris* (*Crossotheca* male organ and *Lagenostoma* female organ); Glossopteridales: (*Vertebraria* root, *Araucarioxylon* trunk, *Glossopteris* leaf, *Glossotheca* male organ, *Denkania* female organ); Bennettitales: *Williamsonia sewardiana* reconstruction (*Bucklandia* stem, *Ptilophyllum* leaf, *Weltrichia* male organ, *Williamsonia* female organ).

Unit II:

Mycology (Theory):

- **Historical development**: Contributions of Heinrich Anton de Bary, Prof. C. V. Subramanian, Dr. K. C. Mehta and Dr. N. K. Rao.
- **Introduction** (General characteristics) – Fungal body and tissue organization (range of somatic structures);, Hyphal Modifications; Fungal cell structure; Cell-wall composition; Septum and its types; Occurrence and Mode of nutrition ; Different classes of spore and mode of sexual reproduction; Sexual degeneration.
- Broad outline Classification of Ainsworth, (1973) up to Sub-division. Concept of f*orma speciales* and physiological races in fungi.
- Detailed characteristics of individual classes* and life cycle of *Saprolegnia* (Mastigomycotina), *Rhizopus* (Zygomycotina), *Saccharomyces, Ascobolus* (Ascomycotina), *Agaricus* (Basidiomycotina); *Alternaria* (Deutromycotina).

*With special emphasis to the formation and development of ascus and ascospores (*Pyronema* type only), types of ascocarps; Mycelial types of Basidiomycotina, Cell division and Clamp-connection, Dikaryotization (Buller phenomenon), Basidial development, their types and types of fruitbodies in Basidiomycotina; Types of conidia and spores in Deuteromycotina, Conidial fruit body types in Asco- and Deuteromycotina.

Unit III:
Plant Pathology (Theory):

- Plant Diseases: Common Definitions; Koch's postulate; Disease cycle, Plant Disease Epidemiology.
- Classification of plant diseases based on symptoms and on spread and severity; Difference between Signs and Symptoms of plant diseases.
- Causal Organism, symptoms, disease cycles and control measures of **Bacterial diseases** – Bacterial blight of rice; **Viral diseases**- Tobacco Mosaic viruses **Fungal diseases**- Late blight of potato, Black stem rust of wheat, loose smut of wheat. **Nematode causing disease**- Root knot of rice; **Mycoplasmal disease** – little leaf disease of Brinjal.
- Disease Predisposing factors and disease forecasting; Use of modelling in disease forecast.

Practical:

- Studies on the morphological and anatomical features of the following: *Cycas* (leaflet) and *Pinus* (needle).
- Studies on the vegetative and reproductive structures of *Cycas, Ginkgo* and *Gnetum* from permanent slides.
- *Morphological studies of the following fossil specimens and determination of their mode of preservation: *Glossopteris* (leaf), *Vertebraria* (root, specimen), *Bucklandia* (stem), *Lyginopteris* (stem in T.S.)

  *[This part should be omitted from Sem-2 syllabus from Palaeobotany practical portion]
- Work out of the following with reproductive structure (Freehand drawing and drawing under drawing-prism with magnification): *Rhizopus* (asexual), *Ascobolus, Agaricus* (gill) and *Polyporus.*

MAJOR PAPER
Course Name: Gymnosperms, Mycology and Plant Pathology-II
Course Code: BSCBOTMJ302
L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Major**	Course Details: **MJC-4**		L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes*:*

1. The role and economic importance of gymnosperms in human welfare will be known.
2. The evolutionary significance of gymnosperms will be understood along with their prehistoric life forms and evolution through geological ages.
3. The skills in laboratory, field and glasshouse work related to mycology and plant pathology will be gained.
4. An idea will be generated to develop an understanding of microbes and fungi and also to know their adaptive strategies.

Unit I:
Gymnosperms (Theory):

- Origin of gymnosperm (origin of secondary wood, heterospory and evolution of seed habit*, concepts of prepollen and preovule).

  *Level of heterospory and seed habits in *Selaginella* and *Lepidocarpon* must be brought here in discussion.

- A comparative account of the life histories and their morpho-anatomical feature of the extant members - *Cycas, Pinus, Ginkgo* and *Gnetum*. Their distribution in India; Ecological and economic importance.

Unit II:
Mycology (Theory):

- Fungal cytogenetics: Sexual compatibility (homothallism and heterothallism); Parasexuality and haploidization, Nuclear behaviour in fungi (diplophase, haplophase and dikaryophase) and life cycle patterns; Karyochoresis; Phylogeny of fungi.
- A brief account on Myxomycota; Key to the classes of Myxomycota according to Ainsworth (1973); Outline life-cycle of Myxomycete and Plasmodiophoromycetes; Plasmodial development in *Stemonitis*.
- Fungal ecology: Mycorrhiza- Ectomycorrhiza, Endomycorrhiza and VAM fungi; Role of mycorrhizae and VAM in agriculture and forestry.
- Role of fungi in biotechnology; Application of fungi in food industry (Enlist application in Fermentation products, Baking and Brewing), Production of industrially important products from fungi viz. organic acids (citric acid), enzymes (protease) and applications of fungi in the production of pharmaceutical products. *Production of antibiotics (Penicillin) and vitamins (Vitamin B-complex and Vitamin B-12).

  *This should include media required, microorganism involved, fermentation process and optimal conditions (pH, temp., substrate), scale up and down-stream processing.
- Fungal toxins (Mycotoxins) with special reference to Aflatoxin (General View).

Unit III:
Phytopathology (Theory):

- Parasitism and Disease Development: Parasitism and Pathogenicity; molecular and biochemical basis of Plant-Pathogen interactions (pre-penetration, penetration, Post-penetration; Brief idea about the roles of cell wall degrading enzymes and pathotoxins are to be included here).
- Structural (Cell wall modifications, histological changes and structural barriers) and biochemical (oxidative burst; Phenolics, Phytoalexins, PR proteins, Elicitors) defense mechanism of plants; Basic concept of R genes (qualitative and quantitative resistance).
- Control of Plant diseases: Prophylactic measures; Plant quarantine; Physical, chemical and biological methods of disease control (should include chemical and biological fungicides); Concpets of LD_{50}, ID_{50}, EC_{50} and MIC; Genetic engineering for disease resistance.

Practical

- Isolation of pathogen from diseased leaf. Inoculation of fruit and sub-culturing.
- Study of the following diseases: White rust of Crucifer or Amaranth, Rust of wheat/Justicia (Puccinia: Herbarium specimens of Black Stem Rust of Wheat or infected Barberry leaves; section/tease mounts of spores of wheat or permanent slides of both the hosts), smut of wheat (or any member of Poaceae).
- Spot identification with reasoning from all specimens included in the theoretical syllabus.
- Collection, preservation and submission of Fungal specimen (both dried and wet specimens)[This should be supported by field note book and field record]
- Submission of herbarium sheet of disease affected plant parts of the surroundings.

Suggested Readings:

1. Botany for degree students. Fungi. B. R. Vashistha, A. K. Sinha. V. R. Singha (Latest edition). S. Chand.

2. College Botany Vol. –II. - Gangulee and Kar, New Central Book Agency, Kolkata.
3. Introduction to Fungi. Webster, J. Cambridge University Press.
4. Introduction to Fungi, Dubey, H. C. Vikas Publishing House.
5. Introduction to Mycology. Alexopoulas, C. J., Mims, C. W. and Blackwell Wiley. Bastern Limited, New Delhi.
6. Introductory Mycology. R. S. Mehrotra and Aneja, K. R. New Age International.
7. Studies in Botany, Vol. I. - Mitra, Mitra, Choudhury. Moulik Library, Kolkata.
8. Plant Pathology. Agrios R. N. Academic Press.
9. Plant Pathology, Mehrotra, R. S. Tata Mc Graw Hill Publishing Company. New Delhi
10. Diseases of Crop Plants in India. Rangaswamy, G. Prentice Hall India Pvt. Ltd. New Delhi.
11. E. M. Gifford and A. S. Foster. 1988. Morphology and Evolution of Vascular Plants.
12. Stewart, W. N. & G. W. Rothwell. 1993. Palaeobotany and Evolution of Plants. Cambridge University Press.
13. Beck, C. B. 1988. Origin and evolution of gymnosperms. Columbia University Press.
14. Bhatnagar, S. P. & A. Moitra. 1996. Gymnosperms. New Age International Ltd., New-Delhi.

MINOR PAPER
Course Name: Gymnosperms, Mycology and Plant Pathology
Course Code: BSCBOTMN301
L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Minor**	Course Details: MNC-3		L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes*:*

1. General characteristics of gymnospermous plant group with special reference to their classification, morphology, reproduction, distribution and ecology will be described.
2. True fungi will be identified and the principles and application of plant pathology in the control of plant disease will be demonstrated.
3. The common plant diseases according to geographical locations will be identified and devices to control measures will be known.

Unit I:
Gymnosperms (Theory):
General characteristics and Classification (Stewart and Rothwell's 1993 classification), morphology, anatomy and reproduction of *Cycas*, *Pinus* and *Gnetum*. (Developmental details not to be included). Economic importance of Gymnosperms.

Unit II:
Mycology (Theory):
Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification (Ainsworth, 1973); True Fungi- General characteristics of all classes, life cycle of *Rhizopus* (Zygomycota) *Penicillium* (Ascomycota), *Puccinia* (Basidiomycota); Symbiotic Associations- Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance. Role of fungi in biotechnology; Application of fungi in food industry (Enlist application in Fermentation products viz, antibiotics, organic acids, enzymes, vitamins; Baking and Brewing).

Unit III:

Plant Pathology (Theory):

Common Definitions, Koch's Postulates, Classification of Plant disease based on symptoms, Plant defense mechanism against pathogens, role of environment in disease development. Control measures of plant diseases. Disease resistance in plants. General symptoms and control measures for the following plant diseases: bacterial blight of rice. Late blight of potato, rusts of wheat.

Practical

- Studies on the morphological and anatomical features of the following: *Cycas* (leaflet) and *Pinus* (needle).
- Studies on the vegetative and reproductive structures of *Cycas, Ginkgo* and *Gnetum* from permanent slides.
- Work out of the following with reproductive structure (Freehand drawing only): *Rhizopus* (asexual), *Ascobolus, Agaricus* (gill)
- Collection, preservation and Submission of Fungal specimen with proper documentation.
- Submission of herbarium sheet of disease affected plants of the surroundings.
- Study of plant diseases with help of infected plant specimen - loose smut of wheat, late blight of potato, rust of wheat.[All from herbarium sheets].
- Spot identification with reasoning from all specimens included in the theoretical syllabus.

Suggested Redings:

1. Botany for degree students. Fungi. B. R. Vashistha, A. K. Sinha. V. R. Singha (Latest edition). S. Chand.
2. Introduction to Fungi. Webster, J. Cambridge University Press.
3. College Botany Vol. –II. - Gangulee and Kar, New Central Book Agency, Kolkata.
4. Studies in Botany, Vol. I. - Mitra, Mitra, Choudhury. Moulik Library, Kolkata.
5. Plant Pathology. Agrios R. N. Academic Press.

SEMESTER – IV

MAJOR PAPER

Course Name: Structural Botany, Economic Botany and Pharmacognosy-I

Course Code: BSCBOTMJ401

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Major**	Course Details: MJC-5			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes:

On completion of this course, the students will be able to:

1. To know about different plants organ like root, stem and leaves and their importance.
2. Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems.
3. Increase the awareness and appreciation of plants & plant products encountered in everyday life.
4. Appreciate the diversity of plants and the plant products in human use.

Unit I:

Morphology (Theory):

- Roots, stems and leaves: Their structures with reference to modification with examples; Phyllotaxi and Fibonacci series; Stipules (types and modifications).
- Inflorescence: Types with examples, evolution (brief idea).

- Flowers: Types, calyx (modifications), corolla (forms, aestivation, modification), stamen (cohesion & adhesion, attachment of anther), carpel - apocarpous & syncarpous, evolution; Ovule – Organization of Orthotropous ovule and types of ovules.
- Placentation: types with examples, evolution (brief idea).
- Fruits and seeds: Types with examples, Dispersal mechanism.
- Defensive mechanism of plants (Homologous and analogous organs).

Unit II:
Economic Botany (Theory):

- Concept of Centres of Origin (Major Centres of origin according to Vavilov, 1951); Origin of Cultivated Plants of West Bengal; Crop domestication and loss of genetic diversity; Germplasm diversity.
- Cereals: Wheat and Rice (origin, morphology, processing & uses); cultivation of rice.
- Legumes: Origin, morphology and uses of Chick pea, Pigeon pea and fodder legumes.
- Sources of sugars and starches: Morphology and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation and uses.
- Spices: Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper.
- Beverages: Tea, Coffee (morphology, processing and uses); cultivation of tea.

Unit III:
Pharmacognosy (Theory):

- Introduction; definitions of drug, crude drug, folk medicine, active principle, Pharmacognosy; Pharmacology, Pharmacopoeia, etc.
- Classification of drugs on alphabetical, morphological, chemical and therapeutic basis; Drug Constituents (active and inert); drug adulteration (sophistication) and drug evaluation.
- A general account on cultivation, harvesting, processing and storage of herbal drugs.

Practical:

- Morphological Studies of different types of roots, stem, leaves, stipules, flowers, fruits and seeds; Modification of roots, stem, leaves and stipules; Types of – Stipules, inflorescence, fruits and seeds.
- T.S. of potato tuber to show localization of starch grains through iodine staining.
- Qualitative test of starch; Wheat or Rice
- Qualitative test for lipid in Soybean/ Groundnut/ Mustard. (test of oil droplets in crushed seeds)

MAJOR PAPER
Course Name: Structural Botany, Economic Botany and Pharmacognosy-II
Course Code: BSCBOTMJ402
L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 5

Course Type: **Major**	Course Details: MJC-6			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes:
On completion of this course, the students will be able to:

1. Develop an understanding of concepts and fundamentals of plant anatomy.

2. Examine the internal anatomy of plant systems and organs.
3. Develop critical understanding on the evolution of concept of organization of shoot and root apex.
4. Analyze the composition of different parts of plants and their relationships.
5. Evaluate the adaptive and protective systems of plants.
6. To know about medicinal properties and uses of plants by folklore and ayurveda system.

Unit I:

Anatomy of Angiosperms (Theory):

- Introduction and scope of Plant Anatomy.
- Applications in systematics, forensics and pharmacognosy.
- Cell wall Structure, chemical composition, wall thickening with reference to pits.
- The tissue systems – dermal, ground tissue and vascular tissue (stems, roots and leaves). Types of vascular bundles, stomata and trichomes; Stelar organization and types; Root-stem transition.
- Classification of tissues: Definitions and types; Simple tissues - types, nature, distribution and functions; Complex tissues - Xylem and Phloem: Structure, ontogeny of tracheary elements and sieve elements; Sclereids; Transfer cells. Secretory structures and ergastic substances- brief idea.
- Apical meristems: Concept of organization of shoot and root apices (Different theories regarding the organizations of shoot and root apices) .
- Structure of primary bodies (dicot and monocot root, stem and leaf). General account on: Cuticle, Stomata, Hydathodes, Cavities, Laticifers, Kranz anatomy.
- Vascular Cambium and Cork Cambium: structure and function. Secondary growth in root and stem. Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood; Dendrochronology. Tyloses and tylosoids; Development of periderm, rhytidome and lenticels. Adaptive and Protective Systems Periderm- brief idea.
- Different principles regarding such distribution of mechanical tissues in flowering plants.
- Anomalous secondary growth in stem of *Boerrhavia*, *Bignonia*, *Dracaena*, *Tinospora*.

Unit II:

Economic Botany (Theory):

- Sources of oils and fats: Fixed Oils: General description, classification, extraction, their uses and health implications; groundnut, linseed, soybean, mustard and coconut (Botanical name, family and uses).
- Essential Oils: General account (sources and chemical nature), extraction methods, comparison with fatty oils, sources and uses of some common essential oils (Eucalyptus, lemongrass, citronella, cinnamomum, chamomile, clove, and rose).
- Natural Rubber Para-rubber: tapping, processing and uses.
- Timber plants: General account with special reference to sal and teak
- Fibres: Classification based on the origin; Cotton and Jute (morphology, extraction and uses); cultivation of Jute.

Unit III:

Pharmacognosy (Theory):

- Diagnostic features, active principles and therapeutic uses of:
  Rauwolfia serpentina (root), *Adhatoda vasica* (leaf), *Strychnos nux-vomica* (seed), *Cinchona succirubra* (bark), *Catharanthus roseus* (Whole plant), *Taxus* sp. (bark).
- Family, plant part used, therapeutic use and habit of following drugs: *Withania sominifera (*Aswagandha), *Andrographis paniculata* (kalmegh), *Zingiber* (Ginger), *Curcuma* (Turmeric),

Bacopa monnieri (Bramhi), , *Digitalis purpurea* (foxglove), *Papaver sominferum* (Afeem) and *Cannabis sativa* (Marijuana).

Practical

- Study of anatomical details through temporary slide preparation of the stem - monocot (maize), dicot (sunflower); root – monocot (Canna), dicot (Chick pea) and leaf – monocot (grass leaf any preferably rice/maize), dicot (mango).
- Microscopic study from permanent slides of: Bulliform cells, stomatal types, hairs (glandular), lenticels, raphides (acicular and sphaeraphides), cystolith, cavities and laticifers.
- Study of wall thickennings and pittings on xylem vessels, fibres and tracheids through maceration in *Pinus* and *Cucurbita* (Any other suitable dicot).
- Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres - Permanent slides.
- Secondary anomalous structure in stem with specimens included in theoretical syllabus.
- Quality control of fibres*: Cotton (whole mount of seed/ seed epidermis to show lint and fuzz;), Jute (whole mount of fibre).*[This study should include, measuring the diameter and length of the fibre, number of convolutions in cotton fibre, lumen size, presence of defect like cracks, fissure or deformities and fungal or bacterial infection if any. In case of jute, lignin content is determined by adding phloroglucinol-HCl to the fibre to see its amount and distribution under compound microscope].
- Study of wood anatomy – Density, Hardness and Grain pattern (with respect to Sal and Teak)
- Organoleptic and microscopic examination of following plant drugs to be supplied fresh and powdered form – *Adhatoda vasica* (leaf), *Strychnos* (seed), Zinger (rhizome).

Suggested Readings:

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA.
3. Mauseth, J.D. (1988). Plant Anatomy. The Benjammin/Cummings Publisher, USA.
4. Evert, R.F. (2006) Esau's Plant Anatomy: Meristems, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc.
5. Pandey B.P.(2012) Plant Anatomy. S.Chand & Company Ltd., New Delhi
6. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
7. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.
8. Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture. Jones & Bartlett Publishers.
9. Sanjeev Pandey, Advance Botany, Volume-1, 2nd Edn, Pub. Books and Allied (P) Ltd. Kolkata.

MINOR PAPER

Course Name: Plant Morphology, Plant Anatomy & Plant Taxonomy

Course Code: BSCBOTMN401

L-T-P (3-0-4) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: **Minor**	Course Details: MNC-4		L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 100	CA Marks	ESE Marks	
		Practical / Theoretical	Practical / Theoretical	
		30 / **15**	20 / **35**	

Course Learning Outcomes:

On completion of this course, the students will be able to:

1. To know about different plants organ like root, stem and leaves and their importance.
2. Develop an understanding of concepts and fundamentals of plant anatomy
3. Examine the internal anatomy of plant systems and organs

4. Interpret the rules of ICN in botanical nomenclature
5. Generalize the characters of the families according to Bentham & Hooker's system of classification
6. Evaluate the Important herbaria and botanical gardens

Unit I:
Plant Morphology (Theory):

- Roots, stems and leaves: Their structures with reference to modification with examples; stipules; phylotaxy
- Inflorescence: Types with examples (brief idea only).
- Flowers: Types, calyx (modifications), corolla (forms, aestivation, modification), stamen (cohesion & adhesion, attachment of anther), carpel - apocarpous & syncarpous.
- Placentation: types with examples.
- Ovules: types with examples.
- Fruits and seeds: Types with examples, Dispersal mechanism.

Unit II:
Plant Anatomy (Theory):

- Introduction of Plant Anatomy, Cell wall Structure.
- The tissue systems – dermal, ground tissue and vascular tissue. Types of vascular bundles.
- Classification of tissues: Simple tissues – types and functions; Complex tissues - Xylem and Phloem: Structure and functions.
- Apical meristems: Concept of organization of shoot and root apices (Tunica Corpus theory, Korper-Kappe theory). Structure of primary bodies (dicot and monocot root, stem and leaf).
- Secondary growth in root and stem. Sapwood and heartwood; Ring and diffuse porous wood; Early and late wood.
- Anomalous secondary growth in stem of *Bignonia, Strychnos, Dracaena*.

Unit III:
Plant Taxonomy (Theory):

- Introduction to systematics; Plant identification, Classification, Nomenclature.
- Field inventory; Importance of Herbarium; Important herbaria and botanical gardens of the world and India; Virtual herbarium; E-flora; Documentation: Flora, Monographs, Journals; Keys: intended (yolked) and bracketed keys.
- Plant classification - artifitial, natural and phylogenetic approach; Outline of the system of classification – Linnaeus (1753); Bentham and Hooker (1862-83) and Arthur Cronquist (1981).
- Botanical Nomenclature**:** Principles and rules (ICBN/ICN); Ranks and names; Typification, author citation.
- Diagonostic characters, floral formula, floral diagram and economic importance of the following plant families with examples from common Indian species.
  Dicotyledons: Magnoliaceae, Brassicaceae, Solanaceae, Malvaceae, Fabaceae, Apocynaceae, Scrophulariaceae, Lamiaceae, Verbenaceae, Acanthaceae, Rubiaceae, Asteraceae.
  Monocotyledons: Poaceae, Cyperaceae and Orchidaceae.

Practical

- Study of different types of stem, leaves, stipules, flowers and fruits.
- Study of primary structure: Stem: monocot (Maize), dicot (Sunflower); Root: monocot(*Canna*), dicot (Chick pea).

- Microscopic study from permanent slides of: Bulliform cells, stomatal types, lenticels, raphides (acicular and sphaeraphides), cystolith, cavities and laticifers.
- Study of the anomalous structures of stems of the following genera: *Bignonia, Dracaena* and *Boerhaavia*
- Study of vegetative and floral characters of the following families (Description, V.S.flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): Malvaceae, Fabaceae, Apocynaceae, Solanaceae, Lamiaceae, Verbenaceae, Asteraceae (Take at least one genus from each family).
- Field visit (local or outside depending on situation).
- Mounting of a properly dried and pressed specimen of any 10 wild plants with Herbarium label (to be submitted during examination).

Suggested Readings:

1. College Botany Vol. I. New Central Book Agency. Calcutta.
2. College Botany Vol. III. New Central Book Agency. Calcutta.
3. Datta, S. C. 1991. Systematic Botany. Wiley Eastern Ltd. New Delhi, Calcutta.
4. Lawrence, G. H. M. 1981. Taxonomy of Vascular Plants. Mc Milian New York.
5. Naik, V. N. Taxonomy of Angiosperms. Tata Mc. Graw Hill Publishers Co. 1981. New Delhi.
6. Plant Groups. (Recent Edition). H. Mukherjee. New Central Book Agency.
7. Plant Systematics. Gurucharan Singh. 2005 (2nd Edition). Oxford & IBH.
8. Fahn, 1982. Plant Anatomy. John Willey.
9. P. Roy. Plant Anatomy, New Central Book Agency, Kolkata

SKILL ENHANCEMENT (SE) PAPER
Course Name: Horticulture, Nursery and Gardening
Course Code: BSCBOTSE401
L-T-P (3-0-0) Theory –15 (CA) and 35 (ESE), Total = 50

Course Type: SE	Course Details: SEC- 3			L-T-P: 3-0-0	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	15	--	35

Course Learning Outcomes:

On completion of this course the students will be able to:

1. Understand the concept of different types of horticultural practices for value addition
2. Understand the process of sowing seeds in nursery
3. List the various resources required for the development of nursery
4. Distinguish among the different forms of sowing and growing plants
5. Analyse the process of Vegetative propagation
6. Appreciate the diversity of plants and selection of gardening
7. Examine the cultivation of different vegetables in nursery and gardening

Unit I: Horticulture:

- Types, classification (annuals, perennials, climbers and trees);
- Propagation Methods: asexual (grafting, cutting, layering, budding), sexual (seed propagation), Bonsai Production;

- Production of ornamental, fruits and vegetables, medicinal and aromatic plants.
- Identification and salient features of some ornamental plants [rose, marigold, tuberose].
- Ornamental flowering trees (Gulmohar, Lagerstroemia and areca palms);
- Description of plants and their economic products;
- Management and marketing of vegetable (Potato and Brinjal) and fruit crops (Mango and Banana);
- Cultivation, processing and marketing of products of major medicinal plants (*Senna*, Ashwagandga, Amla, Vetiver, *Aloe vera*).

Unit II: Nursery and Gardening:

- Definition, objectives and scope and building up of infrastructure for nursery,
- Planning and seasonal activities - Planting - direct seeding and transplants.
- Different types of gardening: ornamental, kitchen, vertical, and rooftop gardens
- Seed storage: Seed banks, factors affecting seed viability.
- Vegetative propagation: air-layering, cutting; treatment of cutting, rooting medium and planting of cuttings.
- Hardening of plants – Principles and methods.
- Protected cultivation methods - greenhouse, mist chamber, , shade house and glasshouse;
- Landscape and home gardening – Principles and landscape designing, planning and designing of home gardens; Xeriscaping, Growing plants of aesthetic value.
- Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes and carrot;
- Post harvest management and marketing - Storage and marketing procedures, Factors affecting storage; Marketing strategies for nursery plants and other plant produce, Problems related to nursery maintenance and marketing, possible solutions.

Suggested Readings:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

NEP SYLLABUS
GEOGRAPHY

Structure and Detailed Syllabus

for

Undergraduate Course

in

Geography

Under Curriculum and Credit Framework for Undergraduate Programmes (CCFUP) - NEP 2020

With effect from Academic Session 2023-24

Kazi Nazrul University
Asansol 713 340
West Bengal
www.knu.ac.in

Scheme for the Curriculum under CCFUP (As per NEP 2020)

✧ Major Course (MJC)

BSCGEOMJ101 - **Fundamentals of Physical Geography**

BSCGEOMJ201 - **Fundamentals of Human Geography**

BSCGEOMJ301 - **Climatology**

BSCGEOMJ302 - **Cartography and Surveying**

BSCGEOMJ401 - **Soil and Biogeography**

BSCGEOMJ402 - **Remote Sensing, GIS and GNSS**

BSCGEOMJ501 - **Economic and Transport Geography**

BSCGEOMJ502 - **Statistical Techniques in Geography**

BSCGEOMJ503 - **Basic Field Training and Field Report**

BSCGEOMJ601 - **Geographical Thought**

BSCGEOMJ602 - **Geography of India and West Bengal**

BSCGEOMJ603 - **Population and Settlement Geography**

BSCGEOMJ604 - **Advanced Remote Sensing and GIS**

BSCGEOMJ701 - **Advanced Geomorphology, Hydrology and Oceanography**

BSCGEOMJ702 - **Environmental Geography**

BSCGEOMJ703 - **Urban and Regional Planning**

BSCGEOMJ704 - **Advanced Analytical Techniques in Geography**

BSCGEOMJ801 - **Research Methodology in Geography**

BSCGEOMJ802 - **Geography of Development**

BSCGEOMJ803 - **Agricultural Geography and Landuse Planning**

BSCGEOMJ804 - **Social and Political Geography**

✧ Minor Course (MNC)

BSCHGEOMN101 - **Fundamentals of Physical Geography**

BSCHGEOMN201 - **Fundamentals of Human Geography**

BSCHGEOMN301 - **Climate Change: Vulnerability and Adaptations**

BSCHGEOMN401 - **Geospatial Science and Technology**

BSCHGEOMN501 - **Sustainable Resource Development**

BSCHGEOMN701 - **Geotourism**

BSCHGEOMN801 - **Rural Development**

✧ Multidisciplinary Course (MD): Courses from Other Disciplines

MD-1 - **Physical Science** (Department of Physics/ Chemistry)

MD-1 - **E-Commerce** (Department of Commerce/ BBA)

MD-1 - **Human Rights** (Department of Political Science)

MD-1 - **Disaster Management** (Department of Geography/ Geology)

MD-1 - **Film Appreciation** (Department of English)

MD-2 - **Business Environment** (Department of Commerce)

MD-2 - **Adhunik Bangla Sahitya** (Department of Bengali)

MD-2 - **Adhunik Hindi Sahitya** (Department of Hindi)

MD-2 - **Application of Bio-Science** (Department of Zoology/ Botany/ Microbiology)

MD-2 - **Educational Philosophy** (Department of Education)

MD-2 - **Sports and Fitness** (Department of Physical Education)

MD-3 - **Mathematical Science** (Department of Mathematics)

MD-3 - **Cultural History of Bengal** (Department of History)

MD-3 - **Business Management** (Department of BBA)

MD-3 - **Nutrition and Public Health** (Department of Nutrition)

MD-3 - **Stress Management** (Department of Psychology/ Philosophy/ Sociology)

✧ Ability Enhancement Compulsory Elective/ Course (AECE/ AECC)

AEC-1 - **English/ MIL Communication**

AEC-2 - **English Communication**

✧ Skill Enhancement Course (SEC)

BSCGEOSE101 - **Elementary Practicals in Physical Geography**

BSCGEOSE201 - **Elementary Practicals in Human Geography**

BSCGEOSE401 - **Computer Applications in Geography**

✧ Value Added Course (VAC)

VAC201 - **Environment Studies**

VAC401 - **Health and Wellness**

VAC402 - **Social Values and Ethics**

VAC403 - **Digital and Technological Solutions**

VAC404 - **Understanding India**

✧ Summer Internship/ Apprenticeship

BSCGEOSI601 - **Summer Internship**

✧ Research Project/ Dissertation

BSCGEORP801 - **Research Project/ Dissertation**

✧ Credits and Marks Distribution Scheme for Course Structure under CCFUP: UG Geography

Discipline Code: BSCGEO

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
I Marks: 350 Credits: 20	Major MJC-1	BSCGEOMJ101: Fundamentals of Physical Geography	5	4 - 1 - 0	----	30	----	70	100
	Minor MNC-1	Choose from the Pool of Minor Courses offered in 1st Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100
	MD Multidisciplinary Course-1	Choose from the Pool of Multidisciplinary Courses offered in 1st Semester	3	3 - 0 - 0	----	15	----	35	50
	AEC-1 Ability Enhancement Elective Course	AECE: English/ MIL Communication (See Pool)	4	4 - 0 - 0	----	15	----	35	50
	SEC Skill Enhancement Course-1	BSCGEOSE101: Elementary Practicals in Physical Geography	3	0 - 0 - 6	30	----	20	----	50
II Marks: 350 Credits: 20	Major MJC-2	BSCGEOMJ201: Fundamentals of Human Geography	5	4 - 1 - 0	----	30	----	70	100
	Minor MNC-2	Minor Course opted for in the 1st Semester should be continued in the 2nd Semester with the Syllabus Content of 2nd Semester	5	4 - 1 - 0	----	30	----	70	100
	MD Multidisciplinary Course-2	Choose from the Pool of Multidisciplinary Courses offered in 2nd Semester	3	3 - 0 - 0	----	15	----	35	50
	VAC Value Added Course-1	VAC-201: Environment Studies	4	4 - 0 - 0	----	15	----	35	50
	SEC Skill Enhancement Course -2	BSCGEOSE201: Elementary Practicals in Human Geography	3	0 - 0 - 6	30	----	20	----	50

Students exiting the programmes after securing **40 credits** will be awarded **UG Certificate** in the relevant Discipline/ Subject, provided they secure **4 credits** in work-based vocational courses offered during the **Summer Term** or **Internship/ Apprenticeship** in addition to **6 credits** from **skill-based courses** earned during the first and second semesters.

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
III Marks: 400 Credits: 22	Major MJC-3	BSCGEOMJ301: Climatology	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-4	BSCGEOMJ302: Cartography and Surveying	5	0 - 0 - 10	60	----	40	----	100
	Minor MNC-3	Choose from the Pool of Minor Courses offered in 3rd Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100
	MD Multidisciplinary Course-3	Choose from the Pool of Multidisciplinary Courses offered in 3rd Semester	3	2 - 1 - 0	----	15	----	35	50
	AEC-2 Ability Enhancement Compulsory Course	AECC: English Communication	4	4 - 0 - 0	----	15	----	35	50
IV Marks: 400 Credits: 22	Major MJC-5	BSCGEOMJ401: Soil and Biogeography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-6	BSCGEOMJ402: Remote Sensing, GIS and GNSS	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-4	Choose from the Pool of Minor Courses offered in 4th Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100
	SEC Skill Enhancement Course-3	BSCGEOSE401: Computer Applications in Geography	3	0 - 0 - 6	30	----	20	----	50

	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
	VAC Value Added Course-2 (Any One)	VAC-401: Health and Wellness	4	4 - 0 - 0	----	15	----	35	50
		VAC-402: Social Values and Ethics		4 - 0 - 0	----	15	----	35	
		VAC-403: Digital and Technological Solutions		4 - 0 - 0	----	15	----	35	
		VAC-404: Understanding India		4 - 0 - 0	----	15	----	35	
Students exiting the programmes after securing **80 credits** will be awarded **UG Diploma** in the relevant Discipline/ Subject, provided they secure additional **4 credits** in **skill-based vocational courses** offered during first year or second year summer term.									
V Marks: 400 Credits: 22	Major MJC-7	BSCGEOMJ501: Economic and Transport Geography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-8	BSCGEOMJ502: Statistical Techniques in Geography	5	0 - 0 - 10	60	----	40	----	100
	Major MJC-9	BSCGEOMJ503: Basic Field Training and Field Report	5	0 - 0 - 10	60	----	40	----	100
	Minor MNC-5	Choose from the Pool of Minor Courses offered in 5th Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100
VI Marks: 450 Credits: 22	Major MJC-10	BSCGEOMJ601: Geographical Thought	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-11	BSCGEOMJ602: Geography of India and West Bengal	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-12	BSCGEOMJ603: Population and Settlement Geography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-13	BSCGEOMJ604: Advanced Remote Sensing and GIS	5	3 - 0 - 4	30	15	20	35	100
	SI Summer Internship-1	BSCGEOSI601: Summer Internship	2	0 - 0 - 4	30	----	20	----	50

Total Credit and Marks		Total Credit	126						Total Marks	2350
Students who want to undertake **3-year** UG programme will be awarded **UG Degree** in the relevant Discipline / Subject upon securing **126 credits**.										
Semester	**Course Type and Details**	**Course Code and Name**	**Credits**	**Credit Pattern (L-T-P)**	**Marks Distribution**					
					Continuous Assessment Marks		**End Semester Marks**		**Total Marks**	
					Practical Exam	**Theoretical Exam**	**Practical Exam**	**Theoretical Exam**		
VII **Marks: 500** **Credits: 25**	Major MJC-14	BSCGEOMJ701: Advanced Geomorphology, Hydrology and Oceanography	5	3 - 0 - 4	30	15	20	35	100	
	Major MJC-15	BSCGEOMJ702: Environmental Geography	5	3 - 0 - 4	30	15	20	35	100	
	Major MJC-16	BSCGEOMJ703: Urban and Regional Planning	5	3 - 0 - 4	30	15	20	35	100	
	Major MJC-17	BSCGEOMJ704: Advanced Analytical Techniques in Geography	5	0 - 2 - 6	60	----	40	----	100	
	Minor MNC-6	Choose from the Pool of Minor Courses offered in 7th Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100	
VIII **Marks: 500** **Credits: 22**	Major MJC-18	BSCGEOMJ801: Research Methodology in Geography	5	3 - 0 - 4	30	15	20	35	100	
	Major MJC-19	BSCGEOMJ802: Geography of Development	4	2 - 0 - 4	30	15	20	35	100	
	Major MJC-20	BSCGEOMJ803: Agricultural Geography and Landuse Planning	4	2 - 0 - 4	30	15	20	35	100	
	Major MJC-21	BSCGEOMJ804: Social and Political Geography	4	2 - 0 - 4	30	15	20	35	100	
	Minor MNC-7	Choose from the Pool of Minor Courses offered in 8th Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100	
Total Credit and Marks		**Total Credit**	**173**						**Total Marks**	**3350**
Students will be awarded **UG Degree** (**Honours**) in the relevant Discipline / Subject provided they secure **173 credits**.										

4-year UG Degree (Honours with Research)									
Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
VII Marks: 500 Credits: 25	Major MJC-14	BSCGEOMJ701: Advanced Geomorphology, Hydrology and Oceanography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-15	BSCGEOMJ702: Environmental Geography	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-16	BSCGEOMJ703: Urban and Regional Planning	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-17	BSCGEOMJ704: Advanced Analytical Techniques in Geography	5	0 - 2 - 6	60	----	40	----	100
	Minor MNC-6	Choose from the Pool of Minor Courses offered in 7th Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100
VIII Marks: 500 Credits: 22	Major MJC-18	BSCGEOMJ801: Research Methodology in Geography	5	3 - 0 - 4	30	15	20	35	100
	RP Research Project-1	BSCGEORP801: Research Project/ Dissertation	12	0 - 0 - 24	180	----	120	----	300
	Minor MNC-7	Choose from the Pool of Minor Courses offered in 8th Semester by the other Disciplines	5	4 - 1 - 0	----	30	----	70	100
Total Credit and Marks		Total Credit	173					Total Marks	3350
Students will be awarded **UG Degree** (**Honours**) in the relevant Discipline / Subject provided they secure **173 credits**.									

Semester wise Pool of **Multidisciplinary Courses** offered for **Major** Disciplines									
Semester	**Course Type and Details**	**Course Code and Name**	**Credits**	**Credit Pattern (L-T-P)**	**Marks Distribution**				
					Continuous Assessment Marks		**End Semester Marks**		**Total Marks**
					Practical Exam	**Theoretical Exam**	**Practical Exam**	**Theoretical Exam**	
I **Marks: 50** **Credits: 3**	**MD** **Multidisciplinary Course -1**	**Physical Science** (Department of Physics/ Chemistry)	3	3 - 0 - 0	----	15	----	35	50
		E-Commerce (Department of Commerce/ BBA)	3	3 - 0 - 0	----	15	----	35	50
		Human Rights (Department of Political Science)	3	3 - 0 - 0	----	15	----	35	50
		Disaster Management (Department of Geography/ Geology)	3	3 - 0 - 0	----	15	----	35	50
		Film Appreciation (Department of English)	3	3 - 0 - 0	----	15	----	35	50
II **Marks: 50** **Credits: 3**	**MD** **Multidisciplinary Course -2**	**Business Environment** (Department of Commerce)	3	3 - 0 - 0	----	15	----	35	50
		Adhunik Bangla Sahitya (Department of Bengali)	3	3 - 0 - 0	----	15	----	35	50
		Adhunik Hindi Sahitya (Department of Hindi)	3	3 - 0 - 0	----	15	----	35	50
		Application of Bio-Science (Department of Zoology/ Botany/ Microbiology)	3	3 - 0 - 0	----	15	----	35	50
		Educational Philosophy (Department of Education)	3	3 - 0 - 0	----	15	----	35	50
		Sports and Fitness (Department of Physical Education)	3	3 - 0 - 0	----	15	----	35	50
III **Marks: 50** **Credits: 3**	**MD** **Multidisciplinary Course -3**	**Mathematical Science** (Department of Mathematics)	3	3 - 0 - 0	----	15	----	35	50
		Cultural History of Bengal (Department of History)	3	3 - 0 - 0	----	15	----	35	50
		Business Management (Department of BBA)	3	3 - 0 - 0	----	15	----	35	50

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
	MD Multidisciplinary Course -3	Nutrition and Public Health (Department of Nutrition)	3	3 - 0 - 0	----	15	----	35	50
		Stress Management (Department of Psychology/ Philosophy/ Sociology)	3	3 - 0 - 0	----	15	----	35	50
Pool of **Communication Courses** offered as **Ability Enhancement Compulsory Courses**									
I Marks: 50 Credits: 4	AEC-1 Ability Enhancement Elective Course	AECEE101: English Communication	4	4 - 0 - 0	----	15	----	35	50
		AECEB101: Bengali Communication	4	4 - 0 - 0	----	15	----	35	50
		AECEH101: Hindi Communication	4	4 - 0 - 0	----	15	----	35	50
		AECEU101: Urdu Communication	4	4 - 0 - 0	----	15	----	35	50
Semester wise Pool of **Minor Courses** offered by this Discipline for other Disciplines									
I	Minor MNC-1	BSCHGEOMN101: Fundamentals of Physical Geography	5	4 - 1 - 0	----	30	----	70	100
II	Minor MNC-2	BSCHGEOMN201: Fundamentals of Human Geography	5	4 - 1 - 0	----	30	----	70	100
III	Minor MNC-3	BSCHGEOMN301: Climate Change: Vulnerability and Adaptations	5	4 - 1 - 0	----	30	----	70	100
IV	Minor MNC-4	BSCHGEOMN401: Geospatial Science and Technology	5	4 - 1 - 0	----	30	----	70	100
V	Minor MNC-5	BSCHGEOMN501: Sustainable Resource Development	5	4 - 1 - 0	----	30	----	70	100
VII	Minor MNC-6	BSCHGEOMN701: Geotourism	5	4 - 1 - 0	----	30	----	70	100
VIII	Minor MNC-7	BSCHGEOMN801: Rural Development	5	4 - 1 - 0	----	30	----	70	100

Programme: B.Sc.	Year: I	Semester: I
Subject: Geography		
Course Name: Introduction to Physical Geography		
Course Code: BSCGEOMJ101		
Course Type: **Major (Theoretical)**	Course Details: **MJC-1**	L-T-P: **4 - 1 - 0**

Course Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	**30**	---	**70**

Course Objectives:

✧ The course offers basic knowledge about the principal characteristics of the Earth's physical environment.

✧ To provide fundamental knowledge of the different aspects of Geomorphology, along with the ability to objectively identify and characterize the different Earth surface processes that have influenced the landscape expressions and landform assemblages and vital roles in the occurrence of several natural hazards.

Learning Outcome:

✧ Students shall obtain an overview of the causes of various geophysical and geomorphic phenomena, their impression on the land surface, and their effect on the habitable world.

✧ The students will definitely assist people regarding risk reduction from any geomorphic hazards.

Professional Skill Development:

✧ The obtained knowledge is vital to provide a foundation for future studies in Physical Geography or Earth System Sciences.

✧ This knowledge will help to provide inputs on the basic concepts that underlie much of the United Nations Sustainable Development Goals on clean water, land, natural resources, and human impacts on the physical environment.

Sub units	Topics to be covered	No. of Lectures
Unit I: The Earth and its Physical Environment [30 Hours]		
1.1	Earth as a Planet: Theories on the origin of the Earth (Immanuel Kant and Pierre-Simon Laplace)	2
1.2	The Solid Earth: Earth's tectonic and structural evolution through geological timescales; Basics of Geochronology	4
1.3	Thermal and physical state of the Earth's interior with special reference to seismological evidence; Genesis of earthquake; Vulcanicity and related landforms	4
1.4	Continental drift and seafloor spreading with special reference to Paleomagnetism; Isostasy (Models of Airy, Pratt and their applicability)	4
1.5	Earth's atmosphere: Insolation; Pressure belts; Planetary wind system; Greenhouse effect and global warming	4
1.6	Earth's hydrosphere: Global hydrological cycle; Ocean circulation - major ocean currents (Atlantic and Pacific)	4

1.7	Earth's biosphere: Major Biomes of the world (Tropical Rainforest, Temperate Grassland and Tundra); Classification of forest (Champion)	4
1.8	Earth's pedosphere: Concept of Zonal, Azonal and Intrazonal Soil; Soil erosion and conservation	4
Unit II: Earth Surface Dynamics and Processes [30 Hours]		
2.1	Basic concepts of Geomorphology (W.D. Thornbury); Scales in Geomorphology	4
2.2	Plate Tectonics and associated landforms: Processes and landforms at plate margins and plate interiors	4
2.3	Degradational processes: Weathering, mass wasting and resultant landforms	4
2.4	Models of landscape evolution: Views of Davis, Penck, and Hack	4
2.5	Development of river network and landforms on uniclinal and folded structures	4
2.6	Development of landforms on igneous rocks: Granite and basalt; Landforms on sedimentary rocks: Sandstones and limestones	4
2.7	Surface processes and landforms: Fluvial, Aeolian and fluvio-aeolian, Glacial and glacio-fluvial	4
2.8	Coastal processes and landforms	2

✧ Course Evaluation:

- **Continuous Assessment: 30 Marks**

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions / topics. [**14 Marks**]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions / topics (s). [**16 Marks**]

- **End Semester Examination: 70 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **four** questions; Four questions carrying **5 marks** each out of given **eight** questions;. Ten questions carrying **2 marks** each out of given **sixteen** questions; Ten questions carrying **1 mark** each out of given **sixteen** questions.

✧ References

Agrawal, D.P. and Yadava, M.G. (1995): Dating the Human Past, ISPQS Monograph Series No. 1, Indian Society for Prehistoric and Quaternary Studies, Department of Archaeology, Deccan College, Pune.

Ahmad, E. (1982): Physical geography (Geophysical Portion), Kalyani Publishers, New Delhi.

Anderson, R.S. and Anderson, S.P. (2010): Geomorphology: The Mechanics and Chemistry of Landscapes, Cambridge University Press, Cambridge.

Barry, R.G. and Chorley R.J. (2009): Atmosphere Weather and Climate. 9th Ed, Routledge.

Bierman, P.R. and Montgomery, D.R. (2014): Key Concepts in Geomorphology, W.H. Freeman and Company Publishers, New York.

Biswas, T.D. and Mukherjee, S.K. (1987): Textbook of Soil Science, Tata-McGraw-Hill.

Bloom, A. L. (2002): Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice Hall, Upper Saddle River, New Jersey.

Brown, G.C. and Mussett, A.E. (1993): The Inaccessible Earth (An integrated view to its structure and composition), Chapman & Hall, London.

Bunting, B.T. (1965): The Geography of Soil, Hutchison University Library, London.

Chorley, R.J. (Editor) (1969): Water, Earth, and Man: A Synthesis of Hydrology, Geomorphology and Socio-Economic Geography, Methuen, London.

Chorley, R.J. and Kennedy, B.A. (1971): Physical Geography: A Systems Approach, Prentice Hall, Upper Saddle River, New Jersey.

Condie, K.C. (2003): Plate Tectonics and Crustal Evolution, Butterworth-Heinemann, Oxford, Burlington.

Cox, A. and Hart, R.B. (1986): Plate Tectonics: How it Works, Blackwell Scientific Publications, Oxford.

Critchfield, H.J. (2008): General Climatology, 4th Edition, Pearson Education India.

Gabler, B., Gabler, R.E., Petersen, J.F. and Trapasso, L.M. (2007): Essentials of Physical Geography, Thomson-Brooks/Cole.

Gerrard, A.J. (1988): Rocks and Landforms, Unwin Hyman, London.

Goudie, A.S. (Ed) (2004): Encyclopedia of Geomorphology, vol. 1 and 2, Routledge.

Gregory, K.J. and Lewin, J. (2014): The Basics of Geomorphology: Key Concepts, SAGE Publications Ltd.

Gutiérrez, M. (2013): Geomorphology, CRC Press, Boca Ranton, Florida.

Hawking, S. (1988): A Brief History of Time: From the Big Bang to Black Holes, Bantam Books.

Holmes, A. (1978): Principles of Physical Geology, Van Nostrand Rheinhold, New York.

Huggett, R.J. (2011): Fundamentals of Geomorphology, Routledge, New York.

Joffe, J.S. (1949): The ABC of Soils, Pedology Publications, New Brunswick, New Jersey.

Kale, V.S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Kolkata.

Keary, P. and Vine, M. (1997): Global Tectonics, Blackwell Scientific Publications, Oxford.

Lowrie, W. (2007): Fundamentals of Geophysics, Second Edition, Cambridge University Press, UK.

MacDonald, G.2001. Biogeography: Introduction to Space, Time, and Life, Wiley.

Ollier. C. (1969). Weathering, Second Edition, Longman, London.

Pinet, P.R. (2006): Invitation to Oceanography, 4th Edition, Jones & Bartlett Pub., New York.

Selby, M.J. (1985): Earth's Changing Surface: An Introduction to Geomorphology, Clarendon Press, Oxford.

Strahler, A.H. and Strahler A.N. (1992): Modern Physical Geography, John Wiley & Sons, New York.

Summerfield, M.A. (1991): Global Geomorphology: An Introduction to the Study of Landforms, John Wiley and Sons Ltd., New York.

Thorn, C. (1988): Introduction to Theoretical Geomorphology, Unwin Hyman, Boston.

Thornbury, W.D. (I960): Principles of Geomorphology, John Wiley & Sons, New York.

Whittow, J.B. (1984): The Penguin Dictionary of Physical Geography, Penguin Books, London.

Wooldridge, S.W. and Morgan, R.S. (1937): An Outline of Geomorphology: The Physical Basis of Geography, Longman, London.

Young, A. (1972): Slopes, Oliver and Boyd, Edinburg.

<table>
<tr><td colspan="2">Programme: B.Sc.</td><td colspan="2">Year: I</td><td colspan="2">Semester: I</td></tr>
<tr><td colspan="6">Subject: Geography</td></tr>
<tr><td colspan="6">Course Name: Elementary Practicals in Physical Geography</td></tr>
<tr><td colspan="6">Course Code: BSCGEOSE101</td></tr>
<tr><td colspan="2">Course Type: SEC (Practical)</td><td colspan="2">Course Details: SEC-1</td><td colspan="2">L-T-P: 0 - 0 - 6</td></tr>
<tr><td colspan="2" rowspan="2">Course Credit: 3</td><td rowspan="2">Full Marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td colspan="2"></td><td>30</td><td>---</td><td>20</td><td>---</td></tr>
<tr><td colspan="6">Course Objectives:
✧ This course is an initiative to impart knowledge on the basic concept of the practicals in Physical Geography to students so that they can apply it to solve geographical problems in the field.
✧ To orient the students towards identifying and analysing various facets of geographical features and processes from maps and field.</td></tr>
<tr><td colspan="6">Learning Outcome:
✧ Students will learn about the application of scale in geographic studies.
✧ Students will be able to interpret landform structures with the help of geological maps and learn to identify minerals and rocks, the fundamental element of landforms.
✧ Upon completing this course, students will understand the interpretation techniques of topographical maps and their application.</td></tr>
</table>

Professional Skill Development:

✧ The acquired knowledge is beneficial for future studies in physical geography.

✧ This obtained knowledge will provide essential inputs in skill development, which will place the students in their professional life in the near future.

Sub units	Topics to be covered	Lab work hours
Unit I: Scale, Minerals and Rocks [20 Hours]		
1.1	Concept and classification of map scales (Linear, Diagonal and Vernier)	12
1.2	Megascopic identification of (a) Mineral samples: Bauxite, Calcite, Chalcopyrite, Feldspar, Galena, Gypsum, Hematite, Magnetite, Mica, Quartz, Talc, Tourmaline; and (b) Rock samples: Granite, Basalt, Dolerite, Pegmatite, Limestone, Shale, Sandstone, Conglomerate, Slate, Phyllite, Schist, Gneiss, Quartzite, Marble	8
Unit II: Basic Geological and Geomorphological Exercises [40 Hours]		
2.1	Measurement of dip and strike using clinometer; Analysis of geological maps (Horizontal, Uniclinal and folded structure along with intrusions and unconformities)	20
2.2	Preparation of data inventory in Physical Geography (Seismic data, Hydro-meteorological data, Soil data); Landform identification from Google Earth; Measurement of pebble shape using slide caliper	20
Unit III: Topographical Maps [30 Hours]		
3.1	Survey of India topographical maps: History, indexing vis-a-vis scale (old and open series); Information on the margin of maps	04
3.2	Extraction and interpretation of geomorphic information from topographical maps of plateau region (Open and Defence Series maps, RF 1:50k): Construction and interpretation of relief (superimposed, projected and composite) profiles and river profiles (cross and longitudinal), delineation of drainage basins, stream ordering (Horton and Strahler) and bifurcation ratio on a drainage basin; Morphometric techniques in 10 cm x 12 cm area: Relative Relief (after G.H. Smith, 1935), Average Slope (after C.K. Wentworth, 1930), Drainage Density and Stream Frequency (after R.E. Horton, 1945)	26

✧ Course Evaluation:

- **Continuous Assessment: 30 Marks**

1. Practical records: A laboratory notebook covering all practical topics must be prepared and duly signed by the teacher. [**10 Marks**]

2. Class test: Internal Assessment to be conducted on the basis of above three units. Students have to answer two compulsory questions of 10 marks from the above three units. [**20 Marks**]

- **End Semester Examination: 20 Marks**

1. Written test: In the End Semester Examination, students have to answer one compulsory question from the above three units, except unit 2.2 [**15 Marks**]

2. Viva-voce based on laboratory notebook [**5 Marks**]

✧ References

Alvi, Z. (1994): A Textbook of Practical Geography, Vikas Publishing House Pvt. Ltd., New Delhi.

Bygott, J. (1964): Introduction to Mapwork and Practical Geography, Harper Collins Distribution Services, London.

Chouhan, P. (2013): Topographical Maps: Analysis and Interpretation, Readers Service, Kolkata.

Dackombe, R.V. and Gardiner, V. (1983): Geomorphological Field Manual, George Allen and Unwin, London.

Doornkamp. J.C. and King C.A.M. (1971): Numerical Analysis in Geomorphology: An Introduction, St. Martin's Press, New York.

Farndon, J. (2012): The Illustrated Guide to Rocks & Minerals, Southwater.

Garnett, A. (1955): The Geographical Interpretation of Topographical Maps, George G. Harrap & Co. Ltd., London.

Ishtiaq, M. (1994): Practical Geography, Jawahar Publishers & Distributors, New Delhi.

Khan, Md. Z.A. (1998): Text Book of Practical Geography, Concept Publishing Company, New Delhi.

Maltman, A. (1990): Geological Maps: An Introduction, Open University Press, Buckingham.

Bolton. T. (2009) (reprint): Geological Maps: Their Solution and Interpretation, Cambridge Univ. Press.

McCullagh, P. (1978): Modern Concept in Geomorphology, Oxford University Press, London.

Pillent, C. (2002): Smithsonian Handbooks: Rocks & Minerals, Dorling Kindersley.

Platt, J.I. and Challinor, J. (1956): Simple Geological Structures (A Series of Notes and Map Exercises), Thomas Murby & Co, London.

Saha, P.K. and Basu, P. (2009): Advanced Practical Geography, Books and Allied (P) Ltd., Kolkata

Sarkar, A. (1997): Practical Geography: A Systematic Approach, Orient Longman Ltd., Hyderabad.

Scheffers, A.M., May, S.M. and Kelletat, D.H. (2015): Landforms of the World with Google Earth: Understanding our Environment, Springer.

Sen, P.K. (1993): Geomorphological Analysis of Drainage Basin, The University of Burdwan, Burdwan.

Singh, Gopal (1998): Map Work and Practical Geography, Vikas Publishing, New Delhi.

Singh, L.R. (2005): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.

Singh, R.L. and Singh, R.P.B. (1991): Elements of Practical Geography, Kalyani Pub., New Delhi.

Sinha, M.M.P. and Bala, S. (2021): Advanced Cartography and Practical Geography, Rajesh Publications, New Delhi.

Sorrell, C.A. and Sandström, G.F. (2001): Rocks and Minerals: A Guide to Field Identification, St. Martin's Press.

Vaidyanadhan, R. and Subbarao, K.V. (2016): Landforms of India from Topomaps and Images, Revised Second Edition (Digital Edition), Geological Society of India.

Programme: B.Sc.	**Year: I**		**Semester: II**	
Subject: Geography				
Course Name: Fundamentals of Human Geography				
Course Code: BSCGEOMJ201				
Course Type: **Major (Theoretical)**	Course Details: **MJC-2**		L-T-P: **4 - 1 - 0**	
Course Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	**30**	---	**70**

Course Objectives:

✧ To have a complete understanding of human aspects of geographical phenomena and their interface within the realm of our environment.

✧ To impart fundamental knowledge about Population Geography and basic concepts in Settlement Geography.

Learning Outcome:

✧ At the end of this course, it is expected that students will be able to understand the social environment from local to global perspectives.

✧ Students will be able to describe and evaluate relevant issues to the needs of the contemporary world.

Professional Skill Development:

✧ This knowledge will provide students with a wide range of professional skills applicable to various fields.

✧ It will prepare them for careers in urban planning, public policy, community development, international development, and social research.

Sub units	Topics to be covered	No. of Lectures
Unit I: Nature and Principles of Human Geography [30 Hours]		
1.1	Nature, scope and recent trends; Development and branches of human geography	3
1.2	Approaches to Human Geography: Resource, locational, landscape, environmental	4
1.3	Evolution of Man-Nature interaction: Hunting and Food gathering, Pastoral nomadism, Agrarian society and industrial society	4
1.4	Human adaptation to environment: Case studies of Eskimo and Masai; Primitive people of India (Santhal and Nagas)	6
1.5	Space and Society: Concept of culture and its components, innovation, diffusion and convergence of culture	3

1.6	Race and ethnic groups: Concept, origin and distribution	4
1.7	Language and religion: Origin, diffusion and distribution	4
1.8	Cultural realms of the world and their characteristics	2
Unit II: Population, Settlement and Development [30 Hours]		
2.1	Population geography and demography; Population growth and distribution; Population composition (Age-Sex composition)	4
2.2	Theories of population: Malthusian and demographic transition; Population-resource regions (W. Zelinsky and E.A. Ackerman)	4
2.3	Population and environment relations with special reference to development-environment conflict (Multi-purpose river valley projects)	2
2.4	Origin and growth of rural settlements; Social morphology and rural house types in India; Types and patterns of rural settlements	6
2.5	Origin and growth of urban settlements; Functional classification of urban settlements; Morphology of urban settlements: Models of Burgess, Hoyt, Harris and Ullman	6
2.6	Trends and patterns of world urbanization (ancient and modern)	2
2.7	Poverty and inequality: Concept, causes and consequences; Food Security in Indian context	3
2.8	Indicators of social well-being; Human development	3

✧ Course Evaluation:

- **Continuous Assessment: 30 Marks**

1. Seminar presentations: A powerpoint presentation to be conducted for internal assessment on the notified portions / topics. [**14 Marks**]

2. Class test: There shall be test (s) of knowledge and understanding through written test on the notified portions / topics (s). [**16 Marks**]

- **End Semester Examination: 70 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer Two questions carrying **10 marks** out of given **four** questions; Four questions carrying **5 marks** each out of given **eight** questions;. Ten questions carrying **2 marks** each out of given **sixteen** questions; Ten questions carrying **1 mark** each out of given **sixteen** questions.

✧ References

Bhende, A.S. and Kanitkar, T. (2015): Principles of Population Studies, Himalaya Publishing House, Mumbai.

Blij, H.D. (1992): Human and Economic Geography, Macmillan Publishing Company.

Carter, H. (1981): Urban Geography, 3rd edition, Arnold-Heinemann, New Delhi.

Chandna, R.C. (2016): Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers.

Clarke, J.I. (1972): Population Geography, Pergamon Press, Oxford.

Daniel, P.A., and Hopkinson, M.F. (1989): The Geography of Settlement, Oliver & Boyd, London.

Fellmann, J.D., Getis, A., Getis, J. and Malinowski, J.C. (2005): Human Geography: Landscapes of Human Activities, McGraw Hill Higher Education, Boston.

Fouberg, E.H., Murphy, A.B. and de Blij H.J. (2015): Human Geography: People, Place, and Culture, 11th ed, Wiley.

Ghosh, S. (1998): Introduction to Settlement Geography, Sangam Books Ltd.

Goodall, B. (1987): The Penguin Dictionary of Human Geography, Penguin Books, London.

Gould, W.T.S. (2015). Population and Development, Routledge.

Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds.) (2009): The Dictionary of Human Geography, 5th ed, Wiley.

Hussain, M. (2003): Human Geography, Rawat Publications, Jaipur.

Knox, P.L. and Marston, S.A. (2014): Human Geography: Places and Regions in Global Context, 6th ed, Pearson Education Limited.

Knox, P.L. and McCarthy, L.M. (2011): Urbanization: An Introduction to Urban Geography, 3rd ed, Pearson Educztuion Ltd.

Mandal, R.B. (2001): Introduction to Rural Settlement, 2nd ed, Concept Publishing Company.

Maurya, S.D. (2012): Human Geography, Pravalika Publications, Allahabad.

Moseley, W.G., Perramond, E., Hapke, H.M. and Laris, P. (2013): An Introduction to Human-Environment Geography: Local Dynamics and Global Processes, Wiley-Blackwell.

Norton, W. (2014): Human Geography, 8th ed, Oxford University Press.

Pickering K.T. and Owen L.A. (1997): An Introduction to Global Environmental Issues, 2nd edition, Routledge, London.

Ramachandran, R. (2010): Urbanisation and Urban Systems of India, Oxford University Press, New Delhi.

Rubenstein, J.M. (2016): The Cultural Landscape: An Introduction to Human Geography, 12th ed, Pearson Education Limited.

Short, R.J. (2017): Human Geography: A Short Introduction, 2nd ed, Oxford University Press.

Singh, L.R. (2005): Fundamentals of Human Geography, Sharda Pustak Bhawan, Allahabad.

Singh, R.B. (Ed.) (1995): Studies in Environment and Development, Rakesh Prakashan, Varanasi.

Singh, R.Y. (1994): Geography of Settlement, Rawat Publications, Jaipur.

Smith, D.M. (1982): Human Geography: A Welfare Approach, Edward Arnold, London.

UNDP (2001-04): Human Development Report, Oxford University Press.

Programme: B.Sc.	**Year: I**		**Semester: II**	
Subject: Geography				
Course Name: Elementary Practicals in Human Geography				
Course Code: BSCGEOSE201				
Course Type: **SEC (Practical)**	Course Details: **SEC-2**		L-T-P: **0 - 0 - 6**	
Course Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	---	**20**	---

Course Objectives:

✧ To develop students' aptitude for acquiring basic skills of carrying out fieldwork for collecting demographic and socio-economic data.

✧ To guide students to learn the science and art of collecting, processing and interpreting the data.

Learning Outcome:

✧ Students shall be able to identify the socio-environmental problems of a locality through field experience in future.

✧ The students will efficiently extract, represent, analyse and interpret demographic and socio-economic data.

Professional Skill Development:

✧ The acquired knowledge is beneficial for future studies in human geography.

✧ This obtained knowledge will provide essential inputs in skill development, which will place the students in their professional life in the near future.

Sub units	Topics to be covered	Lab work hours
Unit I: Data Collection and Representation [30 Hours]		
1.1	Sources of demographic and socio-economic data; Data access from Census of India web portal; Preparation of questionnaire or schedule for collecting data through a household survey; Interview with special reference to focused group discussions	18
1.2	Preparation of maps showing population density by choropleth; Rural and urban population by dots and spheres; Population growth rates by line graph (Annual and Decadal)	12
Unit II: Data Analysis and Interpretation [30 Hours]		

2.1	Measurement of inequality by Lorenz curve and Gini coefficient; Analysis of occupation structure by pie diagram	14
2.2	Computation of Human Development Index (HDI), Multidimensional Poverty Index (MPI) and representation	16
Unit III: Topographical Maps [30 Hours]		
3.1	Study of correlation between physical and cultural features from Survey of India 1:50k topographical maps using transect chart and scatter plots	14
3.2	Analysis of transport and settlements: Transport network analysis by detour index and Nearest neighbour analysis of settlement patterns from toposheets	16

✧ Course Evaluation:

- **Continuous Assessment: 30 Marks**

1. Practical records: A laboratory notebook covering all practical topics must be prepared and duly signed by the teacher. [**10 Marks**]

2. Class test: Internal assessment to be conducted on the basis of above three units. Students have to answer two compulsory questions of 10 marks from the above three units. [**20 Marks**]

- **End Semester Examination: 20 Marks**

1. Written test: In the End Semester Examination, students have to answer one compulsory question from the above three units [**15 Marks**]

2. Viva-voce based on laboratory notebook [**5 Marks**]

✧ References

Alvi, Z. (1994): A Textbook of Practical Geography, Vikas Publishing House Pvt. Ltd., New Delhi.

Anson R. and Ormelling F.J., (1994): International Cartographic Association: Basic Cartographic Vol., Pregmen Press.

Bygott, J. (1964): Introduction to Mapwork and Practical Geography, Harper Collins Distribution Services, London.

Chouhan, P. (2013): Topographical Maps: Analysis and Interpretation, Readers Service, Kolkata.

Garnett, A. (1955): The Geographical Interpretation of Topographical Maps, George G. Harrap & Co. Ltd., London.

Gupta K.K. and Tyagi, V.C., (1992): Working with Map, Survey of India, DST, New Delhi.

Haggett, P., Cliff, A.D. and Frey, A. (1977): Locational Analysis in Human Geography, Edward Arnold, London

Ishtiaq, M. (1994): Practical Geography, Jawahar Publishers & Distributors, New Delhi.

Khan, Md. Z.A. (1998): Text Book of Practical Geography, Concept Publishing Company, New Delhi.

Liendsor, J.M. (1997): Techniques in Human Geography, Routledge.

Mishra R.P. and Ramesh, A. (1989): Fundamentals of Cartography, Concept, New Delhi.

Monkhouse, F.J. and Wilkinson, H.R. (1971). Maps and Diagrams: Their Compilation and Construction, Alphaneumera-Kolkata.

Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., and Guptill, S.C. (1995). Elements of Cartography, 6th ed, Wiley.

Saha, P.K. and Basu, P. (2009): Advanced Practical Geography, Books and Allied (P) Ltd., Kolkata.

Sarkar, A. (2008): Practical Geography: A Systematic Approach, Orient BlackSwan, Kolkata.

Singh, G. (1998): Map Work and Practical Geography, Vikas Publishing, New Delhi.

Singh, L.R. (2005): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.

Singh, R.L. and Singh, P.B. (2009): Elements of Practical Geography, Kalyani Publishers, New Delhi.

Sinha, M.M.P. and Bala, S. (2021): Advanced Cartography and Practical Geography, Rajesh Publications, New Delhi.

Toyne, P. and Newby, P.T. (1971): Techniques in Human Geography, Macmillan Education, London.

Yeates, M. (1968): An introduction to Quantitative Analysis in Human Geography, McGraw-Hill, New York.

NEP SYLLABUS
ELECTRONICS

National Curriculum and Credit Framework (NCCF)

Syllabus

for

ELECTRONICS

w.e.f. Academic Session 2023-24

Kazi Nazrul University

Asansol, Paschim Bardhaman

West Bengal 713340

SEMESTER- I

MAJOR COURSE - 1

Course Name **:Basic Electronics**

Course Code **: BSCELCMJ101**

<table>
<tr><td colspan="2">Course Type: Major (Theoretical & Practical)</td><td colspan="2">Course Details: MJC-1</td><td colspan="2">L-T-P: 3 – 0 – 4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Learning Outcomes:

- After the completion of course, the students will have ability to:
- Basics of electrical energy sources.
- Demonstrate and explain electrical components, electrical circuits and D.C. Network theorems.
- Distinguish between conductors, nonconductors and semiconductors based on energy band theory and classify different types of semiconductors.
- Demonstrate the operating principle and output characteristics of p-n junction diodes, Zener diode & BJT.

BASIC ELECTRONICS (Theory)

Unit-I

Voltage and current sources, Resistors in series and parallel, Inductors, Fixed and variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Capacitors, Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor.

Unit-II

Kirchhoff's current and voltage laws, examples of loop and nodal analysis, Network theorems: Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem.

Unit-III

Semiconductor diodes - Band structure (Qualitative discussions only), Majority and minority carriers, Doping, p-n Junction formation, p-n junction diode, breakdown in junction diodes, Zener diode.

Unit- IV

Bipolar Junction Transistor (BJT): Current flow mechanism, Current components, Transistor as two port network, CE, CB and CC configurations, comparisons, Transistor Biasing fundamentals.

Reference Books:

- B.L. Theraja & R. K. Theraja, A Text book on electrical Technology Vol-1, S. Chand.
- Van Valkenburg, Network analysis, Pearson.
- Millman and Halkias, Integrated Electronics, TMH.
- Chattopadhyay and Rakshit, Foundations of Electronics, New Age.
- Jyoti Prasad Bandyopadhyay, Basic Electronics Engineering, Vikas Publishing House Pvt. Ltd.
- Jyoti Prasad Bandyopadhyay, Basic Electrical and Electronics Engineering, Vols.1 & 2, Vikas Publishing House Pvt. Ltd.
- R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, Pearson.

BASIC ELECTRONICS (Practical), Lab– I

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Verify network theorems using resistive networks and D.C. sources.
- Familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
- Determine the current through a resistance by potentiometer.
- Study I-V characteristics of a suitable resistor and that of a junction diode within specified limiton a graph, and hence to estimate d.c. and a.c. resistances of both the elements at the point of intersection

List of Experiments:

1. Familiarization with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.

2. Determination of the current through a resistance by potentiometer.
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Study of I-V characteristics of a suitable resistor and that of a junction diode within specified limit on agraph, and hence to estimate d.c. and a.c. resistances of both the elements at the point of intersection.

MINOR COURSE - 1

Course Name : BASIC ELECTRONICS

Course Code : BSCELCMN101

<table>
<tr><td rowspan="2">Course Type: Minor (Theoretical & Practical)</td><td colspan="3" rowspan="2">Course Details: MNC-1</td><td colspan="2" rowspan="2">L-T-P: 3- 0- 4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Learning Outcomes:

- After the completion of course, the students will have ability to:
- Basics of electrical energy sources.
- Demonstrate and explain electrical components, electrical circuits and DC network theorems.
- Distinguish between conductors, nonconductors and semiconductors based on energy band theory and classify different types of semiconductors.
- Demonstrate the operating principle and output characteristics of p-n junction diodes, Zener diode & BJT.

Basic Electronics (Theory)

Unit-I

Voltage and current sources, Resistors in series and parallel, Inductors, Fixed and variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Capacitors, Principles of capacitance, Parallel plate

capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor.

Unit-II

Kirchhoff's current and voltage laws, examples of loop and nodal analysis, Network theorems: Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem.

Unit-III

Semiconductor diodes - Band structure (Qualitative discussions only), Majority and minority carriers, Doping, p-n Junction formation, p-n junction diode, breakdown in junction diodes, Zener diode.

Unit- IV

Bipolar Junction Transistor (BJT): Current flow mechanism, Current components, Transistor as two port network, CE, CB and CC configurations, comparisons, Transistor Biasing fundamentals.

Reference Books:

- B.L. Theraja & R. K. Theraja, A Text book on electrical Technology Vol-1, S. Chand.
- Van Valkenburg, Network analysis, Pearson.
- Millman and Halkias, Integrated Electronics, TMH.
- Chattopadhyay and Rakshit, Foundations of Electronics, New Age.
- Jyoti Prasad Bandyopadhyay, Basic Electronics Engineering, Vikas Publishing House Pvt. Ltd.
- Jyoti Prasad Bandyopadhyay, Basic Electrical and Electronics Engineering, Vols.1 & 2, Vikas Publishing House Pvt. Ltd.
- R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, Pearson.

BASIC ELECTRONICS (Practical), Lab– I

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Verify network theorems using resistive networks and D.C. sources.
- Familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
- Determine the current through a resistance by potentiometer.

- Study I-V characteristics of a suitable resistor and that of a junction diode within specified limiton a graph, and hence to estimate d.c. and a.c. resistances of both the elements at the point of intersection

List of Experiments:

1. Familiarization with basic electronic components (R, C, L, diodes, transistors), digital Multimeter,Function Generator and Oscilloscope.
2. Determination of the current through a resistance by potentiometer.
3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of Maximum Power Transfer Theorem.
5. Study of I-V characteristics of a suitable resistor and that of a junction diode within specified limit on agraph, and hence to estimate d.c. and a.c. resistances of both the elements at the point of intersection.

SKILL ENHANCEMENT COURSE - 1

Course Name **: DESIGN AND FABRICATION OF ELECTRONIC CIRCUIT I**

Course Code **: BSCELCSE101**

<table>
<tr><td>Course Type: SE (Practical)</td><td colspan="2">Course Details: SEC-1</td><td colspan="2">L-T-P: 0-0-6</td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td></td><td>20</td><td></td></tr>
</table>

DESIGN AND FABRICATION OF ELECTRONIC CIRCUIT I (Practical)

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Gain knowledge of different electronic/ electrical components.
- Design dc power supply with ICs, combination of 6V battery eliminator, design of CE AFamplifier on broadband, design of Zener regulator, FET audio amplifier, feedback amplifier, design of low frequency oscillator, various op-amp circuits, modulator and demodulator.

Design and fabrication of electronic circuits I

1. Knowledge of electronic/ electrical components, resistor, capacitor, inductor, transformer,signal sources (ac and dc), transistor, FETs, op-amps.
2. Design of dc power supply with ICs, combination of 6V battery eliminator, design of CE AF amplifier on broadband, design of Zener regulator, FET audio amplifier, feedback amplifier, design of low frequency oscillator, various op-amp circuits, modulator and demodulator.

MULTI-DISCIPLINARY COURSE - 1

Course Name : ELECTRONIC MEASUREMENTS

Course Code : MDC116

<table>
<tr><td rowspan="2">Course Type: Multi-disciplinary (Theoretical)</td><td rowspan="2" colspan="2">Course Details: MDC-1</td><td rowspan="2" colspan="2">L-T-P: 3 – 0 – 0</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td></td><td>15</td><td></td><td>35</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Explain the basic working principle of various electronic measurement instruments used tomeasure electrical parameters like current, voltage, power etc.
- Understand and describe the specifications, features, characteristics, error and the performance of an instrument
- Gain knowledge about the functional blocks of a CRO and do analysis, measurements of waveform display.

ELECTRONIC MEASUREMENTS (Theoretical)

Unit-I:

Basics of Measurements: Accuracy, Precision, resolution, reliability, repeatability, validity, Errors and their analysis, Standards of measurement.

Bridge Measurement: DC bridges- Wheatstone bridge, AC bridges – Maxwell,Wien bridges.

Electronic Instruments for Measuring Basic Parameters: Amplified DC meter, AC Voltmeter, True- RMS responding Voltmeter, Electronic multi-meter, Digital voltmeter.

Unit-II:

Oscilloscopes: Cathode Ray Tube, Vertical and Horizontal Deflection Systems, Probes.

Specification of an Oscilloscope. Oscilloscope measurement Techniques, Overview of special Oscilloscopes – Storage Oscilloscope.

Signal Generators: Sine wave generator, Overview of Function Generators.

Reference Books:

- Albert D. Helfrickand William D. Cooper, Modern Electronics Instrumentation & Measurement Techniques, Pearson Education.
- JosephJ. Carr, Elements of Electronics Instrumentation and Measurement-3rd Edition, Pearson Education.
- Anand, Electronics Instruments and Instrumentation Technology, PHI.

SEMESTER- II

MAJOR COURSE - 2

Course Name : SOLID STATE ELECTRONICS

Course Code : BSCELCMJ201

<table>
<tr><td rowspan="2">Course Type: Major (Theoretical & Practical)</td><td colspan="3" rowspan="2">Course Details: MJC-2</td><td colspan="2" rowspan="2">L-T-P: 3 – 0 – 4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Learn about semiconductor physics.

- Describe the behavior of semiconductor devices such as diodes, transistor, FET etc.
- Reproduce the I-V characteristics of Diodes/BJT/FET devices.
- Learn about the applications of p-n junction diodes.

SOLID STATE ELECTRONICS (Theoretical)

Unit-I: Semiconductor Physics

The atomic structure, Energy band diagram and classifications of solids, Metals insulators and semiconductors (Qualitative discussions only),Generation of hole-election pairs at room- temperature and intrinsic semiconductor, Energy band diagram, carrier density; doping and impurity semiconductor, majority and minority carriers, p-type and n-type semiconductors, advantage of silicon over germanium as semiconductor device material, Transport parameters, Current flow in semiconductors, Diffusion and Drift current.

Unit-II: Junction Diode and its applications

p-n junction and its properties (depletion region, barrier voltage, barrier width, junction capacitance and junction resistance), Junction diode, forward and reverse biased characteristics, diode equation (I-V expression only), a.c. and d.c. resistances of a diode, Zener and avalanche breakdown. Qualitative idea ofSchottky diode. Use of diode as rectifier, calculation of ripple factor and efficiency of half and full wave rectifier, Filter-capacitor and inductance filters, their role in power supply, output waveform and working, Regulation- Line and load regulation, Zener diode as voltage regulator.

Unit-III: Bipolar Junction Transistor

Input and output characteristics of transistor in CE and CB configurations, Regions of operation (active, cut offand saturation), Current gains α and β, Relations between α and β, dc load line and Q point, Simple problems. Biasing of BJT (PNP and NPN), idea of bias stability, Factors affecting Stability, Stability factor, Study of Fixed, Self and Voltage divider biasing.

Reference Books:

- C. Kittel, Introduction to Solid State Physics, Wiley.
- Millman and Halkias, Integrated Electronics, TMH.
- Chattopadhyay and Rakshit, Foundations of Electronics, New Age.
- B. L. Theraja, Basic Electronics -Solid State, S. Chand, (Current Edition).
- V. K. Mehta, Principles of Electronics, S. Chand, (Current Edition).

- R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, Pearson.
- Bhargava, Kulashretha, Gupta, Basic Electronics & Linear Circuits, TMH.
- Streetman & Banerjee, Solid State Electronic Devices, PHI.
- Salivahanan, Electronic Devices and Circuits, TMH.
- David A. Bell, Electronic Devices and Circuits, 5th Edition 2015, Oxford University Press.
- D.L. Schilling and C. Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill.

SOLID STATE ELECTRONICS (Practical), LAB – II

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Study P-N Junction diode characteristics, to calculate dc and ac resistances.
- Study Zener diode Characteristics in reverse bias, to determine breakdown voltage and acresistance at breakdown.
- Study Transistor input & output characteristics (CE & CB Modes). To determine dc & acresistances and current gain.
- Study half & full wave rectifier with junction diode with (capacitor) and without filter.
- Study voltage regulation using Zener diode.

List of Experiments:

1. Study of Zener diode Characteristics in reverse bias, to determine breakdown voltage and acresistance at breakdown.
2. Study of Transistor input & output characteristics (CE & CB Modes). To determine d.c. & a.c. resistances and current gain.
3. Study of half & full wave rectifier with junction diode with (capacitor) and without filter.
4. Study of voltage regulation using Zener diode.

Reference Books:

- Zbar, Basic Electronics: A Text Lab Manual, TMH.
- Bell, Laboratory Manual for Electronic Devices and Circuits, PHI.
- Bell, Laboratory Manual for Electric Circuits, PHI.

- J. Edminister and M. Nahvi, Electric Circuits: Schaum's Outlines, TMH.
- Ghosh, Advanced Practical Physics Volume II B. New Central Book Agency.
- Chattopadhyay and Rakshit, An Advanced Course in Practical Physics, New Central BookAgency Pvt. Ltd.

MINOR COURSE - 2

Course Name : **SOLID STATE ELECTRONICS**

Course Code : **BSCELCMN201**

Course Type: **Minor (Theoretical & Practical)**	Course Details: **MNC-1**			L-T-P: **3- 0- 4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:

(After the completion of course, the students will have ability to) :

- Learn about semiconductor physics.
- Describe the behavior of semiconductor devices such as diodes, transistor, FET etc.
- Reproduce the I-V characteristics of Diodes/BJT/FET devices.
- Learn about the applications of p-n junction diodes.

SOLID STATE ELECTRONICS

Unit-I: Semiconductor Physics

The atomic structure, Energy band diagram and classifications of solids, Metals insulators and semiconductors (Qualitative discussions only),Generation of hole-election pairs at room-temperature and intrinsic semiconductor, Energy band diagram, carrier density; doping and impurity semiconductor, majority and minority carriers, p-type and n-type semiconductors,

advantage of silicon over germanium as semiconductor device material, Transport parameters, Current flow in semiconductors, Diffusion and Drift current.

Unit-II: Junction Diode and its applications

p-n junction and its properties (depletion region, barrier voltage, barrier width, junction capacitance and junction resistance), Junction diode, forward and reverse biased characteristics, diode equation (I-V expression only), a.c. and d.c. resistances of a diode, Zener and avalanche breakdown. Qualitative idea of Schottky diode. Use of diode as rectifier, calculation of ripple factor and efficiency of half and full wave rectifier, Filter- capacitor and inductance filters, their role in power supply, output waveform and working, Regulation- Line and load regulation, Zener diode as voltage regulator.

Unit-III: Bipolar Junction Transistor

Inputand output characteristics of transistor in CE and CB configurations, Regions of operation (active, cut offand saturation), Current gains α and β, Relations between α and β, dc load line and Q point, Simple problems. Biasing of BJT (PNP and NPN), idea of bias stability, Factors affecting Stability, Stability factor, Study of Fixed, Self and Voltage divider biasing.

Reference Books:

- C. Kittel, Introduction to Solid State Physics, Wiley.
- Millman and Halkias, Integrated Electronics, TMH.
- Chattopadhyay and Rakshit, Foundations of Electronics, New Age.
- B. L. Theraja, Basic Electronics -Solid State, S. Chand, (Current Edition).
- V. K. Mehta, Principles of Electronics, S. Chand, (Current Edition).
- R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, Pearson.
- Bhargava, Kulashretha, Gupta, Basic Electronics & Linear Circuits, TMH.
- Streetman & Banerjee, Solid State Electronic Devices, PHI.
- Salivahanan, Electronic Devices and Circuits, TMH.
- David A. Bell, Electronic Devices and Circuits, 5th Edition 2015, Oxford University Press.
- D.L. Schilling and C. Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill.

SOLID STATE ELECTRONICS (Practical), LAB – II

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Study P-N Junction diode characteristics, to calculate dc and ac resistances.
- Study Zener diode Characteristics in reverse bias, to determine breakdown voltage and acresistance at breakdown.
- Study Transistor input & output characteristics (CE & CB Modes). To determine dc & acresistances and current gain.
- Study half & full wave rectifier with junction diode with (capacitor) and without filter.
- Study voltage regulation using Zener diode.

List of Experiments:

1. Study of Zener diode Characteristics in reverse bias, to determine breakdown voltage and acresistance at breakdown.
2. Study of Transistor input & output characteristics (CE & CB Modes). To determine d.c. & a.c. resistances and current gain.
3. Study of half & full wave rectifier with junction diode with (capacitor) and without filter.
4. Study of voltage regulation using Zener diode.

Reference Books:

- Zbar, Basic Electronics: A Text Lab Manual, TMH.
- Bell, Laboratory Manual for Electronic Devices and Circuits, PHI.
- Bell, Laboratory Manual for Electric Circuits, PHI.
- J. Edminister and M. Nahvi, Electric Circuits: Schaum's Outlines, TMH.
- Ghosh, Advanced Practical Physics Volume II B. New Central Book Agency.
- Chattopadhyay and Rakshit, An Advanced Course in Practical Physics, New Central BookAgency Pvt. Ltd.

SKILL ENHANCEMENT COURSE - 2

Course Name : DESIGN AND FABRICATION OF ELECTRONIC CIRCUIT II

Course Code : BSCELCSE201

Course Type: **SE (Practical)**	Course Details: **SEC-2**		L-T-P: **0-0-6**
Credit: 3		CA Marks	ESE Marks

	Full Marks: **50**	Practical	Theoretical	Practical	Theoretical
		30		**20**	

DESIGN AND FABRICATION OF ELECTRONIC CIRCUIT II (Practical)

Course Learning Outcomes:

After the completion of course, the students will have ability to:

- Construct electronic circuit for square wave generator and explain its working
- Design of radio receiver and explain its working

Design and fabrication of electronic circuits

1. Study and construction of square wave generator.
2. Construction of radio receiver.

MULTI-DISCIPLINARY COURSE - 2

Course Name : E-WASTE MANAGEMENT

Course Code : MDC212

Course Type: **Multi-disciplinary (Theoretical)**	Course Details: **MDC-2**		L-T-P: **3 – 0 – 0**	
Credit: 3	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

E-WASTE MANAGEMENT

Unit – I: Introduction

E-Waste Definition and its Importance, Sources of E-Waste, Categories of E-Waste, Composition and Generation of E-Waste, Global and Indian Scenario of E-Waste, Possible Hazardous Substances Present in E-Waste, Environmental and Health implications; Beyond the Environment – Data Security and Privacy in E-Waste Recycling, How E-Waste Results in Data Theft?

Unit – II: End-of-Life Management of E-Waste

E-Waste Management Process, Methods of E-Waste Disposal – Dumping, Burning, Acid Washing and Landfill; Recycling and Recovery – Sorting, Crushing, Separation; Emerging Recycling and Recovery Technologies, Formal Metal Extraction Processes from E-Waste, Environmentally Sound Treatment Technology for E-Waste, Guidelines for Establishment of Integrated E-Waste Recycling and Treatment Facility, E-waste in the space orbits due to satellites and space crafts and their management.

Unit – III: E-Waste Management in India

Status of E-Waste Management in India, Challenges for E-waste Management in India, Improvement of E-waste Management in India, How we can Create Robust E-waste Management in India? Popular E-Waste Disposal Methods in India, Occupational and Environmental Health Perspectives of Recycling E-Waste in India.

Unit – IV: E-Waste Legislation

Regulatory regime for e-waste in India, The hazardous waste (Management and Handling) rules 2003, E- waste management rules 2015, Regulatory compliance including roles and responsibility of different stakeholders – producer, manufacturer, consumer etc., Proposed reduction in the use of hazardous substances (RoHS), Extended producer responsibility (EPR).

References:

- Fowler B, Electronic Waste – 1st Edition (Toxicology and Public Health Issues), 2017 Elsevier.
- Hester R.E., and Harrison R.M, Electronic Waste Management. Science, 2009.
- Johri R., "E-waste: implications, regulations, and management in India and current globalbest practices", TERI Press, New Delhi.
- M. N. Mundada, S. Kumar, and A. V. Shekdar; E-Waste: A New Challenge for Waste Management in India. 61(3), 265–279, 2004, Journal of Environmental Studies. https://doi.org/10.1080/0020723042000176060
- https://hindrise.org/resources/e-waste-management-in-india/

SEMESTER- III

MAJOR COURSE - 3

Course Name : NETWORK ANALYSIS AND CIRCUIT THEORY

Course Code : BSCELCMJ301

Course Type: **Major (Theoretical & Practical)**	Course Details: **MJC-3**		L-T-P: **3 – 0 – 4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Understand the difference between response of basic electrical components and circuits, under DC & AC excitation.
- Apply Laplace transform for steady state and transient analysis.
- Appreciating the operation of passive filters.
- Understanding two-port networks.

NETWORK ANALYSIS AND CIRCUIT THEORY

[Credits: 3; Lecture Hours: 36]

Unit-I [8 Hours]

DC transient Analysis: Transient response of R, L, C, series RL, and RC under DC Excitation.

Unit-II [16 Hours]

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values, Voltage-Current Relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Sinusoidal Circuit Analysis for RL, RC, RLC in Series and Parallel, Power in AC Circuits, Instantaneous Power, Average Power, Reactive Power, Power Factor. Resonance in Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth.

Passive Filters: Low Pass, High Pass, Band Pass and Band Stop Filters.

Unit-III [8 Hours]

Analysis of circuits using Laplace transforms: Definition of Laplace transform, Expression of circuit elements using Laplace transform, Analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms.

Unit-IV [4 Hours]

Two Port Networks: Qualitative idea of Impedance (Z), Admittance (Y) and Transmission (ABCD) Parameters. Symmetric T and π network.

NETWORK ANALYSIS AND CIRCUIT THEORY (Practical), Lab– III

[Credits: 2; Practical Hours: 40]

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Proficiency in designing basic passive filter circuits.
- Interpretation of frequency response characteristics of basic passive networks under AC excitation.
- Analyzing and interpreting the characteristic response of a series LCR circuit.

List of Experiments:

1. Designing of a Low Pass RC Filter and study of its Frequency Response.
2. Designing of a High Pass RC Filter and study of its Frequency Response.
3. Design and study of frequency response of RC circuit.
4. Study of the Frequency Response of a Series LCR Circuit and determination of its (a) Resonant Frequency; (b) Impedance at Resonance; (c) Quality Factor Q; (d) Band Width.

Reference Books:

- Bel, Electronic Circuits, Oxford.
- DeCarlo and Lin, Linear Circuit Analysis, Oxford.
- Sadiku, Musa and Alexander, Applied Circuit Analysis, Tata McGraw-Hill.
- Nasar, Electric Circuits, Schaum's Solved Problems Series, Tata McGraw Hill.
- Nahvi and Edminister, Electric Circuits, Schaum's Outline Series, Tata McGraw Hill.
- Van Valkenburg, "Network analysis", Prentice Hall of India, 2000.
- Sudhakar, S. P. Shyammohan, "Circuits and Network", Tata McGraw-Hill New Delhi, 1994.

MAJOR COURSE - 4

.

Course Name **: MATHEMATICAL METHODS AND STATISTICAL MECHANICS**

Course Code **: BSCELCMJ302**

Course Type: **Major (Theoretical & Tutorial)**	Course Details: **MJC-4**			L-T-P: **4 – 1 – 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Knowledge of basic mathematical methods.
- Basic idea about various statistical distribution functions.

MATHEMATICAL METHODS AND STATISTICAL MECHANICS

[Credits: 4; Lecture Hours: 48]

Unit-I [12 Hours]

Ordinary Differential Equation: First Order Ordinary Differential Equations, Basic Concepts, Separable Ordinary Differential Equations, Exact Ordinary Differential Equations, Linear Ordinary Differential Equations, Second Order Homogeneous and non-Homogeneous Differential Equations.

Unit-II [12 Hours]

Matrices: Introduction to Matrices, Determinant of a matrix, Adjoint of a matrix, Transpose of a matrix, Matrix addition, Matrix subtraction, Matrix multiplication, Real and Complex Matrices, Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, Unitary Matrices, System of Linear Algebraic Equations, Cramer's Rule, Gaussian Elimination Method, Gauss-Seidel Method, Eigenvalues and Eigenvectors, Linear Transformation, Properties of Eigenvalues and Eigenvectors, Diagonalization, Powers of a Matrix.

Unit-III [12 Hours]

Complex Variables and Functions: Complex Variable, Complex Function, Continuity, Differentiability, Cauchy-Riemann (C-R) Equations, Exponential Function, Trigonometric Function, Hyperbolic Function, Series and Power Series, Taylor's Series, Zeroes and Poles.

Unit-IV [12 Hours]

Statistical Mechanics: Macroscopic and Microscopic States, Concept of Phase Space and Density of States, Statistical Interpretation of Entropy, Quantization of Phase Space, Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein Distribution Functions and their Importance.

MATHEMATICAL METHODS AND STATISTICAL MECHANICS (Tutorial)

[Credits: 1; Lecture Hours: 15]

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Proficiency of a standard simulation software.
- Developing standard problem-solving skills.

Scilab/MATLAB/Any Other Mathematical Simulation Software:

1. Solution of First Order Differential Equations.

2. Solution of Second Order Homogeneous Differential Equations.

3. Solution of Addition and/ Subtraction of Two Matrix.

4. Solution of Linear System of Equations using Gauss Elimination Method.

5. Solution of Fermi-Dirac distribution function.

Reference Books:

• Kreyszig, Advanced Engineering Mathematics, Wiley.

• Spiegel, Lipschutz, Schiller and Spellman, Schaum's Outline of Complex Variables, Schaum Outline Series, Tata McGraw Hill.

• Pal and Bhunia, Engineering Mathematics, Oxford.

• Garg and Gupta, Engineering Mathematics Volume I & II, Pearson.

• Dass and Verma, Higher Engineering Mathematics, S. Chand.

• Eisberg and Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, Wiley.

• Pillai, Solid State Physics, New Age.

• Kasap, Principles of Electronic Materials and Devices, Tata McGraw Hill.

• Roy, Fundamentals of Classical and Statistical Thermodynamics, Wiley.

MINOR COURSE - 3

Course Name : **NETWORK ANALYSIS AND CIRCUIT THEORY**

Course Code : **BSCELCMN301**

Course Type: **Minor (Theoretical & Practical)**	Course Details: **MNC-3**		L-T-P: **3- 0- 4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Understand the difference between response of basic electrical components and circuits, under DC & AC excitation.
- Understanding two-port networks.

NETWORK ANALYSIS AND CIRCUIT THEORY

[Credits: 3; Lecture Hours: 28]

Unit-I [8 Hours]

DC transient Analysis: Transient response of R, L, C, series RL, and series Circuits under DC Excitation.

Unit-II [16 Hours]

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values, Voltage-Current Relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Sinusoidal Circuit Analysis for RL, RC, Series and Parallel RLC Circuits, Power in AC Circuits, Instantaneous Power, Average Power, Reactive Power, Power Factor. Resonance in Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth.

Unit-III [4 Hours]

Two Port Networks: Qualitative idea of Impedance (Z), Admittance (Y) and Transmission (ABCD) Parameters.

NETWORK ANALYSIS AND CIRCUIT THEORY (Practical), Lab– III

[Credits: 2; Practical Hours: 26]

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Interpretation of frequency response characteristics of basic passive networks under AC excitation.
- Analyzing and interpreting the characteristic response of a series LCR circuit.

List of Experiments:

1. Design and study of frequency response of RC circuit.

2. Study of the Frequency Response of a Series LCR Circuit and determination of its (a) Resonant Frequency; (b) Impedance at Resonance; (c) Quality Factor Q; (d) Band Width.

Reference Books:

• Bel, Electronic Circuits, Oxford.

• DeCarlo and Lin, Linear Circuit Analysis, Oxford.

• Sadiku, Musa and Alexander, Applied Circuit Analysis, Tata McGraw-Hill.

• Nasar, Electric Circuits, Schaum's Solved Problems Series, Tata McGraw Hill.

- Nahvi and Edminister, Electric Circuits, Schaum's Outline Series, Tata McGraw Hill.
- Van Valkenburg, "Network analysis", Prentice Hall of India, 2000.
- A. Sudhakar, S. P. Shyammohan, "Circuits and Network", Tata McGraw-Hill New Delhi,

SEMESTER- IV

MAJOR COURSE - 5

.

Course Name : ELECTROMAGNETIC THEORY

Course Code : BSCELCMJ401

Course Type: **Major (Theoretical & Tutorial)**	Course Details: **MJC-5**		L-T-P: **4 – 1 – 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Apply the concepts of Electrostatics and Magnetostatics based on the problem.
- Improvise the concepts of wave propagation in various media.

ELECTROMAGNETIC THEORY

[Credits: 4; Lecture Hours: 54]

Unit-I [10 Hours]

Vector Analysis, Poisson's Equation and Laplace Equation: Scalars and Vectors, Unit Vector and Vector Components, Vector Field, Vector Algebra, Rectangular (Cartesian) Coordinate, Curvilinear Coordinates, Unit Vectors and Scalar Factors, Cylindrical Coordinate and Spherical Coordinate; Differential Length, Area and Volume, Line, Surface and Volume Integrals, Del Operator, Gradient of a Scalar, Divergence of a Vector and Divergence Theorem, Curl of a Vector and Stokes's Theorem, Green's Theorem, Laplacian of a Scalar.

Unit-II [12 Hours]

Electrostatics: Coulomb's Law, Electric Field and Electric Potential due to Discrete and Continuous Charge Distributions, Electric Flux Density, Gauss's Law – Maxwell's Equation and Applications, Electric Dipole, Electric Fields in Different Materials, Current and Current Density, Polarization, Dielectric Constant, Boundary Conditions, Poisson's and Laplace's Equations Uniqueness Theorem, Electrostatic Energy and Forces, Energy Density.

Unit-III [10 Hours]

Magnetostatics: Biot Savart's Law, Magnetic Dipole, Ampere's Circuital Law – Maxwell's Equation, Magnetic Flux and Magnetic Flux Density – Maxwell's Equation, Scalar and Vector Magnetic Potentials. Magnetization in Materials and Permeability, Magnetic Boundary Conditions.

Unit-IV [10 Hours]

Time-Varying Fields and Maxwell's Equations: Faraday's Law of Electromagnetic Induction – Maxwell's Equation, Stationary Circuit in Time-Varying Magnetic Field, Transformer and Motional EMF, Displacement Current, Maxwell's Equations in Differential and Integral Form, Potential Functions, Lorentz Gauge, Coulomb Gauge, Wave Equations for EM fields, Concept of Retarded Potentials, Electromagnetic Boundary Conditions.

Unit-V [12 Hours]

Electromagnetic Wave Propagation: Electromagnetic Spectrum, Wave Equation in a Source Free Isotropic Homogeneous Media, Qualitative Idea of Uniform Plane wave in different media, Skin Effect, Wave Polarization, Reflection and Transmission of Plane Waves at Normal and Oblique Incidence, Snell's Law, Fresnel's Equation, Brewster's Angle, Concept of Phase and Group Velocity, Electromagnetic Power and Poynting Vector and Poynting Theorem.

ELECTROMAGNETIC THEORY (Tutorial)

[Credits: 1; Lecture Hours: 15]

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Analyze and visualize the concepts established in the Electromagnetic theory through standardized simulation software.

Scilab/Matlab/Any Other Similar Simulation Software:

1. Understanding and Plotting Vectors.

2. Transformation of Vectors into Various Coordinate Systems.

3. Representation of the Gradient of a Scalar Field, Divergence and Curl of Vector Fields.

4. Plots of Electric Field and Electric Potential due to Charge Distributions.

5. Solutions of Poisson and Laplace Equations - Contour Plots of Charge and Potential Distributions.

Reference Books:

• Spiegel, Lipschutz and Spellman, Vector Analysis, Schaum's Outline Series, Tata McGraw Hill.

• Ida, Engineering Electromagnetics, Springer.

• Sadiku, Elements of Electromagnetics, Oxford.

• Hayt, Buck and Akhtar, Engineering Electromagnetics, Tata McGraw Hill.

• Cheng, Field and Wave Electromagnetics, Pearson.

• Edminster, Electromagnetics, Schaum's Outline Series, Tata McGraw Hill.

• Griffiths, Introduction to Electrodynamics, Pearson.

• Jordan and Balmain, Electromagnetic Waves and Radiating Systems, Pearson.

MAJOR COURSE - 6

Course Name : ANALOG ELECTONICS I

Course Code : BSCELCMJ402

Course Type: **Major (Theoretical & Practical)**	Course Details: **MJC-6**			L-T-P: **3 – 0 – 4**
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Design and analyze various analog circuits.
- Analyze circuits with devices for specific applications.

ANALOG ELECTRONICS I

[Credits: 3; Lecture Hours: 45]

Unit-I [7 Hours]

Diode Circuits: Clipping and Clamping Circuits, Eber's-Moll Equation.

Special Junction Diodes & applications: Varactor Diode, Solar Cell (open circuit voltage & short circuit current), Zener Diode as a Voltage Regulator.

Unit-II [8 Hours]

Bipolar Junction Transistor Circuits: Transistor as a Switch, Darlington Pair, BJT Amplifier, Voltage and Power Amplifier, DC and AC Load Line Analysis, Hybrid Model of CE Configuration, Quantitative Study of Frequency Response of CE Amplifier and Multi-stage amplifiers.

Unit-III [12 Hours]

Feedback Amplifiers: Concept of Feedback, Negative and Positive Feedback, Barkhausen Criterion, Types of Feedback Circuits, Advantages and Disadvantages of Negative Feedback, Voltage (Series and Shunt) and Current (Series and Shunt), Feedback Amplifiers, Effect of Negative Feedback on Gain, Input and Output Impedances, Bandwidth and Distortion.

Oscillators (Qualitative Study): Basic concept of oscillation, Hartley Oscillator, Colpitts Oscillator, Phase Shift Oscillator, Wien Bridge Oscillator, Piezoelectric Crystal Oscillator.

Unit-IV [10 Hours]

Power Amplifiers: Difference between Voltage and Power Amplifier, Classification of Power Amplifiers, Class A, Class B, Class C, Class AB and their Comparisons, Operation of Class A Single Ended Power Amplifier, Operation of Transformer Coupled Class A Power Amplifier, Efficiency calculation, Operation of Complementary Symmetry Class B Push Pull Power Amplifier, Crossover Distortion.

Modulation: Qualitative Idea on Modulation.

Unit-V [8 Hours]

Introduction to Power Devices: Need for Semiconductor Power Devices, Power Diodes, Enhancement of Reverse Blocking Capacity.

Silicon Controlled Rectifier (SCR): Structure, Two Transistor Analogy, I-V Characteristics, Turn-On and Turn-Off characteristics, Application.

UJT: Working Principle & Applications.

ANALOG ELECTRONICS I (Practical)

[Credits: 2; Lecture Hours: 60]

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Design and analyze analog circuits.

Experiments:

1. Design of Clipping and Clamping Circuits.
2. Designing and Testing of 5V/9V DC Regulated Power Supply and find its Load Regulation.
3. Designing of a Single Stage CE Amplifier.
4. Study of the Phase Shift Oscillator.
5. Study of the I-V Characteristics of the SCR.

Reference Books:

• Sze, Semiconductor Devices: Physics and Technology, Wiley.

• Streetman and Banerjee, Solid State Electronic Devices, Pearson.

• Neamann and Biswas, Semiconductor Physics and Devices, Tata McGraw Hill.

• Boylestead and Nashelsky, Electronic Devices and Circuit Theory, Pearson.

• Bell, Electronic Devices and Circuits, Oxford.

• Schilling and Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill.

• Millman and Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, Tata McGraw Hill.

• Cathey, 2000 Solved Problems in Electronics, Schaum's Outline Series, Tata McGraw Hill.

• Sedra and Smith, Microelectronic Circuits, Oxford.

• Rashid, Electronic Devices and Circuits, Cengage.

MINOR COURSE - 4

Course Name : **ANALOG ELECTONICS**

Course Code : **BSCELCMN401**

<table>
<tr><td>Course Type: Minor (Theoretical & Practical)</td><td colspan="2">Course Details: MNC-4</td><td colspan="2">L-T-P: 3- 0- 4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Design and analyze various analog circuits.
- Analyze circuits with devices for specific applications.

ANALOG ELECTRONICS

[Credits: 3; Lecture Hours: 37]

Unit-I [7 Hours]

Junction Diode and its applications: p-n junction and its properties, Junction diode, forward and reverse biased characteristics, Zener and avalanche breakdown. Use of diode as rectifier, Zener diode as voltage regulator, Varactor Diode, Solar Cell (open circuit voltage & short circuit current).

Unit-II [8 Hours]

Bipolar Junction Transistor: Bipolar Junction Transistor (BJT): p-n-p & n-p-n transistor, transistor operation, CE, CB and CC configurations, Transistor Biasing fundamentals, Input and output characteristics of transistor in CE and CB configurations, Regions of operation, Relations between current gains, dc load line and Q point, operation of transistor as an amplifier and a switch, idea of biasing and stability, Voltage and Power Amplifier, DC and AC Load Line Analysis.

Unit-III [12 Hours]

Feedback Amplifiers: Concept of Feedback, Negative and Positive Feedback, Barkhausen Criterion, idea of oscillation, Types of Feedback Circuits, Advantages and Disadvantages of Negative Feedback, Voltage (Series and Shunt) and Current (Series and Shunt), Feedback Amplifiers, Effect of Negative Feedback on Gain, Input and Output Impedances, Bandwidth and Distortion.

Unit-IV [10 Hours]

Power Amplifiers: Difference between Voltage and Power Amplifier, Classification of Power Amplifiers, Class A, Class B, Class C, Class AB and their Comparisons, Operation of Class A Single Ended Power Amplifier, Operation of Transformer Coupled Class A Power Amplifier.

ANALOG ELECTRONICS (Practical)

[Credits: 2; Lecture Hours: 60]

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Design and analyze analog circuits.

Experiments:

1. Study p-n Junction diode characteristics, to calculate dc and ac resistances.

2. Study Zener diode Characteristics in reverse bias, to determine breakdown voltage and ac resistance at breakdown.

3. Study Transistor input & output characteristics (CE & CB Modes). To determine d.c. & a.c. resistances and current gain.

4. Study voltage regulation using Zener diode.

5. Designing of a Single Stage CE Amplifier.

Reference Books:

• Sze, Semiconductor Devices: Physics and Technology, Wiley.

• Streetman and Banerjee, Solid State Electronic Devices, Pearson.

• Neamann and Biswas, Semiconductor Physics and Devices, Tata McGraw Hill.

• Boylestead and Nashelsky, Electronic Devices and Circuit Theory, Pearson.

• Bell, Electronic Devices and Circuits, Oxford.

• Schilling and Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill.

• Millman and Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, Tata McGraw Hill.

• Cathey, 2000 Solved Problems in Electronics, Schaum's Outline Series, Tata McGraw Hill.

• Sedra and Smith, Microelectronic Circuits, Oxford.

• Rashid, Electronic Devices and Circuits, Cengage.

SKILL ENHANCEMENT COURSE - 3

Course Name : **COMMUNICATION LAB**

Course Code : **BSCELCSE401**

<table>
<tr><td>Course Type: SE (Practical)</td><td colspan="2">Course Details: SEC-3</td><td colspan="2">L-T-P: 0-0-6</td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td></td><td>20</td><td></td></tr>
</table>

Course Learning Outcomes:

(After the completion of course, the students will have ability to):

- Design and analyze various basic analog communication circuits.

COMMUNICATION LAB

[Credits: 3; Lecture Hours: 40]

Hardware and/or Simulation Software Laboratory:

1. Design and/or Study of Amplitude Modulation.

2. Design and/or Study of Amplitude Demodulation.

3. Design and/or Study of Frequency Modulation.

4. Design and/or Study of Frequency Demodulation.

Reference Books:

• Kennedy, Electronic Communication Systems, Tata McGraw Hill.

• Roddy and Coolen, Electronic Communications, Pearson.

• Haykin, Communication Systems, Wiley.

• Lathi and Ding, Modern Digital and Analog Communication Systems, Oxford.

• Frenzel, Principles of Electronic Communication Systems, Tata McGraw Hill.

• Kundu, Analog and Digital Communications, Pearson.

• Couch, Digital and Analog Communication Systems, Pearson.

NEP SYLLABUS
COMMERCE

KAZI NAZRUL UNIVERSITY

DEPARTMENT OF

COMMERCE

Syllabus

Semester I and II

KAZI NAZRUL UNIVERSITY

BCOM 3 / 4 Years (H+R)

W.E.F 2023-24

SEMESTER WISE DISTRIBUTION OF COURSES NEP

Semester I and II

BCOM HONOURS/HONOURS WITH RESEARCH

SEMESTER I:

SL.NO	NATURE	PAPER	CREDIT PP
1	Major(DSC)	Financial Accounting-I	5
2	Minor	Principles of Management (Fixed for B.Com)	5
3	Multi-Disciplinary	Microeconomics(Fixed for B.Com)/ Accounting for All (for pool)	3
4	Ability Enhancement Course(AEC)	English/MIL	4
5	Skill Enhancement Course(SEC)	Entrepreneurship Development	3
6	Value Added Course(VAC)	NA	NA
7	Summer/Internship	NA	NA
8	Research Project	NA	NA

20

SEMESTER II:

SL.NO	NATURE	PAPER	CREDIT PP
1	Major(DSC)	Cost Accounting	5
2	Minor	Principles of Marketing Management(Fixed for B.COM)	5
3	Multi-Disciplinary	Macroeconomics(Fixed for B.COM) /Personal Finance (for pool)	3
4	Ability Enhancement Course(AEC)	NA	NA
5	Skill Enhancement Course(SEC)	Computer Application in Business	3
6	Value Added Course(VAC)	Environment Studies	4
7	Summer/Internship	NA	NA
8	Research Project	NA	NA

20

Semester 1
Subject-Financial Accounting-I
Paper Type: Major
Code:
F.M-100 (ES: 70+CA: 30)

Objectives: The objective of this paper is to help students in acquiring conceptual knowledge of financial accounting and to impart skills for recording various kinds of transactions.

Learning Outcomes:
• The students will be able to understand and identify the accounting principles, rules and procedures which are relevant to different types of transactions.
• The students will be able to apply the accounting principles, rules and procedures in recording different types of transactions.

Course Contents

Unit-I: Introduction: Conceptual Framework: Accounting principle, Concepts and Conventions, Accounting Process: Journal, ledger, Trial Balance, Financial Statements (overview) Capital Expenditure, Revenue Expenditure and Deferred Revenue Expenditure. Introduction to Accounting Standards and Indian Accounting Standards (AS & Ind AS), Single Entry-Conversion form single entry to double entry system.

Unit-II: Preparation of Financial Statements: Final account of a profit-making sole proprietorship trading firm with additional information, Preparation of Financial Statements of a not for profit organisation, Preparation of Financial Statements of a Non-for profit organisation-Income-Expenditure Account,

Unit-III: Accounting for Consignment: Consignment: Basic features; difference with sales. Recording in the books of Consignor, at cost & at invoice price, Valuation of unsold stock; Ordinary commission. Treatment and valuation of abnormal & normal loss, unsold stock, Special commission: Del credere commission - use of Consignment Debtors A/C. Recording in the books of Consignee.

Unit-IV: (a) Royalties Accounting-Minimum Rent, Short Workings Recoverable, Royalties Receivables, Sub-Lease.

Unit-V: Hire Purchase and Installment Payment System: Hire Purchase Accounting: Calculation of Interest, Partial and Full Repossession, Profit Computation (Stock & Debtors System only), Instalment Payment System.

VI: **Insurance Claim: (a)Loss of stock:** Physical & ownership concept; concept of under-insurance and average clause;
computation of claim – with price change; consideration of unusual selling line; price reduction etc.

(b) Loss of profit: Concept – insured & uninsured standing charges, GP rate, short sales and increased
cost of working, average clause and computation of claim

Unit-VII: Accounting for Partnership Firm: Partnership Accounts: Accounting for Dissolution of Partnership Firm, Dissolution of Partnership Firm including Insolvency of partners, Garner Vs Murray Case Rules (excluding sale to a limited company), Gradual realization of assets and piecemeal payment of liabilities.

Suggested Readings:

1. Robert N. Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases, McGraw-Hill Education.
2. Charles T. Horngren and Donna Philbrick, Introduction to Financial Accounting, Pearson.
3. M.C. Shukla, T.S. Grewal and S.C. Gupta, Advanced Accounts, Vol.-I. S. Chand & Co.
4. P.C. Tulsian, Financial Accounting, Pearson Education.
5. Rajasekaran, Financial Accounting, Pearson
6. Mukherjee and Mukherjee, Financial Accounting I, Oxford
7. Amitabha Mukherjee, Mohammed Hanif, Financial Accounting I, McGraw Hill Education.
8. V.K. Goyal & Ruchi Goyal, Financial Accounting, PHI Learning.
9. Amitabha Basu and Sibasish Dutta, Financial Accounting I, Tee Dee Publications.
10. Relevant IND ASs.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Continuous Assessment: (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (70 Marks): End Semester Written Examination, Duration 4 Hours

Semester 1
Subject- Principles of Management
Paper Type: Minor (Fixed for B.Com)
Code:
F.M-100(ES 70+CA 30)

Course Contents

Objectives
1. Understanding the basic concepts and various functions of management;
2. Creating awareness among the students about the application of management principles in business organizations.

Learning Outcome
1. The students will be able to understand and identify the management principles and practices which are relevant in the business environmental context.
2. The students will be able to apply the acquired knowledge in managerial functions.

Unit I: Introduction: Concept and Features of Management. Importance and Functions of Management, Management as an Arts or Science; Managerial Levels, Managerial Skills & Competencies, Contribution to Management Theories [Fayol, Taylor and Max-Weber's Theory only]. Managerial Roles (Mintzberg).

Unit II: Planning and Decision Making: Concept and Definition of Planning, Features and Importance of Planning. Principles of Planning, Planning Premises, Steps involved in the Planning Process, Advantages and Limitations of Planning, Concepts, Nature and Principles of Decision Making, Relationship between Planning & Decision Making.

Unit III: Organizing: Concept and Definition of Organizing, Importance and Functions of Organizing, Principles of Organizing, Span of Organizing, Decentralization and Delegation of Authority; Concept of Organizational Design, Factors affecting Organizational Design; Departmentalization; Organizational Structures, Formal & Informal Organization

Unit IV: Directing and Staffing: Concept and Definition of Directing, Functions and Process of Directing. Concept and Definition of Staffing, Different Elements of Staffing, Staffing as an Important Function of Management, Importance of Staffing in Management

Unit-V: Motivation & Leadership: Concept and Definition of Motivation, Importance and factors affecting motivation; Theories of Motivation-Maslow's Theory, Herzberg's Theory and Theory-X & Theory-Y. Meaning and Importance of Leadership, Styles of Leadership, Qualities of Leadership

Unit-VI: Controlling: Meaning and Importance of Controlling, Steps of Controlling, Principles of Controlling; Concept of Feedback and Feedforward Control, Relationship between Planning and Controlling, Modern Tools of Controlling. Limitations of Controlling

Unit VII: Company Management: Concept of Corporate Management, Directors and their Functions, Appointment, Qualifications of Company Directors, Power, Duties & Responsibilities of Directors. Different types of Directors, Concept about different types of Company Meeting.

Suggested Readings:

1. Koontz and O'Donnell, Principles of Management, McGraw Hill Education.
2. C.B.Gupta,Business Management, Sultan Chand and Sons.
3. L.M.Prasad,Principles and Practice of Management, Sultan Chand and Sons.
4. A.F.Stoner and R.E.Freeman, Management, Prentice Hall.
5. P.C.Tripathi & P. N.Reddy, Principles of Management, TMH Publications.
6. Griffin, Management Principles and Application, Cengage Learning.
7. Harold Koontz and Heinz Weihrich, Essentials of Management: An International and Leadership Perspective, McGraw Hill Education.
8. B.P.Singh and A.K.Singh,Essentials of Management, Excel Books.
9. T.N.Chhabra,Management Concepts and Practice, Dhanpat Rai & Co. (Pvt. Ltd.).

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Continuous Assessment: (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (70 Marks): End Semester Written Examination, Duration 4 Hours

Semester 1

Microeconomics

(Fixed for B.Com)/

Paper Type: MDS

Code:

F.M-50(SE 35+ CA 15)

Course Objective

To familiarize the students with the basic concepts of microeconomics and to enable them to understand the uses of such concepts in business applications

Course Learning Outcomes

After completing the course, the student shall be able to:

CO1: understand the concepts of demand and supply and determination of equilibrium price through the interaction of market forces.

CO2: analyze different approaches explaining the theoretical foundation of consumer behaviour.

CO3: understand the concepts of cost, nature of production and its relationship to Business operations.

CO4: understand the concepts of different market forms and to analyze short run and long run equilibrium conditions for different market forms.

CO5: understand and analyze different theories related to determination of factor prices.

Course Contents

Unit 1: Basics of Demand and Supply: The concept of demand and demand function; Derivation of Individual demand curve and Market demand curve; Shifting of the demand curve; The supply function and the supply curve; Derivation of individual supply curve and market supply curve; Shifting of the supply curve; Determination of equilibrium price.

Unit 2: Theory of Consumer Behaviour: Cardinal analysis; Law of diminishing marginal utility; consumer surplus Ordinal approach; Indifference curve analysis; Budget line; Consumer Equilibrium; Income consumption curve and Price consumption curve; Hicksian decomposition of price effect into substitution effect and income effect; Demand curve for Normal, inferior and Giffen goods Concept of Elasticities of demand; Measurement of various elasticities of demand; Distinction between slope of a demand curve and the elasticity of demand; Elasticity of supply.

Unit 3: Theory of Production and Costs: Total Cost, Average Cost, Marginal Cost, Production function; stages of production; law of variable proportions; law of returns to scale; Economics of scale; Short run and long run cost functions – their definition, nature, shape and relationship; Isoquants and iso-cost lines – Concepts and their properties; Choice of best input combinations. Empirical production functions – their properties and estimation; Empirical estimation of cost functions.

Unit 4: Market Structure: Revenue concepts under different market conditions: TR, AR, MR and relationship among AR, MR and elasticity of demand; Perfect Competition-Short run and long run equilibrium; Supply curve in the short run; Monopoly – Short run and long run equilibrium; Concept of Price discrimination. Monopolistic competition, Oligopoly Market and

Duopoly Market. B.Com.(Hons) CBCS(LOCF) Department of Commerce, Kazi Nazrul University

Unit 5: Factor Price Determination: Theory of Wage Determination; Backward Bending Supply curve of labour; Determination of Rent, Profit and Interest rate.

Suggested Readings:

1. Samuelson, P.A. and Nordhus, W.D., Economics. Tata Mc- Graw Hill Publication Co. Ltd.
2. Koutsoyiannis, A.: Modern Micro Economics, Macmillan.
3. Damodoran, S: Managerial Economics, Oxford University Press, New Delhi.
4. Salvatore, D.: Managerial Economics, Tata McGraw Hill.
5. Stonier and Hague (1953) "A Textbook of Economic Theory". Longmans.
6. Branson, W., Macro economic Theory and Policy, Harper International.
7. Ahuja, H.L., Macroeconomics: Theory and Policy, S. Chand P

Assessment Methods

Continuous Assessment: (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (35 Marks): End Semester Written Examination, Duration 2 Hours

Semester 1
Subject-Accounting for All
(Minor to be offered to others department)
Paper Type: MDS
Code:
F.M-50 (SE 35+ CA 15)

Objectives: The objective of this paper is to help students in acquiring conceptual knowledge of financial accounting and to impart skills for recording various kinds of transactions.

Learning Outcomes:
• The students will be able to understand and identify the accounting principles, rules and procedures which are relevant to different types of transactions.
• The students will be able to apply the accounting principles, rules and procedures in recording different types of transactions.

CONTENTS

Unit 1: **Introduction of Accounting**: (i) Accounting: Meaning, objectives, Types of accounting information, Users of accounting information and their needs. Basis of accounting – cash basis, accrual basis and hybrid basis. Types of accounting – Financial Accounting, Cost Accounting and Management Accounting.

(ii) Accounting Principles: Entity Concept, Money Measurement Concept, Going Concern Concept and Accounting Period Concept.

(iii) Basic Accounting Terms: Transaction, Event, Capital, Drawings, Asset (Fixed and Current), Liabilities (Long term, Short Term or Current), Receipts (Capital & revenue), Expenditure (Capital, Revenue and Deferred Revenue), Income, Profit/Loss, Purchase, Sales, Stock, Debtors, Creditors, Cost, Revenue, Discount (Cash & Trade)

Unit 2: Recording of Transactions and Preparation of Trial Balance

(i) Double Entry System: Introduction, Rule for Debit and Credit – classification of accounts and application of Golden Rule.

(ii) Evidence of transactions: invoice, cash memo, pay-in-slip, cheque; Preparation of Voucher (Cash, Credit and Transfer)

(iii) Books of Original Entry: Meaning, Format & Recording.

(iv) Cash Book: Single Column Cash Book, Double Column Cash Book & Petty Cash Book

(v) Special Purpose Books: Purchase Book, Sales Book, Purchase Return Book, Sales Return Book, Bills Receivable Book, Bills Payable Book and Journal Proper.

(vi) Ledger: Meaning, Utility, Format; posting from Journal, Cash Book and Special Purpose Books; balancing of Ledger Accounts.

(vii) Trial Balance: Meaning, Objectives and Preparation.

(viii) Bank Reconciliation Statement: Meaning, Need and Preparation.

Unit 3: Financial Statement

(i) Financial Statement: Objective and Importance.

(ii) Trading and Profit & Loss Account: Preparation of Accounts.

(iii) Balance Sheet: Need for Preparation, Grouping and Marshalling of Assets & Liabilities.

(iv) Preparation of Financial Statement: Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietorship trading concern.

Unit 4: Financial Statement of Non-Profit Seeking Organizations

(i) Non-Profit Seeking Organization: Concept

(ii) Receipts and Payments Account: Need for preparation and features.

(iii) Income and Expenditure Account: Need for preparation and features.

(iv) Financial Statement: Preparation of Income & Expenditure Account and Balance Sheet from the given Receipts & Payments Account and additional information.

Unit 5: Business Proposal Writings- Detailed Project Report-Provisional and estimated financial statement, working capital requirement.

Suggested Readings:

1. Charles T. Horngren and Donna Philbrick, Introduction to Financial Accounting, Pearson.
2. M.C. Shukla, T.S. Grewal and S.C. Gupta, Advanced Accounts, Vol.-I. S. Chand & Co.
3. P.C. Tulsian, Financial Accounting, Pearson Education.
4. Amitabha Basu, Financial Accounting I, Tee Dee Publications.
5. T. S. Grewwal, Financial Accounting, Sultan Chand,
6. Rajasekaran, Financial Accounting, Pearson
7. Mukherjee and Mukherjee, Financial Accounting I, Oxford
8. Amitabha Mukherjee, Mohammed Hanif, Financial Accounting I, McGraw Hill Education.

9. S. Anil Kumar, V. Rajesh Kumar and B. Mariyappa, Fundamentals of Accounting, Himalaya Publishing House.
10. V.K. Goyal, Ruchi Goyal, Financial Accounting, PHI Learning.
11. Debashri Bhattacharya, Financial Accounting I, Law Point

Suggested Readings:

1. Robert N. Anthony, David Hawkins, Kenneth A. Merchant, Accounting: Text and Cases, McGraw-Hill Education.
2. Charles T. Horngren and Donna Philbrick, Introduction to Financial Accounting, Pearson.
3. M.C. Shukla, T.S. Grewal and S.C. Gupta, Advanced Accounts, Vol.-I. S. Chand & Co.
4. P.C. Tulsian, Financial Accounting, Pearson Education.
5. Rajasekaran, Financial Accounting, Pearson
6. Mukherjee and Mukherjee, Financial Accounting I, Oxford
7. Amitabha Mukherjee, Mohammed Hanif, Financial Accounting I, McGraw Hill Education.
8. V.K. Goyal & Ruchi Goyal, Financial Accounting, PHI Learning.
9. Amitabha Basu and Sibasish Dutta, Financial Accounting I, Tee Dee Publications.
10. Relevant IND ASs.

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Continuous Assessment: (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (35 Marks): End Semester Written Examination, Duration 2 Hours

B.Com: Semester-I
Paper Name: SEC
F.M-50 (SE 35+ CA 15)
Course Name: ENTREPRENEURSHIP DEVELOPMENT

Course Objective
To inculcate the spirit of entrepreneurship among the learners to ensure materialization of entrepreneurial desire into a new venture.

Course Learning Outcomes
After completing the course, the student shall be able to:
CO1: understand the concept of entrepreneurship in the context of Indian economic scenario.
CO2: link the individual's capability and strength as a guiding factor towards entrepreneurial orientation.
CO3: understand social support system for gaining strength towards entrepreneurial preferences.
CO4: understand entrepreneurial process for initiating new venture creation.
CO5: understand various dimensions of managing a business enterprise once it is formed.

Unit I: Entrepreneurship: Meaning, Elements, determinants and importance of entrepreneurship and creative behaviour; Entrepreneurship and creative response to the society' problems and at work; Dimensions of entrepreneurship: intrapreneurship, technopreneurship, cultural entrepreneurship, international entrepreneurship, net-preneurship, eco-preneurship, and social Entrepreneurship Business houses and family business in India;

Unit-II: Creativity: Meaning and Concept of Creativity; Creativity Process; Nature and Characteristics of Creativity and Creative Persons; Factors affecting Creativity; Recognizing and Avoiding Mental blocks; Thinking Preferences; Risk Taking; Creativity Styles; Creative Thinking Tools.

Unit III: Innovation: Innovation Vs. Creativity; Types of Innovations, Categories of Innovation: Product, Process, and Service Finance (Venture Capital, Angel Investors), Role and functions of business incubators, venture capital, start-up finance and private equity fund. Initiatives of Government of India to promote entrepreneurship –Start-up India, Stand- up India, Make in India, and Self-Help groups etc.

Unit IV: Enterprise Formation: Significance of writing the business plan/project proposal including feasibility analysis; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report

Unit-V: Understanding and Analysing Business Opportunities: Market demand analysis, project feasibility study; preparation of business plan; Start-ups and basic start-ups problems, sources of financing business start-ups; Cases of Indian start-ups (practical knowledge on preparation of business plan/project report shall be imparted).

Suggested Readings:

1. Brandt, S. C. *Entrepreneuring: The Ten Commandments for Building a Growth Company*. MacMillan Business Books.
2. Dollinger, M. J. *Entrepreneurship: Strategies and Resources.* Illinois: Irwin.
3. Holt, D. H. *Entrepreneurship: New Venture Creation.* New Delhi: Prentice Hall of India.
4. Panda, S. C. *Entrepreneurship Development*. New Delhi: Anmol Publications.
5. Roy, R. (2011). *Entrepreneurship*. Oxford University Press.
6. Taneja, S., & Gupta, S. L. *Entrepreneurship Development-New Venture creation*. New Delhi: Galgotia Publishing House.
7. Vasper, K. H. *New Venture Strategies.* New Jersey: Prentice-Hall.

Assessment Methods

Continuous Assessment: (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (35 Marks): End Semester Written Examination, Duration 2 Hours

BCOM SECOND SEMESTER

KAZI NAZRUL UNIVERSITY

BCOM 3 year/ 4 Years (H+R)

Semester II

SL.NO	NATURE	PAPER	CREDIT PP
1	**Major(DSE)**	**Cost Accounting**	**5**
2	**Minor**	**Principles of Marketing Management(Fixed for B.COM)**	**5**
3	**Multi-Disciplinary**	**Macroeconomics(Fixed for B.COM) /Personal Finance (for pool)**	**3**
4	**Ability Enhancement Course(AEC)**	**NA**	**Na**
5	**Skill Enhancement Course(SEC)**	**Computer Application in Business**	**3**
6	**Value Added Course(VAC)**	**Environment Studies**	**4**
7	**Summer/Internship**	**NA**	**NA**
8	**Research Project**	**NA**	**NA**

Semester II
Subject-Cost Accounting
Paper Type: Major
Code:
F.M-100 (ES 70+ CA30)

Objectives:

i) To develop an understanding of the basic concepts and applications to establish the cost associated with the production of products and services,
ii) To develop an understanding of cost accounting statements, and
iii) To acquire the ability to apply information for cost ascertainment, planning, control and decision-making.

Learning Outcomes: After completion of the course, learners will be able to:

1. examine and analyse the different cost concepts.
2. determine various components of cost of production.
3. classify unit cost and total cost by preparing a cost statement.
4. compute employee cost, employee productivity and employee turnover.

Unit I: Introduction: Meaning, scope, objectives and advantages of cost accounting; Role of a cost accountant in an organisation. Difference between financial and cost accounting. Cost concepts and classifications-Direct, Indirect, Functional Classification, Notional and Imputed, Product and Period, Controllable and Uncontrollable, Explicit and Implicit, Sunk Cost and Pre-production Cost, E-tendering, Elements of cost and preparation of Cost sheet. Concepts of job costing and batch costing,

Unit II: Material

Materials: Material/inventory control techniques. Accounting and control of purchases, storage and issue of materials. Inventory systems, EOQ, Various levels of stocks, Methods of pricing of materials issues — FIFO, LIFO, Simple Average, Weighted Average, Physical Verification-Perpetual and Periodical System, Accounting treatment and control of losses— Wastage, scrap, spoilage and defectives, ABC Analysis, VED, JIT, Material Turnover Ratio,

Unit III: Labour

Labour: Accounting and Control of labour cost. Time-keeping and time-booking. Concept and treatment of idle time, over time, labour turnover and fringe benefits. Methods of wage payment, Time Rate, Piece Rate, and Incentive schemes- Halsey, Rowan, Taylor‘s differential piece wage, Requisites of Good Wages Incentive Plan.

Unit IV: Overheads

Classification, allocation, apportionment and absorption of overheads, Under- and over-absorption; Causes and treatment of Under- and over- absorption; Activity based costing (Concept Only). Machine Hour Rate,

Unit V: Methods of Costing: Contract costing and process costing

(c) Contract Costing-Features, Accounting Procedures, Profit on Incomplete Contracts-Surveyor‘s Certificate, Work-in-Progress, Costing of Running Contract, Only Concept: Bid Costing and Cost-Plus contract, Escalation Clause and De-Escalation Clause.

(d) Process costing (excluding inter process profit and W-I-P Valuation)-Features-Process Loss and Gains, Normal Loss, Abnormal Loss and Abnormal Gain.

Unit VI: Variance analysis (only material and labour variances) - Elementary concepts and analysis

Unit VII: Cost Accounting Systems

Integral and non-integral systems, meaning, features, advantages of integral accounting system; Causes of difference in Cost profit and profits as per financial a/c, Reconciliation of cost accounting profits with financial profits

Suggested Reading:

1. JawaharLal, Cost Accounting, McGraw Hill Education.
2. S.P. Jain and K.L. Narang, Cost Accounting, Kalyani Publishers.
3. M.N. Arora, Cost Accounting, Principles and Practice, Vikas Publishing House.
4. S.N. Maheshwari, and S.N. Mittal, Cost Accounting: Theory and Problems, ShriMahavir Book Depot,
New Delhi.
5. S.P. Iyengar, Cost Accounting, Sultan Chand & Sons.
6. B.K. Bhar, Cost Accounting, World Press.
7. V.K Saxsena & C.D.Vashist, Advanced Cost and Management Accounting. Sultan Chand and Sons ,New Delhi.
8. Drury, Management and Cost Accounting, Cengage Learning.
9. Horngren, Cost Accounting, Pearson.
10. Dutta, Cost Accounting: Principles & Practice, Pearson.
11. Debasis Banerjee, Cost Accounting & Management Accounting.Book Syndicate.
12. C.H.Sengupta and B G Chowdhury-Cost and Management Accounting, Dey Book Concern.
13. Goutam Kumar Jana, Cost and Management Accounting(Theory and Practice) .Books andAallied(P)

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Continuous Assessment: (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (70 Marks): End Semester Written Examination, Duration 4 Hours

KAZI NAZRUL UNIVERSITY
BCOM 3 year/ 4 Years (H+R)
Semester II
Subject-Principles of Marketing Management
Paper Type: (MINOR)(Fixed for B.Com)
Code:
F.M-100(ES:70+CA:30)

Course Objective

The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing and to provide knowledge about various developments in the marketing.

Course Learning Outcomes

After completing the course, the student shall be able to:

CO1: develop understanding of basic concepts of marketing, marketing philosophies and environmental conditions effecting marketing decisions of a firm.

CO2: understand the dynamics of consumer behaviour and process of market selection through STP stages.

CO3: understand and analyze the process of value creation through marketing decisions involving product development.

CO4: understand and analyze the process of value creation through marketing decisions involving product pricing and its distribution.

CO5: understand and analyze the process of value creation through marketing decisions involving product promotion and also to equip them with the knowledge of various developments in marketing area that may govern marketing decisions of a firm

Course Contents

Unit I: Introduction to Marketing: Meaning, Nature, Scope and Importance; Core concepts of marketing; Marketing Philosophies; Services Marketing: Meaning and distinctive characteristics; Marketing Mix.

Unit II: Marketing Environment: Need for studying marketing environment; Micro environmental factors- company, suppliers, marketing intermediaries, customers, competitors, publics; Macro environmental factors – demographic, economic, natural, technological, politico-legal and socio- cultural.

Unit III (a)Consumer Behaviour: Need for studying consumer behaviour; Types; Stages in Consumer buying decision process; Factors influencing consumer buying decisions.

(b)Market Selection: Choosing market value through STP. Market Segmentation- Levels and bases of segmenting consumer markets. Market Targeting- concept and criteria. Product Positioning – concept and bases; Product differentiation- concept and bases.

Unit IV (a)Product Decisions: Concept and classification; Levels of Product. Designing value-Product- mix dimensions, strategies and types; Branding- functions, strategies, types and qualities of good brand name; Packaging and Labeling- functions, types and ethical aspects; Product support services.

(b) New Product Development: Product life cycle – concept and marketing strategies; New product development- concept and process.

Unit V Pricing Decisions: Objectives; Factors affecting price of a product; Pricing methods; Pricing strategies; Ethical issues in pricing decisions. Distribution Decisions: Channels of distribution, types and functions. Delivering value- factors affecting choice of distribution channel; Distribution strategies; Distribution logistics – concept, importance and major logistics decisions; Wholesaling and retailing; Types of retail formats;

Unit VI Place and Promotion Decisions: Concept of place, types and factors to be considered for determining suitable marketing channels, Communication process; Importance of Promotion. Communicating value- Decision about Promotion mix tools including advertising, personal selling, sales promotion, public relations, publicity and direct marketing; Factors influencing promotion mix

Unit VII Developments in Marketing: Relationship Marketing- concept and dimensions. Sustainable Marketing- concept and issues. Rural marketing- characteristics, drivers of growth in rural marketing, rural marketing mix. Service marketing: Marketing of Banking services, Mutual Funds etc., Social marketing- Digital marketing- concept. Digital platforms in Marketing – GeM, Amazon, Flipkart, Marketing Apps like Zomato, SWIGGY

Suggested Readings:

Etzel, M. J., Walker, B. J., Stanton, W. J., & Pandit, A. (2010). *Marketing (14th ed.)*. Mc Graw Hill.

Kapoor, Neeru. *Principles of Marketing*. PHI

Kotler, P., Armstrong, G. and Agnihotri, P. (2018). Principles of Marketing (17th Edition), Pearson Education. Indian edition.

Mahajan, J.P. and Mahajan Anupama. *Principles of Marketing.* Vikas Publications.

Sharma, K., & Swati Aggarwal. (2018). *Principles of Marketing*. Taxmann's.

Note: Latest edition of readings may be used

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Continuous Assessment: (30 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (70 Marks): End Semester Written Examination, Duration 4 Hours

KAZI NAZRUL UNIVERSITY
BCOM 3 year/ 4 Years (H+R)
Semester II
Subject-Macro Economics
Paper Type: MD
Code:
F.M-50 (SE 35+ CA 15)

Course Objective

To provide the students with knowledge of enriching concepts and variables of macro-economics; appreciate the impact of labor market, money market and foreign exchange on working of an economy and understand the modern tools of macro-economic analysis.

Course Learning Outcomes

After completing the course, the student shall be able to:

CO1: describe the nature and scope of Macro Economics, Income, Expenditure and their components and determinants.

CO2: expose fiscal and monetary policy implications through IS-LM framework in short run and long run.

CO3: comprehend the different theories of demand for money, supply of money approach and working of money multiplier.

CO4: elucidate causes and effects of different types of inflation and trade-off between inflation and unemployment.

CO5: describe the role of saving and investment in different size of economies on trade and exchange rate and rate of interest.

Course Contents:

Unit I: Basic Concepts and National Income Determination: Macroeconomics, Concepts, Scope, Macroeconomic variables- GDP, Interest rate, Income, Expenditure etc., Objectives, Difference between Microeconomics and Macroeconomics. National Income - Definition, concepts and measurement of GNP, NNP, GDP, NDP, and NI; Different methods of measuring national income; The Accounting identity of saving and investment; Problems of using national income as a measure of Economic welfare; Problems of measuring national income in any country.

Unit II: Consumption Function: Keynesian consumption function and its properties; Factors affecting consumption expenditure; Saving function and its properties. Concepts of MPS, APS, MPC and APC. Determination of equilibrium level of income, Nature of equilibrium, Stability of equilibrium; Concept of Multiplier; Investment multiplier; limitations of the multiplier analysis; Paradox of thrift.

Unit III: Economy in the Short Run and IS– LM framework: Meaning, Objectives and instruments of fiscal and monetary policy, AD-AS approach- Determination of aggregate demand, Shifts in aggregate demand, Aggregate supply in the short- run and long-run, Aggregate demand- Aggregate supply analysis. IS and LM curve- Definition, Properties, Derivation of IS and LM Functions; Joint determination of National Income and rate of Interest.

Unit IV: Demand for money and Supply of money

Demand for money- Quantity Theory of Money (Fisher‘s Transactions approach), Keynesian theory of demand for money, Baumol-Tobin Transaction approach, Tobin‘s Portfolio Balance approach. Supply of money- Measures of money supply by RBI, Money multiplier.

Unit V: Inflation, Unemployment and Labor Market

Inflation-Causes and effects, Demand pull and cost push inflation. Measures to control inflation. Social costs of inflation. Unemployment – Natural rate of unemployment, Frictional and wait unemployment. Labour market and its interaction with production system. Phillips curve, Trade-off between inflation and unemployment, Sacrifice ratio**.**

Suggested Readings:

 Andrew B. Abel and Ben S. Bernanke, *Macroeconomics*, Pearson Education, Inc., 7 thedition, 2011.
 Branson, William H. *Macroeconomic Theory and Policy*. HarperCollins India Pvt. Ltd.
 Deepashree. *Principles of Macroeconomics.* Scholar Tech Press. Ed. 2017.
 Dornbusch, Rudiger, Stanley Fischer and Richard Startz, *Macroeconomics*, McGraw Hill Education; Twelfth edition, 2018
 Edward Shapiro. *Macroeconomic Analysis. Ed.5th* Galgotia Publications Pvt Ltd-New Delhi,2013
 Froyen, *Macroeconomics:- Theories and Policies* Pearson New Delhi, Sixth edition, 2013
 G.S. Gupta : *Managerial Economics* McGraw Hill Education; 2ndedition, 2017
Government of India (GOI) (Latest Year) : —Economic Survey, Ministry of Finance: New Delhi
 JM Keynes: *General Theory of Interest, Employment & Money*, Atlantic, 2008
 Mankiw, N. Gregory, *Principles of Macroeconomics,* Cengage Learning India Pvt. Ltd.;7th edition, New York, Hampshire, U.K. 2015
 Olivier Blanchard, Macroeconomics, Pearson Education, Inc., 5 th edition, 2009.
 Paul R. Krugman, Maurice Obstfeld and Marc Melitz, *International Economics,* Pearson Education Asia, 9 th edition, 2012.
 Richard T. Froyen, *Macroeconomics,* Pearson Education Asia, 2 nd edition, 2005.
 Salvatore, Dominick. *International Economics.* John Wiley & Sons Singapore.
 T Foryen Richard: *Macro Economic Theories and Policies; 6th edition*, 1998

Note: Latest edition of readings may be used

Teaching Learning Process

Teaching learning process may be interactive classroom sessions with the help of Power Point presentations, reflective assessment and case study discussions to ensure active participation and continuous learning.

Assessment Methods

Continuous Assessment: (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (35 Marks): End Semester Written Examination, Duration 2 Hours

Personal Finance (For Pool)

Paper Type: MD

Code:

F.M-50 (SE 35+ CA 15)

Unit I: Introduction to Personal Finance: KYC Management, PAN, AADHAR, Personal Income, Active income, passive income, personal expenditure, savings, income savings ratio; Various financial institutions – Banks, Insurance companies, Post Offices; Mobile App based services. Need of availing of financial services from banks, insurance companies and postal services, digital transaction security system.

Unit II: Financial Planning and Budgeting : Meaning, importance and need for financial planning; Personal Budget, Family Budget, Business Budget; Procedure for financial planning and preparing budget; avenues for savings from surplus.

Unit III: Banking Services : Types of banks; Banking products and services –Types of bank deposit accounts – Savings Bank Account, Term Deposit, Current Account, Recurring Deposit, PPF, NSC, Sukanya Samridhi Yojana etc.; Formalities to open various types of bank accounts, PAN Card, Address proof; Various types of loans – short term, medium term, long term, micro finance, and related interest rates offered by various nationalized banks and post office; Cashless banking, e-banking, Check Counterfeit Currency; CIBIL, ATM, Debit and Credit Card, and APP based Payment system; Banking complaints and Ombudsman. Unified Payment Interface (UPI).

Unit IV: Post Office Financial Services: Post office Savings Schemes: Savings Bank, Recurring Deposit, Term Deposit, Monthly Income Scheme, Kishan Vikas Patra, Senior Citizen Savings Scheme (SCSS), Sukanya Samriddhi Yojana/ Account (SSY/SSA); India Post Payments Bank (IPPB). Money Transfer: Money Order, E-Money order. Instant Money Order, collaboration with the Western Union Financial Services; MO Videsh, International Money Transfer Service, Electronic Clearance Services (ECS), Money gram International Money Transfer, Indian Postal Order (IPO).

Unit V: Protection and Investment Related Financial Services:

Insurance Services: Life Insurance Policies: Life Insurance, Term Life Insurance, Endowment Policies, Pension Policies, ULIP, Health Insurance and its Plans, Property Insurance: Policies offered by various general insurance companies. Post office life Insurance Schemes: Postal Life Insurance and Rural Postal Life Insurance (PLI/RPLI). Housing Loans: Institutions providing housing loans, Loans under Pradhan Mantri Awas Yojana – Rural and Urban.

Investment avenues in Equity and Debt Instruments: Share Market and Debt Market, Sensex and its significance; Investment in Shares – Mutual Fund – SIP.

Assessment Methods

Continuous Assessment: (15 Marks): Internal Assessment may be conducted by using any one or in combinations of Class participation, Presentation, Project Writing and Presentation, Assignment and Presentation, Surprise Test as suitable.

End-Semester Examination: (35 Marks): End Semester Written Examination, Duration 2 Hours

Computer Application in Business

Skill Enhancement Course (SEC)

Course Type: Practical

Full Marks 50 (CA-30+ES-20)

Course Objective

To provide computer knowledge to commerce students and equip them with computational skills using
ICT tools.

Course Learning Outcomes

After completing the course, the student shall be able to:

CO1: understand the various concepts and terminologies used in computer networks and internet and be aware of the recent developments in the fast changing digital business world.

CO2: handle document creation for communication.

CO3: acquire skills to create and make good presentations

CO4: make various computations in the area of accounting and finance and represent the business data using suitable charts. S/He should be able to manipulate and analyze the business data for better understanding of the business environment and decision making

CO5: understand and apply the various database concepts and tools in the related business areas with the help of suggested popular software

Unit1: Data Processing, Networking and Recent trends in computing

Computing: Concept of computing, Data and information; Computing Interfaces: GUI, CLI, Touch Interface, NLI; data processing; applications of computers in business.**Computer Networks:** Meaning of computer network; objectives/ needs for networking; Applications of networking; Basic Network Terminology; Types of Networks; Network Topologies; Distributed Computing: Client Server Computing, Peer- to- peer Computing; Wireless Networking; Securing Networks: firewall. **Basic Internet Terminology:** I.P. Address, Modem, Bandwidth, Routers, Gateways, Internet Service Provider (ISP), World Wide Web (www), Browsers, Search Engines, Proxy Server, Intranet and Extranet; Basic Internet Services; Internet Protocols: TCP/IP, FTP, HTTP(s), Uses of Internet to Society; Cyber Security: Cryptography, digital signature. **Recent trends in computing:** Tools of business collaboration: emails, wikis, file sharing, screen sharing, web presenting, work scheduling; E-Commerce: meaning, business models, Electronic Data Interchange (EDI), Payment Gateways; Internet of Things (IoT)

Unit II: Word Processing (Practical)

Introduction to word Processing, Word processing concepts, Use of Templates, Working with word document: Editing text, Find and replace text, Formatting, spell check, Autocorrect, Autotext; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Tables: B.Com.(Hons) CBCS(LOCF) Department of Commerce, Kazi Nazrul University Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge: including linking with Databases and spreadsheet files; Printing documents; Citations and Footnotes. **Creating Business Documents using the above facilities**

Unit III: Preparing Presentations (Practical)

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, hyperlinking, Media; Design; Transition; Animation; and Slideshow. **Creating Business Presentations using above facilities**

Unit IV: Spreadsheet and its Business Applications (Practical)

(a) Spreadsheet concepts, managing worksheets; Formatting, conditional formatting, Entering data, Editing, and Printing and Protecting worksheets; Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs; Working with Multiple worksheets; controlling worksheet views, naming cells and cell ranges.

(b) Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database functions, Text functions and Error functions

(c) Working with Data: Sort and filter; Consolidate; Tables; Pivot tables; What–if-analysis: Goal seek, Data tables and Scenario manager; Data analysis Tool Pak: Descriptive Statistics, Moving averages, Histogram, Covariance, correlation and Regression analysis (only for projection)

(d) Creating business spreadsheet: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Constraint optimization, Assignment Problems, Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression Analysis

Unit-V: Computerised Accounting Systems (ERP-Tally)

Computerized Accounts by using any popular accounting software: Creating a Company; Configure and Features settings; Creating Accounting Ledgers and Groups; Creating Stock Items and Groups; Vouchers Entry; Generating Reports - Cash Book, Ledger Accounts, Trial Balance, Profit and Loss Account, Balance Sheet, Funds Flow Statement, Cash Flow Statement Selecting and shutting a

Company; Backup and Restore data of a Company

Suggested Readings

- Elmasari, Ranez and Shamkant B. Navathe, *Fundamentals of Database Systems*, Pearson Education
- Jain Hem Chand and Tiwari H. N. (2019), Computer Applications in Business, Taxmann
- Madan Sushila, Computer Applications in Business, Scholar Tech Press.
- Mathur Shruti and Jain Pooja, Computer Applications in Business, Galgotia Publishing Company
- Sharma S.K. and Bansal Mansi, Computer Applications in Business, Taxmann
- Wayne Winston, Data Analysis & Business Modeling, PHI.

Note: The latest editions of the books should be referred.

Teaching Learning Process

The course would involve lectures supported by group discussion, real life projects, open ended projects and hands-on-practice in computer labs. B.Com.(Hons) CBCS(LOCF) Department of Commerce, Kazi Nazrul University

Assessment Methods

There shall be practical examination of 50(Internal 30 and External 20 Marks.)

Methods	Marks		Examiner
Project Note	i. Lab Note Book: 05 Marks	30 Marks	Continuous

Book	ii. Viva : 10 Marks iii. Experiment: 15 Marks		Assessment(Internal)
Practical	i. Experiment: 15 Marks ii. Viva : 05 Marks	20 Marks	End Semester (External)

****
****

NEP SYLLABUS
PHILOSOPHY

CURRICULUM AND SYLLABUS

B.A. Honours and B.A. Program
in
Philosophy

(w.e.f 2016-2017)

UNDER CHOICE BASED CREDIT SYSTEM

KAZI NAZRUL UNIVERSITY
ASANSOL, WEST BENGAL

KAZI NAZRUL UNIVERSITY

CURRICULUM AND SYLLABUS

B.A. HONOURS IN PHILLOSOPHY

(6 Semesters Pattern)

With effect from 2016-2017 academic session and onwards

There will be six semesters in the three- year B.A. Honours in Philosophy. The Curriculum consists of 14 Core Courses (C), 2 Ability Enhancement Compulsory Courses (AECC), 2 Skill Enhancement Courses (SEC) and 4 Discipline Specific Elective (DSE) Courses and 4 Generic Elective (GE) courses [to be taken from the pool of Generic Elective courses]*. Each course is of 50 marks. L stands for Lecture Hour, T for Tutorial Hour and P for Practical Hour.

B.A.(Honours) in Philosophy: 1st Semester

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks
Outlines of Indian Philosophy-I	CC-1	BAHPHIC101	5 - I - 0	6	50
History of Western Philosophical Thoughts-I	CC-2	BAHPHIC102	5 - I - 0	6	50
Choose from Pool of Generic Electives given below	GE-1	Coding List Attached			50
Environmental Studies	AEC-1	AECE101	4 - 0 - 0	4	50
			SEMESTER TOTAL:	22	200

B.A.(Honours) in Philosophy: 2nd Semester

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks
Outlines of Indian Philosophy-II	CC-3	BAHPHIC201	5 - I - 0	6	50
History of Western Philosophical Thoughts-II	CC-4	BAHPHIC202	5 - I - 0	6	50
Choose from Pool of Generic Electives given below	GE-2	Coding List Attached			50
English/Mil	AEC-2	AECE201	4 - 0 - 0	4	50
			SEMESTER TOTAL:	20	200

B.A.(Honours) in Philosophy: 3rd Semester

Course Title		Course type	Course Code	(L-T-P)	Credit	Marks
Indian Ethics		CC-5	BAHPHIC301	5 - I - 0	6	50
Western Ethics		CC-6	BAHPHIC302	5 - I - 0	6	50
Indian Logic		CC-7	BAHPHIC303	5 - I - 0	6	50
Choose from Pool of Generic Electives given below		**GE-3**	Coding List Attached			50
Logical Rules & Fallacies (Indian)	Any One	SEC-1	BAHPHISEC301	2 - 0 - 0	2	50
Methods of Philosophical Enquiry (Indian)			BAHPHISEC302			
				SEMESTER TOTAL:	26	250

B.A.(Honours) in Philosophy: 4th Semester

Course Title		Course type	Course Code	(L-T-P)	Credit	Marks
Western Logic-I		CC-8	CORE-8	5 - I - 0	6	50
Psychology		CC-9	CORE-9	5 - I - 0	6	50
Philosophy of Religion		CC-10	CORE-10	5 - I - 0	6	50
Choose from Pool of Generic Electives given below		**GE-4**	Coding List Attached			50
Logical Rules & Fallacies (Western)	Any One	SEC-2	BAHPHISEC401	2 - 0 - 0	2	50
Methods of Philosophical Enquiry (Western)			BAHPHISEC402			
				SEMESTER TOTAL:	26	250

B.A.(Honours) in Philosophy: 5th Semester

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks
Socio-Political Philosophy	CC-11	CORE-11	5 - I - 0	6	50
Western Logic-II	CC-12	CORE-12	5 - 1- 0	6	50
Any two from Group A given below	DSE-1		5 - I - 0	6	50
	DSE-2		5 - I - 0	6	50
Group A					
Bertrand Russell: *The Problems of Philosophy*	DSE	BAHPHIDSE501	5 - I - 0		
Kaṭhopaniṣad		BAHPHIDSE502	5 - I - 0		
Rene Descartes: *Meditations on first Philosophy*		BAHPHIDSE503	5 - I - 0		
Debiprasad Chattopadhyay: *Lokāyata Darśana*		BAHPHIDSE504	5 - I - 0		
Shibaditya Misra: *Saptapadārthī*		BAHPHIDSE505	5 - I - 0		
			SEMESTER TOTAL:	24	200

B.A.(Honours) in Philosophy: 6th Semester

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks
Philosophy in the Twentieth Century: Indian	CC-13	CORE-13	5 - I - 0	6	50
Philosophy in the Twentieth Century: Western	CC-14	CORE-14	5 - 0 - 0	6	50
Any two from Group B (Given below)	DSE-3		5 - I - 0	6	50
	DSE-4		5 - I - 0	6	50
Group B					
David Hume: *An Enquiry Concerning Human Understanding*	DSE	BAHPHIDSE601	5 - I - 0		
Dhammapada		BAHPHIDSE602	5 - 0 - 0		
Rabindranath Tagore: *Sādhanā*		BAHPHIDSE603	5 - I - 0		
Plato: *The Republic*		BAHPHIDSE604	5 - I - 0		
Lokacari Swami: *Tattvatraya*		BAHPHIDSE605	5 - I - 0		
			SEMESTER TOTAL:	24	200
			GRAND TOTAL:	**142**	1300

POOL OF GENERIC ELECTIVE PAPERS [INTERDISCIPLINARY] FOR HONOURS: SEMESTER 1-4

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks
Outlines of Indian Philosophy	GE-1	BAHPHIGE101	5 - I - 0	NA	NA
Psychology		BAHPHIGE102	5 - I - 0		
History of Western Philosophy	GE-2	BAHPHIGE201	5 - I - 0		
Ethics	GE-3	BAHPHIGE301	5 - I - 0		
Socio-Political Philosophy		BAHPHIGE302	5 - I - 0		
Logic	GE-4	BAHPHIGE401	5 - I - 0		
Philosophy of Religion		BAHPHIGE402	5 - I - 0		

SYLLABUS IN DETAILS FOR THE

B.A. HONOURS IN PHILOSOPHY

(SIX SEMESTER PATTERN)

(To be effective from the academic session 2016-2018)

BAHPHIC101	**Outlines of Indian Philosophy-I**	**Minimum Classes: 84**

Suggested Topics:

- **Detailed Introduction:**

(a) General Features of Indian Philosophy (b)An Overview of Schools of Indian Philosophy.

- **Cārvaka:**

(a) Perception as the only Source of Knowledge, Refutation of Inference and Testimony as Sources of Knowledge, *(b) jaḍavāda* and *dehātmavāda*

- **Jainism:**

(a) *anekāntavāda*, (b) *syādvāda* and *nayavāda*, (c) Theory of Self and Liberation (d) Nature of Substance: Relation between Substance, Attributes & Modes

- **Buddhism:**

(a) Four Noble Truths, (b) *pratītyasamutpādavāda* (c) *kṣaṇabhangavāda*, (d) *nairātmyavāda* (e) Schools of Buddhism

- **Nyāya–Vaiśeṣika:**

(a) Nyāya Epistemology : Perception, Inference, Comparison and Testimony; Theory of Error

(b) Vaiśeṣika Metaphysics : Nature of Cause, Classification of Causes, Theory of Causality, *paramāṇuvāda*, Seven Categories

- **Sāṁkhya:**

(a) Theory of Evolution, *prakṛti* and its *guṇa*-s, Notion of *puruṣa*, *bahupuruṣavāda*, Theory of Causality

Recommended Texts:

- S. C. Chatterjee & D. M. Dutta : *An Introduction to Indian Philosophy,* Calcutta University Press, Kolkata 700019, 2004
- C. D. Sharma : *A Critical Survey of Indian Philosophy* ,Motilal Banarsidass Publishers Private Limited, Delhi, 2009

References:

- J. N. Mohanty : *Classical Indian Philosophy*, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy,* Motilal Banarsidass, Delhi, 2009
- S.N. Dasgupta : *A History of Indian philosophy, Vols. I to V,* Motilal Banarsidass, Delhi, 1988
- T.R.V.Murti : The *Central Philosophy of Buddhism,* Munshiram Monoharlal Publishers Pvt. Ltd., New Delhi, 2013
- R.D. Ranade : *A Constructive Survey of Upanisadic Philosophy,* Oriental Book Agency,Poona,1926
- R. Puligandla : *Fundamentals of Indian Philosophy,* Abingdon Press, Nashville, New York,1975
- P.T.Raju : *Structural Depths of Indian Thought,* south Asian publications, 1985
- Kalikrishna Bandyopadhyay *: Nyayatattva Parikrama,* Papyrus, Kolkata, 1984
- Karuna Bhattacharya: *Nyaya-Vaiśeṣika Darśan,* Paschimbanga Rajya Pustak Parsad, Kolkata, January 2013
- Panchanan Shastri : *Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda
- Panchanan Shastri : *Bauddha Darśan,* Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joyguru pustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73
- Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī,* Pragatishil Prakasak, Kolkata, 2011
- Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā* , The New Durga Printing Works, Medinipur, 7th ed.1986

BAHPHIC102	**History of Western Philosophical Thoughts-I**	**Minimum Classes: 84**

Suggested Topics:

- **The Pre-Socratic Period:**

(a) Ionian School, Parmenides, Heraclitus and Democritus

- **Plato:**

(a) Theory of Knowledge, Theory of Ideas

- **Aristotle:**

(a) Refutation of Plato's Theory of Ideas, Theory of Substance and Mind-Body Problem, (B) Classification of Ideas, Theory of Causation, Form and Matter, potentiality and actuality, soul and God

- **Medieval Philosophy**:

(a) St. Augustine – Problem of Evil.
(b) St. Anselm – Ontological argument.
(c) St. Thomas Aquinas – Faith and Reason, Essence and Existence, the Existence of God

- **Francis Bacon:** (a) General outline of Bacon's philosophy, (b) Idolas, (c) Induction, (d) Critical evaluation

- **Descartes:**

(a) Method of Descartes, (b) *Cogito Ergo Sum*, (c) Criterion of Truth, (d) Existence of God, e) Mind and Body

- **Spinoza:**

(a) The Doctrine of Substance, Attributes and Modes, (b) Relation between Mind and Body: Parallelism, (c) Degrees of Knowledge.

- **Leibniz:**

(a) Doctrine of Monads and Pre-established Harmony (b) Truths of Reason and Truths of Fact, Identity of indiscernibles

Recommended Texts :

- Y. Masih : *A Critical History of Western Philosophy*, Matilal Banarsidass Publishers Private limited., Delhi,1996.

References:

- F. Copleston : *A History of Philosophy* [Vols. I, IV, V, & VII],Continuum Publishers, London (1946-1974)
- B. Russell : *History of Western Philosophy*, George Allen & Unwin Ltd., London,1946
- R. Falckenberg : *History of Modern Philosophy,* Progressive Publishers, Calcutta, 1962
- W.T. Stace : *A Critical History of Greek Philosophy,* MacMillan and St. Martine's Press Inc,1967
- W.K. Wright: *A History of Modern Philosphy,*The Macmillan Company, New York, 1958
- Anders Wedberg : *A History of Philosophy*, Vol.-I & II, Clarendon Press,Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy,*Clarendon Press,Oxford,2005

BAHPHIC201	**Outlines of Indian Philosophy-II**	**Minimum Classes: 84**

Suggested Topics:

- **Yoga:**

citta, cittabhūmi, cittavṛtti, cittavṛttinirodha and *īśvara*

- **Pūrva Mīmāṁsā :**

pramāṇa-s with special reference to *arthāpatti* and *anupalabdhi*, Theories of error: *akhyativāda*(prabhākara), a*nyathakhyativāda* (Bhātta)

- **Advaita Vedānta :**

Nature of Brahman, *vivartavāda, māyā, jīva* and *jagat*

- **Viśiṣṭādvaita Vedānta:**

Distinction between *advaitavāda* and *viśiṣṭādvaitavāda*, Nature of *īśvara*, *jīva* and *jagat*, Ramanuja's Criticism of Saṁkara's Doctrine of *māyā*

Recommended Texts :

- S. C. Chatterjee & D. M. Dutta : *An Introduction to Indian Philosophy,* Calcutta University Press, Kolkata , 2004
- C. D. Sharma : *A Critical Survey of Indian Philosophy* ,Motilal Banarsidass Publishers Private Limited, Delhi, 2009

References :

- J. N. Mohanty : *Classical Indian Philosophy*, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy*, Motilal Banarsidass, Delhi, 2009
- S.N.Dasgupta : *A History of Indian philosophy, Vols. I to V,* Motilal Banarsidass, Delhi, 1988
- T.R.V.Murti : *The Central Philosophy of Buddhism*, Munshiram Monoharlal Publishers Pvt. Ltd.,New Delhi ,2013
- R.D.Ranade : *A Constructive Survey of Upanisadic Philosophy*, Oriental Book Agency,Poona,1926
- R.Puligandla : *Fundamentals of Indian Philosophy*, ABINGDON PRESS, Nashville, New York,1975
- P.T.Raju : *Structural Depths of Indian Thought*, south Asian publications, 1985
- Kalikrishna Bandyopadhyay *: Nyayatattva Parikrama*, Papyrus, Kolkata, 1984
- Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan,* Paschimbanga Rajya Pustak Parsad, Kolkata, January 2013.
- Panchanan Shastri : *Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda.
- Panchanan Shastri : *Bauddha Darśan,* Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joyguru pustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73.
- Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakaumudī,* Pragatishil Prakasak, Kolkata, 2011
- Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā* , The New Durga Printing Works, Medinipur, 7th ed.1986
- Jharna Bhattacharya : *Advaitavāda O Viśiṣṭādvaitavāda,* Snskrit Prakasak Bhander, Kolkata,1382

BAHPHIC202	**History of Western Philosophical Thoughts-II**	**Minimum Classes: 84**

Suggested Topics:

- **Locke :**

(a) Refutation of Innate Ideas and Principles, (b) Theory of Ideas, (c) Distinction between Primary and Secondary Qualities, (d) Theory of Substance, (e) Theory of Knowledge, (f) The Extent and Validity of Knowledge

- **Berkeley :**

(a) Rejection of the Lockean notion of Substance, (b) Refutation of Abstract Ideas (c) Rejection of the Distinction between Primary and Secondary Qualities, (d) *Esse Est Percipii* (e) God and self

- **Hume :**

(a) Origin of Knowledge : Impressions and Ideas, (b) Laws of Association, (c) Distinction between Relations of Ideas and Matters of Fact, (d) Notion of Causality, (e) The Problem of Personal Identity, (F) Hume's Scepticism, (g) rejection of metaphysics

- **Kant :**

(a) Idea of the Critical Philosophy, (b) Possibility of Metaphysics, (c) Kant's Copernican Revolution in Philosophy, (d) Role of Sensibility and Understanding in the origin of Knowledge, (e) Possibility of Synthetic *a priori* Judgments, (f) Space and Time: Metaphysical and Transcendental expositions.

- **Hegel:**

(a) Dialectical Method, (b)The Absolute.

- **A.J. Ayer:**
  (a) The Elimination of Metaphysics
  (b) Verifiability Theory of Meaning

Recommended Texts :

- Y. Masih : *A Critical History of Western Philosophy*, Motilal Banarsidass Publishers Private limited., Delhi, 1996.
- I. Kant : *Critique of Pure Reason, Translated by N.K.Smith, Macmillan and Co., Limited, London,1929.*
- A.J. Ayer : *Philosophy in the Twentieth Century,* Unwin Paperbacks, London,1984

References:

- F. Copleston : *A History of Philosophy* [Vols. I, IV, V, & VII], Continuum Publishers, London(1946- 1974)
- B. Russell : *History of Western Philosophy*, George Allen & Unwin Ltd., London,1946
- R. Falckenberg : *History of Modern Philosophy*, Progressive Publishers, Calcutta, 1962
- W.K. Wright: *A History of Modern Philosphy*, The Macmillan Company, New York, 1958
- Anders Wedberg : *A History of Philosophy*, Vol.-I & II, Clarendon Press,Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy*, Clarendon Press,Oxford,2005
- Robert R. Ammerman (Ed..): *Classics of Analytic Philosophy*, TATA Mc GRAW-HILL Publishing Company Ltd.,New Delhi, 1965
- Norman Kemp Smith : *A Commentary to Kant's Critique of Pure Reason*, Palgrave Macmillan, New York,2003

BAHPHIC301	**Indian Ethics**	**Minimum Classes: 84**

Suggested Topics:

- *puruṣārtha* (Cārvāka, Bauddha and *āstika* views)
- Vedic Concept of *ṛta, satya, yajña*, *ṛṇa, vidhi* and *niṣedha*
- The concepts of *niṣkāmakarma* and *sthitaprajña* in the *Śrīmadbhagavadgītā*
- Buddhist Ethics : *pañcaśīla* and *brahmavihārabhāvanā*
- Jaina Ethics : *pañcamahāvrata, triratna, anuvrata* and *mahāvrata*
- Yoga Ethics : *hiṁsā, ahiṁsā,yama* and *niyama*

Recommended Texts :

- S. K. Maitra : *Ethics of the Hindus,* Calcutta University Press, Kolkata , 1963

References :

- I. C. Sharma : *Ethical Philosophies of India,* George Allen & Unwin Ltd., London,1965
- M. Hiriyanna : *The Indian Conception of Values,* Kavyalaya Publishers, Mysore ,1975
- Surama Dasgupta : *Development of Moral Philosophy in India,* FREDERICK UNGAR PUBLISHING CO., New York,1965
- Jagadish Chandra Ghosh *: Bhagavadgītā*
- Sukhamoy Bhattacharya : *Pūrvamīmāṁsā Darśan,* Paschimbanga Rajya Pustak Parsad, Kolkata, 2006

BAHPHIC302	**Western Ethics**	**Minimum Classes: 84**

Suggested Topics:

- Nature and Scope of Ethics; Nature of Morality
- Moral and Non-moral actions
- Object of Moral Judgment : Motive and Intention
- Postulates of Morality
- The Development of Morality
- Normative Theories :

Consequentialism(Teleology): Ethical Egoism; Utilitarianism: Act and Rule Utilitarianism; Act and Rule Deontology; Kant's Moral Theory; Divine Command Theory; Eudaemonism

- Theories of Punishment: Retributive, Deterrent And Reformative Theory
- Issues in Applied Ethics :

Suicide; Mercy Killing and Euthanasia: Nature and Types; Famine and Affluence; Gender Equality; Basic Concerns of Environmental Ethics: Anthropocentrism, Non-anthropocentrism and Eco-feminism

Recommended Texts:

- W. Frankena: *Ethics,*2nd ed.*,* Prentice Hall of India Private Limited, Delhi, 1973
- Y. V. Satyanarayan : *Ethics : Theory and Practice*

Refere nces:

- W. Lillie *: An Introduction to Ethics,* University Paperbacks, London,1955
- J. S. Mackenzie : *A Manual of Ethics,* Oxford UniversityPress, London, 1973
- J. L .Mackie : *Ethics: Inventing Right and Wrong,* Penguine Books, New York, 1977
- P. Singer : *Practical Ethics,* Cambridge Universirty Press, 2011
- Somnath Chakraborty : *Nītividyār Tattvakathā,* Progressive Publishers, Kolkata, 2002
- Somnath Chakraborty : *Kathāy Karme Ethics,* Progressive Publishers, Kolkata, 2006
- Mrinal Kanti Bhadra *: Nītividya,* The University of Burdwan , Burdwan,1991
- Dikshit Gupta *: Nītiśāstra,* Paschimbanga Rajya Pustak Parsad, Kolkata, 2nd ed., 2007

BAHPHIC303	**Indian Logic**	**Minimum Classes: 84**

Recommended Topics & Texts :

Annambhatta : *Tarkasaṁgraha with Dīpikā*

[From "*sarvavyavahāraheturguṇo buddhirjñānam"* to "*smṛtirapi dvividhā yathārthāyathārthaśceti*"]

References:

- Gopinath Bhattacharyya (tr. & elucidated) *Tarkasaṁgrahadīpikā on Tarkasaṁgraha,* Progressive Publishers, Calcutta, 1976, Reprint august 2009.
- Narayan Chandra Goswami : *Tarkasaṁgraha of Annambhatta,* Snskrit Prakasak Bhander, Kolkata

BAHPHIC401	**Western Logic-I**	**Minimum Classes: 84**

Suggested Topics:

Half-I : Deduction Propositional Logic , 1st Order Predicate Logic up to singly general proposition.

Recommended Texts :

- M. Copi, C. Cohen, K. McMahon : *Introduction to Logic* (14th Edition) [Chapters 5 to 10], First published 2014 by Pearson Education, Inc, Reprint Routledge, 2017.

Suggested Topics:

- **Half-II : Induction**

Recommended Texts :

M. Copi, C. Cohen, K. McMahon : *Introduction to Logic* (14th Edition) [Chapters 11 to 14], First published 2014 by Pearson Education, Inc, Reprint Routledge, 2017.

BAHPHIC402	**Psychology**	**Minimum Classes: 84**

Suggested Topics:

- Nature of Psychology
- Psychological Research Methods
- Biological Processes and Behavior: Nervous System and Endocrine System
- Perception : Colour and Depth , Pattern Recognition, Perceptual Organization
- Attention
- Learning: Classical Conditioning Theory, Instrumental(Operant) Conditioning Theory
- Memory
- Cognition and emotion : Appraisal Theory of Emotion, Cognition-emotion- action
- Consciousness: Content and Levels of Consciousness
- Intelligence

Recommended Texts :

- C.T.Morgan & R.A.King Jr.: *Introduction to Psychology*, Tata McGraw–Hill Publishing Company Ltd.,New Delhi,1993
- Robert S. Feldman: *Understanding Psychology*, Mc Graw-Hill, Inc.,1993

References:

- G. F. Stout : *A Manual of Psychology*, Hinds, Noble & Eldridge, 1915
- Woodworth & Marquis : *Psychology*, Holt, New York, 1947
- R. S. Woodworth *: Contemporary Schools of Psychology*, Methuen & Co.Ltd., Great Britain,1931
- E. B. Titchener : *A Text- book of Psychology*, Macmillan, 1921
- Baron & Misra : *Psychology*, Pearson, 5th Edition, 2014
- Sadhan Chakraborti : *Monovidyar Prathamik Porichay*, Paschimbanga Rajya Pustak Parshad, Kolkata, 2017

BAHPHIC403	**Philosophy of Religion**	**Minimum Classes: 84**

Suggested Topics:

- Nature and Scope of Philosophy of Religion
- Origin and Development of Religion
- Religion, Dharma, Dhamma
- Hinduism, Christianity, Islam, Buddhism : Basic Tenets, Prophets (if any), Incarnation, Bondage and Liberation
- Arguments for the Existence of God
- Arguments against the Existence of God
- The Problem of Evil

- Monotheism, Polytheism, Henotheism
- God as Immanent or Transcendent

Recommended Texts

- J. Hick : *Philosophy of Religion,* Prentice Hall of india,3rd ed., 1988

References:

- D. Mohanta: *Dharma Darsaner Katipay Samasya*, Nababharati Prakashani, Kolkata, 2010
- P.B.Chatterjee : *Studies in Comparative Religion,* Dasgupta & Co. Private Ltd., Calcutta, 1971
- Kalidas Bhattacharyya : *Possibility of Different Types of Religion*, The Asiatic Society, Calcutta,1975
- K.N.Tiwari : *Comparative Religion,* Motilal Banarsidass, Delhi, 1987

BAHPHIC501	**Socio-Political Philosophy**	**Minimum Classes: 84**

Suggested Topics:

- Nature and Scope of Social Philosophy and Political Philosophy
- Basic Concepts : Society, Social Group, Community, Association, Institution, Customs, Folkways and Mores
- Social Class and Caste: Class Attitude and Class Consciousness, Marxian Theory of Class, Caste System in India, B. R . Ambedkar's Criticism of Caste System, Dalit Movement
- Socio-Political Ideas:
  - Democracy – its Different Forms
  - Socialism – Utopian and Scientific
  - Secularism and its Nature
  - Secularism in India
  - Nation, Nationalism and Internationalism (Rabindranath Tagore)
  - Humanism (Manabendranath Roy)
  - Swaraj and Sarvodaya (M.K.Gandhi)
  - Basic issues of Human rights

Recommended Texts :

- Krishna Roy : *Political Philosophy : East and West*, CAS, Dept. of Philosophy & Allied Publishers Ltd., Delhi, 2003
- Andrea Veltman : *Social and Political Philosophy: Classic & Contemporary Readings,* Oxford University Press, 2008
- John Somarville & Ronald E. Santoni : *Social and Political Philosophy: Readings from Plato to Gandhi,* Anchor Books, 1963

References:

- R. M. MacIver & C. H. Page : *Society,* Macmillan & CO LTD., London,1957
- Morris Ginsberg : *Sociology,* Oxford University Press, 1950
- Tom Bottomore : *Sociology, A Guide to Problems and Literature,* Blackie & Son (India) Ltd., Bombay, 1972

- P. Gisbert *: Fundamentals of Sociology,* Oriental Longmans Private Ltd. 1959,Calcutta 13
- F. Engles : *Socialism* : *Utopian and Scientific,* Resistance Books, 1999
- Satyabrata Chakraborty(Ed.) : *Bharatbarsha : Rastrabhabana,* Ekushe, Kolkata, 2003
- Amal Kumar Mukhopadhyay : *'Secularism in the Present Indian Society' in Bulletin of the Ramkrishna Mission Institute of Culture,* Vol. LVII No. II
- D.E. Smith : *India as A Secular State,* Princeton University Press, 2015
- Sobhanlal Duttaguta : *Marxiya Rastrachinta,* Paschim Bango Rajya Pustak Parsad, Kolkata,1984
- M.K.Gandhi *: Hind Swaraj or Indian Home Rule*, Printed & Published by : Jitendra T Desai, Navajivan Publishing House, Ahmedabad, 380 014 (INDIA), 1909
- Benulal Dhar : *Manavadhikar ki ebong keno ?* , Pragatishil Prakashak, College Street, Kolkata -700073, 2015
- Benulal Dhar : *The Philosophical Understanding of Human Rights* , Pragatishil Publishers College Street, Kolkata -700073, 2013

BAHPHIC502	**Western Logic -II**	**Minimum Classes: 84**

Suggested Topics:

- **Chapter 9: Sets**
- **Chapter 10: Relations**

Recommended Texts:

- P. Suppes: *Introduction to Logic*, East West Press Private Limited, New Delhi,1957

BAHPHIC601	**Philosophy in the Twentieth Century: Indian**	**Minimum Classes: 84**

Suggested Topics:

Philosophical Thoughts of Rabindranath Tagore, Swami Vivekananda, Sri Aurobindo, S. Radhakrishnan, Md. Iqbal and Mahatma Gandhi (Minimum number of classes on each thinker should not be less than **14**)

- **Rabindranath Tagore**
  (a) Nature of man : The Finite Aspect of Man, the Infinite Aspect of Man ,the Finite-Infinite Aspect of Man, (b) Nature of Religion, (c) Problem of Evil (f) Surplus in Man
- **Swami Vivekananda**
  (a) Practical Vedānta, (b) Universal Religion, (c) Yoga
- **Sri Aurobindo**
  (a) Nature of Reality, (b) Human Evolution– its different stages, (c) Integral Yoga
- **S. Radhakrishnan**
  (a) Nature of Man, (b) Nature of Religious Experience, (c) Nature of Intuitive Apprehension
- **Md. Iqbal**
  (a) Nature of the Self, (b) Nature of the World, (c) Nature of God
- **Mahatma Gandhi**
  (a) God and Truth, (b) *Ahiṁsā*, (c) Trusteeship

Recommended Texts :

- B. K. Lal : *Contemporary Indian Philosophy,* Motilal Banarsidass Publishers Pvt. Ltd., Delhi,2005
- Benay Gopal Ray : *The Philosohy of Rabindranath Tagore,* Progressive Publishers, Calcutta,1970

References:

- Swami Vivekananda : *Complete Works of Swami Vivekananda* (Vol. II), Advaita Ashrama , Kolkata,1997
- P.T.Raju : *Structural Depths of Indian Thought*, south Asian publications, 1985

BAHPHIC602	**Philosophy in the Twentieth Century: Western**	**Minimum Classes: 84**

Suggested Topics:

- Philosophical thoughts of G.E. Moore, B. Russell, Quine, M. Heidegger and J.P. Sartre

- **G.E.Moore:**

(a)The Refutation of Idealism (b) The Defence of Common Sense

- **B. Russell:**

(a)Knowledge by Acquaintance and Knowledge by Description

- **L. Wittgenstein:**

(a) Use Theory of Meaning

- **Quine:**

(a) Critique of Empiricism

- **M. Heidegger:**

(a) Being in the World : Existenz, Facticity and Fallenness

(b) Authenticity and Inauthenticity

- **J.P.Sartre:**

(a) Nothingness

(b) Freedom

Recommended Texts:

- B. Russell: *The Problems of Philosophy,* Cambridge University Press, New York, 1912
- W.V.O. Quine: *Two Dogmas of Empiricism, (Classics of Analytic philosophy),* Edited by R. Ammerman, Mcgraw-Hill, New York, 1965.

Re ferences:

- A.J.Ayer : *Language,Truth and Logic*, Dover Publications, 2nd ed. , 31 may 2002.
- A.J.Ayer : *The Central Questions of Philosophy*, Penguin Books, New York , 1973
- Mrinal Kanti Bhadra : *A Critical Study of Sartre's Ontology of Consciousness,* The University of Burdwan, Burdwan, 1978
- Mrinal Kanti Bhadra *: A Critical Survey of Phenomenology and Existentialism,* Allied Publishers, New Delhi, 1990
- J. Passmore : *Recent Philosophers A Hundred Year of Philosophy,* Penguin Books Ltd., England, 1968
- Somnath Chakraborty : *Prasanga* : *Darsana Jignasa, (1&2), Progressive Publishers , Kolkata, June 1999, January 2000.*
- Debika Saha : *Darshaner Samasyabali*
- M.K.Bhadra : *Astibad O Manabatabad*, The University of Burdwan, Burdwan, 1995

DSE-I & II Group A

BAHPHIDSE501 **Special Text: Bertrand Russell: *The Problems of Philosophy*** **Minimum Classes: 84**

Suggested Topics:

- Chapters 1-9 & 15

Recommended Texts:

- Bertrand Russell: *The Problems of Philosophy***,** Oxford University Press, Paperback, 1959.

BAHPHIDSE502 **Special Text: *Kaṭhopaniṣad*** **Minimum Classes: 84**

Recommended Texts : *Kaṭhopaniṣad-*

Suggested Topics:

- *three boons,* Nature of self, *preyas* and *śreyas*, allegory of chariot, Nature of Body
- Chapter1: *prathama vallī*, *dvitīya vallī, tṛitīya vallī,*
- Chapter2: *prathama vallī* (Nature of body) & *dvītiya vallī*

BAHPHIDSE503 **Special Text: René Descartes: *Meditations on First Philosophy*** ***Minimum Classes: 84***

Suggested Topics:

- ***Pages 1 to 57 (6** Meditations**) ;*** Objections & Replies excluded

Recommended Texts :

- René Descartes: *Meditations on First Philosophy,* Translated & Edited by John Cottingham, Cambridge University Press, 2017 (First Published 1986)

BAHPHIDSE504 **Special Text: Debiprasad Chattopadhyay: *Lokāyata Darśana*** **Minimum Classes: 84**

Suggested Topics:

- *Prathama*, *dvitīya*, and *tṛitīya pariccheda*

Recommended Texts :

- Debiprasad Chattopadhyay: *Lokāyata Darśana ,* New Age Publisher's PVT. *Kolkata, 1956*

References :

- Chattopadhyaya , Debiprasad : Lokayata: A study in Ancient Indian Materialism ,People's Publishing House, New Delhi, 1959

BAHPHIDSE505 ***Special Text:* Shibaditya Misra : *Saptapadārthī*** ***Minimum Classes: 84***

Suggested Topics:

- *maṅgalācaraṇa, uddesā prakaraṇa, lakṣaṇa prakaraṇa*

Recommended Texts :

- Shibaditya Misra : *Saptapadārthī-*

References :

- Joy Bhattacharjee: Shibaditya-Birochito- *Saptapadārthī,* Ramkrishna Mission Institute of Culture.

DSE-III & IV Group B

BAHPHIDSE601 Special Text: Hume: *An Enquiry Concerning Human Understanding* **Minimum Classes: 84**

Suggested Topics:

- Sections 1 to 8 & 12

Recommended Texts :

- David Hume: *An Enquiry Concerning Human Understanding*

References :

- David Hume: *An Enquiry Concerning Human Understanding*, with an introduction by J. N. Mohanty, Progressive Publishers, Calcutta, 1999

BAHPHIDSE602 **Special Text: *Dhammapada*** **Minimum Classes: 84**

Recommended Texts : *Dhammapada-*

Suggested Topics:

- Chapter1: *yamaka varga, Chapter2: apramāda varga, Chapter3: citta varga, Chapter4. puṣpa varga, Chapter10: daṇda varga, Chapter14: buddha varga, Chapter26: brāhmana varga*

References :

- *Dhammapada:Bhumika:* Prabhat Kumar Mukhopadhyay, Haraf Prakasani.
- *Dhammapad*a: Grantha parichiti-Rabindranath Tagore, edited by Charuchandra Basu, Mahabodhi Book Agency, Kolkata.

BAHPHIDSE603 **Special Text: Rabindranath Tagore: *Sādhanā*** **Minimum Classes: 84**

Suggested Topics:

- Soul consciousness, The problem of Evil, The problem of self, Realisation in Action.

Recommended Texts :

- Rabindranath Tagore: *Sādhanā-*

References :

- Rabindranath Tagore: *Sādhanā- The Realization of Life, Published by Rupa.Co*

BAHPHIDSE604	**Special Text: Plato : *The Republic***	**Minimum Classes: 84**

Suggested Topics:

- Part I, Chapters 1-4
- Part II, Chapters 5,6,10-14
- Part III, Chapters 18, 23

Recommended Texts : The Republic of **Plato, Translated with introduction and notes by Francis Macdonald cornford, Oxford University Press, 1941.**

References :

BAHPHIDSE605	**Special Text: Lokacari Swami: *Tattvatraya***	**Minimum Classes: 84**

Recommended Texts : Lokacari Swami: *Tattvatraya*

- *cit tattva*
- *acit tattva*
- *Brahman*
- Relation among *cit*, *acit* and *Brahman*

POOL OF GENERIC ELECTIVE PAPERS [INTERDISCIPLINARY] FOR HONOURS: SEMESTER 1-6

[Students of a particular Honours department should choose one Generic Elective Paper of any other existing Honours Department except of his/her own Department from the pool provided below.]

BAHPHIGE101	**Outlines of Indian Philosophy**	**Minimum Classes: 84**

Suggested Topics:

- **Introduction:**
  - (a) General Features of Indian Philosophy
- **Cārvāka:**
  - (a) Perception as the only Source of Knowledge
  - (b) Refutation of Inference and Testimony as Sources of Knowledge
  - *(c) jaḍavāda* and *dehātmavāda*
- **Jainism:**
  - *(d) anekāntavāda*
  - *(e) syādvāda* and *nayavāda*
  - (f) Theory of Self and Liberation
- **Buddhism:**
  - (a) Four Noble Truths
  - *(b) pratītyasamutpāda*
  - *(c) kṣaṇabhangavāda*
  - *(d) nairātmyavāda*
  - (e) Schools of Buddhism
- **Nyāya–Vaiśeṣika:**
  - (a) Nyāya Epistemology : Perception, Inference, Comparison and Testimony;,
  - (b) Vaiśeṣika Metaphysics : Theory of Causality, *paramanuvāda*, Seven Categories
- **Sāṁkhya:**
  - (a) Theory of Evolution
  - (b) *prakṛti* and its *guṇa*-s
  - *(c)* Notion of *puruṣa*, *bahupuruṣavāda*
  - (d) Theory of Causality
- **Yoga :**
  - *(a) citta*
  - *(b) cittabhūmi*
  - *(c) cittavṛtti*
  - *(d) cittavṛttinirodha*
- **Advaita Vedānta:**
  - (a) Nature of Brahman
  - *(b) māyā*
  - *(c) jīva* and *jagat*

Recommended Texts :

- S. C. Chatterjee & D. M. Dutta : *An Introduction to Indian Philosophy,* Calcutta University Press, Kolkata , 2004
- Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā,* The New Durga Printing Works, Medinipur, 7th ed.1986

References :

- C. D. Sharma : *A Critical Survey of Indian Philosophy* ,Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- J. N. Mohanty : Classical Indian Philosophy, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy*, Motilal Banarsidass, Delhi,2009
- S.N.Dasgupta : *A History of Indian philosophy, Vols. I to V,* Motilal Banarsidass, Delhi,1988
- T.R.V.Murti : *Central Philosophy of Buddhism*, Munshiram Monoharlal Publishers Pvt. Ltd.,New Delhi ,2013
- R.D.Ranade : *A Constructive Survey of Upanisadic Philosophy*, Oriental Book Agency,Poona,1926
- R.Puligandla : *Fundamentals of Indian Philosophy*, ABINGDON PRESS, Nashville, New York,1975
- P.T.Raju : *Structural Depths of Indian Thought*, south Asian publications, 1985
- Kalikrishna Bandyopadhyay *: Nyayatattva Parikrama*, Papyrus, Kolkata, 1984
- Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan,* Paschimbanga Rajya Pustak Parsad, Kolkata, January 2013.
- Panchanan Shastri : *Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda.
- Panchanan Shastri : *Bauddha Darśan,* Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joyguru pustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73.
- Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakaumudī,* Pragatishil Prakasak, Kolkata, 2011

BAHPHIGE102	**Psychology**	**Minimum Classes: 84**

Suggested Topics:

- Nature of Psychology
- Psychological Research Methods
- Biological processes and behaviour: Nervous system and endocrine system
- Perception : Colour and depth , pattern recognition, perceptual organization
- Attention
- Learning: Classical Conditioning Theory, Instrumental(Operant) Conditioning Theory
- Memory
- Cognition and emotion : Appraisal theory of emotion, Cognition-emotion- action
- Consciousness: Content and levels of Consciousness

Recommended Texts :

- C.T.Morgan & R.A.King Jr.: *Introduction to Psychology*, Tata McGraw–Hill Publishing Company Ltd.,New Delhi,1993
- Robert S. Feldman: *Understanding Psychology*, Mc Graw-Hill, Inc.,1993

References:

- G. F. Stout : *A Manual of Psychology,* Hinds, Noble & Eldridge, 1915
- Woodworth & Marquis : *Psychology*, Holt, New York, 1947
- R. S. Woodworth *: Contemporary Schools of Psychology,* Methuen & Co.Ltd., Great Britain,1931
- E. B. Titchener : *A Text- book of Psychology,* Macmillan, 1921
- Baron & Misra : *Psychology*, Pearson, 5th Edition, 2014
- Sadhan Chakraborti : *Monovidyar Prathamik Porichay*, Paschimbanga Rajya Pustak Parshad, Kolkata, 2017

BAHPHIGE201	**History of Western Philosophy**	**Minimum Classes: 84**

Suggested Topics:

- **Descartes :**
  (a) Method of Doubt, (b) *Cogito Ergo Sum*, (c) Criterion of Truth, (d) Existence of God, e) Mind and Body
- **Spinoza :**
  (a) The Doctrine of Substance, Attributes and Modes, (b) Relation between Mind and Body : Parallelism, (c) Degrees of Knowledge
- **Leibniz :**
  (a) Doctrine of Monads and Pre-established Harmony (b) Truths of Reason and Truths of Fact, (c) Theory of Knowledge
- **Locke :**
  (a) Refutation of Innate Ideas and Principles, (b) Theory of Ideas, (c) Theory of Substance, (d) Distinction between Primary and Secondary Qualities, (e) Theory of Knowledge
- **Berkeley :**
  (b) Rejection of the Lockean notion of Substance, (b) Refutation of Abstract Ideas (c) *Esse Est Percipii*
- **Hume :**
  (c) Origin of Knowledge : Impressions and Ideas, (b) Laws of Association, (c) Distinction between Relations of Ideas and Matters of Fact, (d) Notion of Causality (F) Hume's Scepticism.

Recommended Texts :

- Y. Masih : *A Critical History of Western Philosophy*, Motilal Banarsidass Publishers Private limited., Delhi, 1996.

References :

- F. Copleston : *A History of Philosophy* [Vols. I, IV, V, & VII], Continuum Publishers, London(1946-1974)
- B. Russell : *History of Western Philosophy*, George Allen & Unwin Ltd., London,1946
- R. Falckenberg : *History of Modern Philosophy*, Progressive Publishers, Calcutta, 1962
- W.T. Stace : *A Critical History of Greek Philosophy*, MacMillan and St. Martine's Press Inc,1967
- W.K. Wright: *A History of Modern Philosophy*, The Macmillan Company, New York, 1958
- Anders Wedberg : *A History of Philosophy*, Vol.-I & II, Clarendon Press,Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy*, Clarendon Press,Oxford,2005

BAHPHIGE301	**Ethics**	**Minimum Classes: 84**

Suggested Topics:

- Nature and Scope of Ethics; Nature of Morality
- Object of Moral Judgment : Motive and Intention
- Postulates of Morality
- Normative Theories :
  a) Consequentialism (Teleology): Ethical Egoism & Utilitarianism, b) Kant's Moral Theory
- Theories of Punishment
- Issues in Applied Ethics : Suicide, Euthanasia, Basic Concerns of Environmental Ethics

Recommended Texts :

- W. Frankena: *Ethics,*2nd ed., Prentice Hall of India Private Limited, Delhi, 1973
- Y. V. Satyanarayan : *Ethics : Theory and Practice*

References::

- W. Lillie *: An Introduction to Ethics,* University Paperbacks, London,1955
- J. S. Mackenzie : *A Manual of Ethics,* Oxford UniversityPress, London, 1973
- J. L .Mackie : *Ethics: Inventing Right and Wrong,* Penguine Books, New York, 1977
- P. Singer : *Practical Ethics,* Cambridge Universirty Press, 2011
- Somnath Chakraborty : *Nītividyār Tattvakathā,* Progressive Publishers, Kolkata, 2002
- Somnath Chakraborty : *Kathāy Karme Ethics,* Progressive Publishers, Kolkata, 2006
- Mrinal Kanti Bhadra *: Nītividya,* The University of Burdwan , Burdwan,1991
- Dikshit Gupta *: Nītiśāstra,* Paschimbanga Rajya Pustak Parshad, Kolkata, 2nd ed., 2007

BAHPHIGE302	**Socio-Political Philosophy**	**Minimum Classes: 84**

Suggested Topics:

- **Nature and Scope of Social and Political Philosophy**
- **Basic Concepts** : Society, Social Groups, Community, Association,Institution
- **Social Class and Caste** : Class and Caste in India
- **Current Social Problems** : Justice and Equality, National Integration, Marriage and Divorce
- **Political Ideas** : Democracy, Socialism, *Sarvodaya* and *Swaraj*

Recommended Texts :

- Krishna Roy : *Political Philosophy : East and West*, CAS, Dept. of Philosophy & Allied Publishers Ltd., Delhi, 2003
- Andrea Veltman : *Social and Political Philosophy: Classic & Contemporary Readings,* Oxford University Press, 2008
- John Somarville & Ronald E. Santoni : *Social and Political Philosophy: Readings from Plato to Gandhi,* Anchor Books, 1963

Reference:

- R. M. MacIver & C. H. Page : *Society,* Macmillan & CO LTD., London,1957
- Morris Ginsberg : *Sociology,* Oxford University Press, 1950
- Tom Bottomore : *Sociology, A Guide to Problems and Literature,* Blackie & Son (India) Ltd., Bombay, 1972
- P. Gisbert *: Fundamentals of Sociology,* Oriental Longmans Private Ltd. 1959,Calcutta 13
- F. Engles : Socialism : *Utopian and Scientific,* Resistance Books, 1999
- Satyabrata Chakraborty(Ed.) : *Bharatbarsha : Rastrabhabana,* Ekushe, Kolkata, 2003
- Amal Kumar Mukhopadhyay : *'Secularism in the Present Indian Society' in Bulletin of the Ramkrishna Mission Institute of Culture,* Vol. LVII No. II
- D.E. Smith : *India as A Secular State,* Princeton University Press, 2015
- Sobhanlal Duttaguta : *Marxiya Rastrachinta,* Paschim Bango Rajya Pustak Parsad, Kolkata,1984
- M.K.Gandhi *: Hind Swaraj or Indian Home Rule*, Printed & Published by : Jitendra T Desai, Navajivan Publishing House, Ahmedabad, 380 014 (INDIA), 1909

BAHPHIGE401	**Logic**	**Minimum Classes: 84**

Suggested Topics:

- Categorical propositions
- Categorical Syllogism: Figure and Mood, Venn Diagram technique for Testing Validity
- Symbolic Logic : Test of Truth-functional Arguments by Truth-Tables
- Analogical Reasoning
- Science and Hypothesis

Recommended Texts :

I. M. Copi, C. Cohen, K. McMahon: *Introduction to Logic* (14th Edition) [Chapters :5 to 8 & 11,13], First published 2014 by Pearson Education, Inc, Reprint Routledge, 2017.

Reference:

M. Copi, C. Cohen, K. Mcmahon: *Introduction to Logic* (14th Edition) (Relevant Chapters) First published 2014 by Pearson Education, Inc, Reprint Routledge, 2017.

BAHPHIGE402	**Philosophy of Religion**	**Minimum Classes: 84**

Suggested Topics:

- Nature and Scope of Philosophy of Religion
- Origin and Development of Religion
- Religion, Dharma, Dhamma
- Hinduism, Christianity, Islam, Buddhism : Basic Tenets, Prophets (if any), Incarnation, Bondage and Liberation
- Arguments for the Existence of God
- Arguments against the Existence of God
- The Problem of Evil

Recommended Texts :

J. Hick : *Philosophy of Religion,* Prentice Hall of india,3rd ed., 1988

References:

- D. Mahanta: Dharma Darsaner Katipay Samasya, Nababharati Prakashani, Kolkata, 2010
- P.B.Chatterjee : *Studies in Comparative Religion,* Dasgupta & Co. Private Ltd., Calcutta, 1971
- J. Hick : *Philosophy of Religion,* Prentice Hall of india,3rd ed., 1988
- Kalidas Bhattacharya : *Possibility of Different Types of Religion*, The Asiatic Society, Calcutta,1975
- K.N.Tiwari : *Comparative Religion,* Motilal Banarsidass, Delhi, 1987

POOL OF SEC COURSE

BAHPHISEC301	**Logical Rules & Fallacies** (Indian)	**Minimum Classes: 84**

Suggested Topics:

- **Definition and classification of *anumāna***
  a) The Nyāya model
  b) The Buddist model (Svārthānumāna)
- **Aid to *anumāna*:**
  a) tarka
  b) avayava
  c) dṛṣṭānta
  d) siddhānta
- **Logical Fallacies**
  a) *hetvābhāsa* : Nature and Types

Recommended Texts :

- Gautama : *Nyāyasūtra:* Phanibhushan Tarkabagish, Paschimbanga Rajya Pustak Parshad, Kolkata
- Th. Stcherbatsky: *Buddhist Logic,* Vol.-I, Motilal Banarsidass Publishers Private Ltd., Delhi, 2008
- Bimal Krishna Matilal: *The Character of Logic in India*, Oxford University Press, New York, 1998
- B. N. Singh: *Indian Logic,* Asha Prakashan, Baranasi, 1982

References:

- Bimal Krishna Matilal: *Logic, Language and Reality,* Motilal Banarsidass, Delhi, 1985 .
- J.N. Mohanty: *Reason and Tradition in Indian Thought* , Clarendon Press, Oxford, 1992
- Phanibhushan Tarkabagish: *Nyāya Parichay,* Paschimbanga Rajya Pustak Parshad, Kolkata, 1978
- Satischandra Chatterjee *: The Nyaya Theory of Knowledge* , Motilal Banarsidass Publishers Private Ltd., Delhi, 2017

BAHPHISEC302	Methods of Philosophical Enquiry (Indian)	**Minimum Classes: 84**

Suggested Topics:

- **Common and differentiating characteristics of Philosophy and *darśana***
- **Nature of Inquiry in *darśana***
- **Types of Inquiry in *darśana***:
  2. Epistemic Inquiry in *darśana*
  3. Metaphysical Inquiry in *darśana*
  4. Axiological Inquiry in *darśana*
- **Methods of Philosophical Discourse (*kathā*)**
  a) *vāda*
  b) *jalpa*
  c) *vitaṇḍā*
  d) *chala*
  e) *jāti*
  f) *nigrahasthāna*

Recommended Texts :

- B.K. Matilal: *The Word And The World* , Oxford University Press, 2001
- Th. Stcherbatsky: *Buddhist Logic*, Vol.-I, Motilal Banarsidass Publishers Ltd., Delhi,2008
- Bimal Krishna Matilal: *The Character of Logic in India*, Oxford University Press, New York, 1998
- Gautama : *Nyāyasūtra*

References:

- B.K. Matilal: *Perception* , Oxford University Press, 1986
- S.C. Chatterjee & D. M. Datta : *An Introduction to Indian Philosophy,* Calcutta University Press, Kolkata , 2004
- C. D. Sharma : *Critical Survey of Indian Philosophy*, Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- PhanibhushanTarkabagish: *Nyāya Parichay, Paschimbango Rajya Pustak Parsad, Kolkata*

BAHPHISEC401	**Reasoning, Logical Rules & Fallacies (Western)**	**Minimum Classes: 84**

Suggested Topics:

- Argument: deductive and inductive
- Deductive Argument: Immediate inference , Categorical Syllogism, truth functional argument and quantificational argument
- Opposition of propositions: Rules and Fallacies
- Immediate inference: Rules and Fallacies
- Categorical Syllogisms : Rules and Fallacies
- Truth functional Argument : Rules and Fallacies
- Quantificational Argument : Rules and Fallacies
- Fallacious Reasoning in Argumentation
- Inductive Argument : Rules and Fallacies

Recommended Texts :

- M. Copi, C. Cohen, P. Jetli & M. Prabhakar : *Introduction to Logic* (14th Edition)
- R.S. Agarwal: *A Modern Approach to Logical Reasoning* Paperback, 2007

BAHPHISEC402	**Methods of Philosophical Enquiry (Western)**	**Minimum Classes: 84**

Suggested Topics:

- Reasoned Speculation
- Conceptual Analysis
- Linguistic Analysis
- Logical Argumentation
- Critical Reflection

Recommended Texts :

- H. Cappelen: *The Oxford Handbook of Philosophical Methodology,* Oxford University Press, 2016

References:

- Paul F. Kisak: *Philosophical Methodology : the Methods of Philosophical Inquiry* CSI Publishing Platform, 2016
- Bertrand Russell: *The Problems of Philosophy*, Chapter xv (The Value of Philosophy), Holt, New York, 1912
- R. M. Keon: *Philosophic Semantics and Philosophic Inquiry*
- G. E. Moore: *Some Main Problems of Philosophy*, London George Allen & Unwin Ltd. New York - The Macmillan Company,1953

CURRICULUM & SYLLABUS OF DEGREE PROGRAMME:

3 YEARS DEGREE WITH PHILOSOPHY/4 YEARS DEGREE WITH PHILOSOPHY HONOURS/ 4 YEARS DEGREE WITH PHILOSOPHY HONOURS WITH RESEARCH

(w.e.f 2023-2024)

UNDER
NATIONAL CURRICULUM AND CREDIT FRAMEWORK (NCCF)

KAZI NAZRUL UNIVERSITY
ASANSOL, WEST BENGAL

KAZI NAZRUL UNIVERSITY

CURRICULUM AND SYLLABUS

3 YEARS DEGREE WITH PHILOSOPHY/4 YEARS DEGREE WITH PHILOSOPHY HONOURS/ 4 YEARS DEGREE WITH PHILOSOPHY HONOURS WITH RESEARCH

(8 Semesters Pattern)

With effect from 2023-2024 academic session and onwards

Abbreviations: MJC-= Major (Core); AE= Ability Enhancement; AECC= Ability Enhancement Compulsory Course; MNC= Minor (Core); SE= Skill Enhancement; SEC= Skill Enhancement Course; MD= Multidisciplinary Course; SI - Summer Internship; RP= Research Project; VAC= Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, L= Lecture Hour; T= Tutorial Hour and P= Practical Hour/ Field Work and NA= Not Applicable

SEMESTER: I

Course Title	Course Type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Fundamentals of Indian Philosophy	MJC-1	BAPHIMJ101	4 - 1 - 0	5	30	70	100
MINOR COURSE- Choose from the Pool of Minor Courses offered in 1st Semester by the other Disciplines	MNC-1	See Pool	4 - 1 - 0	5	30	70	100
Choose from the Pool of Multidisciplinary Courses offered in 1st Semester	MDC-1	See Pool	3 - 0 - 0	3	15	35	50
English/MIL Communication	AEC-1	See Pool	4 - 0 - 0	4	15	35	50
Reasoning: Deductive and Inductive	SEC-1	BAPHISE101	2 - 1 - 0	3	15	35	50
		SEMESTER	TOTAL:	20	350		

SEMESTER: II

Course Title	Course Type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Fundamentals of Western Philosophy	MJC-2	BAPHIMJ201	4 - 1 - 0	5	30	70	100
MINOR COURSE- Choose from the Pool of Minor Courses offered in 2nd Semester by other Disciplines within the faculty	MNC-2	See Pool	4 - 1 - 0	5	30	70	100
Choose from the Pool of Multidisciplinary Courses offered in 2nd Semester	MDC-2	See Pool	3 - 0 - 0	3	15	35	50
Environment Studies	VAC-1	VAC-201	4 - 0 - 0	4	15	35	50
Applied Ethics	SEC-2	BAPHISE201	2 - 1 - 0	3	15	35	50
		SEMESTER	TOTAL:	20	350		

SEMESTER: III

Course Title	Course Type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Outlines of Indian Philosophy	MJC-3	BAPHIMJ301	4 - 1 - 0	5	30	70	100
History of Western Philosophical Thoughts	MJC-4	BAPHIMJ302	4 - 1 - 0	5	30	70	100
MINOR COURSE- Choose from the Pool of Minor Courses offered in 3rd Semester by other Disciplines within the faculty	MNC-3	See Pool	4 - 1 - 0	5	30	70	100
Choose from the Pool of Multidisciplinary Courses offered in 3rd Semester	MDC-3	See Pool	3 - 0 - 0	3	15	35	50
English Communication	AEC-2	See Pool	4 - 0 - 0	4	15	35	50
		SEMESTER	TOTAL:	22			400

SEMESTER: IV

Course Title	Course Type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Indian Logic	MJC-5	BAPHIMJ401	4 - 1 - 0	5	30	70	100
Western Logic	MJC-6	BAPHIMJ402	4 - 1 - 0	5	30	70	100
MINOR COURSE- Choose from the Pool of Minor Courses offered in 4th Semester by other Disciplines within the faculty	MNC-4	See Pool	4 - 1 - 0	5	30	70	100
Logical Paradox	SEC-3	BAPHISE401	2 -1 - 0	3	15	35	50
Choose from the Pool of Value Added Course offered in 4th Semester	VAC-2	See Pool	4 - 0 - 0	4	15	35	50
		SEMESTER	TOTAL:	22			400

POOL OF PHILOSOPHY MINOR COURSES OFFERED BY PHILOSOPHY DEPARTMENT FOR OTHER DISCIPLINES

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Fundamentals of Indian Philosophy	**MNC-1**	**BAPHIMN101**	4 - 1 - 0	5	30	70	100
Fundamentals Of Western Philosophy	**MNC-2**	**BAPHIMN201**	4 - 1 - 0	5	30	70	100
Classical Indian Philosophy	**MNC-3**	**BAPHIMN301**	4 - 1 - 0	5	30	70	100
History of Western Philosophy	**MNC-4**	**BAPHIMN401**	4 - 1 - 0	5	30	70	100

POOL OF PHILOSOPHY MULTIDISCIPLINARY COURSES OFFERED BY PHILOSOPHY DEPARTMENT

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Yoga for Daily Life	MDC-1	MDC115	2 - 1 - 0	3	15	35	50
Methodology of Indian Knowledge System	MDC-3	MDC308	2 - 1 - 0	3	15	35	50

POOL OF PHILOSOPHY VALUE ADDED COURSES OFFERED BY PHILOSOPHY DEPARTMENT FOR ALL DISCIPLINES ACROSS ALL FACULTIES

Course Title	Course type	Course Code	(L-T-P)	Credit	Marks		
					CA Marks	ESE Marks	Total Marks
Social Values and Ethics	VAC-2	VAC402	4 - 0 - 0	4	15	35	50

SYLLABUS IN DETAILS FOR THE

B.A. HONOURS/WITH RESEARCH IN PHILOSOPHY

(EIGHT SEMESTER PATTERN)

(To be effective from the academic session 2023-2024)

3-YEAR UG DEGREE /4-YEAR UG DEGREE (HONOURS) / 4-YEAR UG DEGREE (HONOURS WITH RESEARCH)

……

SEMESTER- I

MAJOR COURSE - 1

Course Name: Fundamentals of Indian Philosophy

Course Code: BAPHIMJ101

Course Type: **Major (Theoretical)**		Course Details: **MJC-1**		L-T-P: 4 - 1 - 0	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:

The objective of this course is to make students familiar with Indian Intellectual traditions. This course will be an Introduction to the basic concept of Indian philosophy.

Course Outcome:

Students will be benefited from studying Indian Philosophy because this subject shares many concepts such as dharma, karma, suffering, renunciation, meditation with almost all of them focusing on the ultimate goal of liberation of the individual through diverse range of spiritual practices.

Suggested Topics:

Unit– I: What is Philosophy?

- Darśana and Philosophy (including a discussion on the distinctive nature of Indian Philosophy)
- Basic Characteristics of Indian Philosophy
- Common Features of Indian Philosophical Schools

UNIT – II: Some Ethical Concepts of Indian Philosophy

- Cosmic moral order: *Ṛta, Ṛna* and *Yajña*
- *Dharma*: *sādhāraṇadharma* and *viśeṣadharma*
- Concept of *Puruṣārtha*
- *Śreyas* and *Preyas*
- Cārvaka‟s Hedonism

- *Triratna*
- *Pañcaśīla*

Unit–III: Some Basic Concepts of Indian Epistemology

- *pramā* and *apramā* (Nyāya, Pūrva Mīmāṁsā, Vedānta)
- Definition and kinds of *pramāṇa*

UNIT – IV: Different Theories of Causation:

- *satkāryavāda*
- *asatkāryavāda*
- *svabhāvavāda*
- *pratītyasamutpādavāda*
- *vivartavāda*

Recommended Texts:

- S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy,* Calcutta University Press, Kolkata 700019, 2004
- C. D. Sharma: *A Critical Survey of Indian Philosophy*, Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- S. K. Maitra : *Ethics of the Hindus,* Calcutta University Press, Kolkata , 1963

References:

- J. N. Mohanty: Classical *Indian Philosophy*, Oxford University Press, New Delhi, 2000
- M. Hiriyanna: *Outlines of Indian Philosophy,* Motilal Banarsidass, Delhi, 2009
- S.N. Dasgupta : *A History of Indian philosophy,* Vols. I to V, Motilal Banarsidass, Delhi, 1988
- R.Puligandla : *Fundamentals of Indian Philosophy,* Abingdon Press, Nashville, New York,1975
- T.R.V.Murti : The *Central Philosophy of Buddhism*, Munshiram Monoharlal Publishers Pvt. Ltd., New Delhi,2013
- R.D. Ranade : *A Constructive Survey of Upanisadic Philosophy*, Oriental Book Agency, Poona, 1926
- P.T.Raju : *Structural Depths of Indian Thought,* south Asian publications, 1985
- Kalikrishna Bandyopadhyay: Nyayatattva *Parikrama,* Papyrus, Kolkata, 1984
- Karuna Bhattacharya: *Nyaya-Vaiśeṣika Darśan,* Paschimbanga Rajya Pustak Parshad, Kolkata, January 2013
- Panchanan Shastri: *Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda
- Panchanan Shastri: Bauddha *Darśan,* Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joygurupustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73
- Rajat Bhattacharya: *Sāṁkhyakārikā O Sāṁkhyatattvakaumudī,* Pragatishil Prakashak, Kolkata, 2011
- Haridas Bandyaopadhyay: *Bhāratīya DarśanerMarmakathā* , The New Durga Printing Works, Medinipur, 7th ed.1986

SKILL ENHANCEMENT COURSE - 1

Course Name: Reasoning: Deductive and Inductive

Course Code: BAPHISE101

Course Type: **SE (**Theoretical**)**		Course Details: **SEC-1**		L-T-P: **2 - 1 - 0**	
Credit: 3	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

Course Objective:

The course aims to provide the students with the basic skills and know-how of the discipline of Deductive and Inductive Logic. They are expected to acquaint themselves with the primary concepts and theories of Deductive and Inductive logic.

Course Outcome:

After the completion of course, the students will have ability to:

- Students will know about the fundamental methods and techniques of correct reasoning which will sharpen their argumentation skills.
- Students will be capable of comparing between traditional logic and symbolic logic and will be well acquainted with the basic terminologies, premises and conclusions.
- They will gain predictive power by learning the rules and fallacies from deductive and inductive logic.

Suggested Topics:

- What is reasoning?
- Standard form categorical propositions: Forms and Classification
- Distribution of terms of standard from categorical propositions
- Proposition and argument
- Argument: deductive and inductive
- Deductive Argument: Immediate inference, Categorical Syllogism
- Opposition of propositions: Rules and Fallacies
- Immediate inference: Rules and Fallacies
- Categorical Syllogisms: Rules and Fallacies
- Fallacious Reasoning in Argumentation
- Inductive Argument: Rules and Fallacies
- Causal Reasoning
- Method of Scientific Reasoning
- Cause and Effect
- Mill's methods of causal reasoning
- Scientific Thought and Unscientific Thought
- Hypotheses

Recommended Texts:

- I. M. Copi, C. Cohen, P. Jetli & M. Prabhakar: Introduction *to Logic* (14th Edition)
- Agarwal: *A Modern Approach to Logical Reasoning* Paperback, 2007

SEMESTER- II

MAJOR COURSE - 2

Course Name: Fundamentals of Western Philosophy

Course Code: BAPHIMJ201

Course Type: **Major (Theoretical)**		Course Details: **MJC-2**		L-T-P: **4 - 1 - 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective

The objective of this course is to make students familiar with ancient Western tradition and the thinkers of Ancient Greece. It begins with the Pre-Socratic natural philosophers. Then, it discusses theory of knowledge, and the discussion of others western philosophers have also been included in this course to introduce the students with the different views of the western philosophy.

Course Outcome:

It will introduce students with the basic tenets of early Greek Philosophers with the chief exponents of Rationalism inspiring them for further studies.

Suggested Topics:

Unit-I: An Introduction to Western Philosophy

- Meaning of the Term "Philosophy"
- Nature and Scope of Philosophy
- Philosophy as the analysis of language and conceptual structure
- Branches of Philosophy (Epistemology, Metaphysics, Ethics, Aesthetics, Logic)

Unit-II: Basic Tenets of Early Greek Philosophy

- Sophist, Ionian School, Parmenides, Heraclitus and Democritus,
- Thales and Anaximander, Zeno

Unit- III: Greek Philosophy: Aristotle and Plato

- Plato: Theory of Knowledge, Theory of Ideas
- Aristotle: Refutation of Plato"s Theory of Ideas, Classification of Ideas, Theory of Causation, Form and Matter

Unit- IV: Theories of Knowledge

- Rationalism
- Empiricism
- Critical Philosophy (Kant)

Unit V: Theories of Causation

- ❖ Notion of Causal Relation
- ❖ Entailment Theory
- ❖ Regularity Theory

Unit V: Theories of Reality.

- ❖ Universal
- ❖ Realism (naïve, representative)
- ❖ Idealism (subjective, objective)
- ❖ Concept of Substance and Quality (Locke, Berkeley, Hume, Descartes, Spinoza, Leibnitz)

Recommended Texts:

- J. Hospers: *An introduction to Philosophical analysis*, Routledge, London, 1997
- Y. Masih: *A Critical History of Western Philosophy*, Matilal Banarsidass Publishers Private limited. Delhi, 1996.

References:

- F. Copleston: *A History of Philosophy* [Vols. I, IV, V, & VII], Continuum Publishers, London (1946-1974)
- B. Russell: *History of Western Philosophy*, George Allen & Unwind Ltd., London,1946
- R. Falckenberg: *History of Modern Philosophy*, Progressive Publishers, Calcutta, 1962
- W.T. Stace: A *Critical History of Greek Philosophy*, MacMillan and St. Martine‟s Press Inc,1967
- W.K. Wright: *A History of Modern Philosophy*, The Macmillan Company, New York, 1958
- Anders Wedberg : *A History of Philosophy*, Vol.-I & II, Clarendon Press,Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy*, Clarendon Press, Oxford, 2005

SKILL ENHANCEMENT COURSE - 2

Course Name: Applied Ethics

Course Code: BAPHISE201

Course Type: **SE (**Theoretical**)**		Course Details: **SEC-2**		L-T-P: **2 - 1 - 0**	
Credit: 3	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

COURSE OBJECTIVES:

This course aims to discuss important questions in the area of ethics and this course provides anopportunity for students to explore the rich tradition of Western ethical reflection and moral formation.

COURSE OUTCOME:

It will help to explore some issues related to morality, values, and also some burning issues like Euthanasia and Abortion and also Environmental Ethics which will guide us a lot in our daily life.

Suggested Topics:

Unit I:

- An Introduction to Applied Ethics/ what is applied Ethics?
- Human Value in the light of applied Ethics

Unit II:

- Definition and Nature of Human Rights

Unit III:

- Mercy Killing and Euthanasia: Nature and Types
- Abortion

Unit IV:

- Environmental Ethics: Definition and Concerns

Recommended Texts:

- Peter Singer: *Practical Ethics*, Cambridge University Press. 1979
- Y. V. Satyanarayan: *Ethics: Theory and Practice*

References:

- Peter Singer: *Practical Ethics*, Cambridge University Press. 1979
- David S. Oderberg: *Applied Ethics: A Non-Consequential Approach*, Blackwell,2000
- Tom L. Beauchamp: "The Nature of Applied Ethics", *A Companion to Applied Ethics* (eds. R.G.Frey & C.H. Wellman), Blackwell,1970
- Patrick Hayden(ed.): *The Philosophy of Human Rights*, Paragon House, St. Paul, First Edition, 2001
- Somnath Chakraborty: *Kathāy Karme Ethics*, Progressive Publishers, Kolkata, 2006
- Dikshit Gupta: *Nītiśāstra,* Paschimbanga Rajya Pustak Parsad, Kolkata, 2nd ed., 2007

SEMESTER- III

MAJOR COURSE - 3

Course Name: Outlines of Indian Philosophy

Course Code: BAPHIMJ301

Course Type: **Major (Theoretical)**		Course Details: **MJC-3**		L-T-P: **4 - 1 - 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:
The objective of this course is to make students familiar with Indian Intellectual traditions. This course will be an Introduction to the major schools of Indian philosophy.

Course Outcome:
Students will be benefited by studying Indian Philosophy because this subject shares many concepts such as dharma, karma, suffering, renunciation, meditation with almost all of them focusing on the ultimate goal of Liberation of the individual through diverse range of spiritual practices.

Suggested Topics:

- **Unit I:**
  - **Cārvaka Darśana:**
    - Perception as the only Source of Knowledge,
    - Refutation of Inference and Testimony as Sources of Knowledge,
    - *jaḍavāda* and *dehātmavāda*
  - **Jain Darśana:**
    - *anekāntavāda*,
    - *syādvāda* and *nayavāda*,
    - Theory of Self and Liberation
    - Nature of Substance: Relation between Substance, Attributes & Modes
  - **Buddha Darśana:**
    - Four Noble Truths,
    - *kṣaṇabhangavāda*,
    - *nairātmyavāda*
    - Schools of Buddhism
- **Unit II:**
  - **Nyāya Darśana and Vaiśeṣika Darśana:**
    - Nyāya Epistemology : Perception, Inference, Comparison and Testimony; Theory of Error
    - Vaiśeṣika Metaphysics : Seven Categories
- **Unit III:**
  - **Sāṁkhya Darśana:**

- ❖ Theory of Evolution,
- ❖ *prakṛti* and its *guṇa*-s,
- ❖ Notion of *puruṣa*, *bahupuruṣavāda*

- **Yoga Darśana:**
  - ❖ *citta,*
  - ❖ *cittabhūmi,*
  - ❖ *cittavṛtti,*
  - ❖ *cittavṛttinirodha*
  - ❖ *īśvara*

➢ **Unit IV:**

- **Pūrva Mīmāṁsā Darśana:**
  - ❖ *arthāpatti* and *anupalabdhi pramāṇa*,
  - ❖ Theories of error: *akhyativāda*(prabh*ā*kara), a*nyathakhyativāda* (Bh*ā*tta),
  - ❖ *Mīmāṁsā*-Seven Principles of interpreting text
- **Advaita Vedānta Darśana:**
  - ❖ *Nature* of Brahman,
  - ❖ *māyā,*
  - ❖ *jīva* and *jagat*
- **Viśiṣṭādvaita Vedānta Darśana:**
  - ❖ Distinction between advaitavāda and viśiṣṭādvaitavāda,
  - ❖ Nature of *īśvara*, *jīva* and *jagat*,
  - ❖ Ramanuja"s Criticism of Saṁkara"s Doctrine of *māyā*

Recommended Texts:

- S. C. Chatterjee & D. M. Dutta : *AnIntroduction to Indian Philosophy,* Calcutta University Press, Kolkata 700019, 2004
- C. D. Sharma : *A Critical Survey of Indian Philosophy*,Motilal Banarsidass Publishers Private Limited, Delhi, 2009

References:

- J. N. Mohanty : *Classical Indian Philosophy*, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy,* Motilal Banarsidass, Delhi, 2009
- S.N.Dasgupta : *A History of Indian philosophy, Vols. I to V,* Motilal Banarsidass, Delhi, 1988
- T.R.V.Murti : *The Central Philosophy of Buddhism,* Munshiram Monoharlal Publishers Pvt. Ltd.,New Delhi,2013
- R.D.Ranade : *A Constructive Survey of Upanisadic Philosophy,* Oriental Book Agency,Poona,1926
- R.Puligandla : *Fundamentals of Indian Philosophy,* Abingdon Press, Nashville, New York,1975
- P.T.Raju : *Structural Depths of Indian Thought,* south Asian publications, 1985
- Kalikrishna Bandyopadhyay *: Nyayatattva Parikrama,* Papyrus, Kolkata, 1984
- Karuna Bhattacharya: *Nyaya-Vaiśeṣika Darśan,*Paschimbanga Rajya Pustak Parsad, Kolkata, January 2013
- Panchanan Shastri :*Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda
- Panchanan Shastri : *Bauddha Darśan,*Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joyguru pustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73
- Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakumudī,* Pragatishil Prakasak, Kolkata, 2011
- Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā* , The New Durga Printing Works, Medinipur, 7th ed.1986

MAJOR COURSE - 4

Course Name: History of Western Philosophical Thoughts

Course Code: BAPHIMJ302

Course Type: **Major (Theoretical)**		Course Details: **MJC-4**		L-T-P: **4 - 1 - 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective

The objective of this course is to make students familiar with ancient Western tradition and the thinkers of Ancient Greece. It begins with the Pre-Socratic natural philosophers. Then, it discusses the Plato"s theory of knowledge, Idea and the Aristotelian view on Plato"s theory of Idea. The discussion of others western philosophers have also been included in this course to introduce the students with the different views of the western philosophers.

Course Outcome:

It will introduce students with the basic tenets of early Greek Philosophers, with Plato, Aristotle and the chief exponents of Rationalism inspiring them for further studies.

Suggested Topics:

- **Unit I**
  - **Medieval Philosophy**:
    - St. Augustine – Problem of Evil.
    - St. Anselm – Ontological argument.
    - St. Thomas Aquinas – Faith and Reason, Essence and Existence, the Existence of God
  - **Philosophy of Francis Bacon:**
    - General outline of Bacon"s philosophy,
    - Idolas,
    - Induction,
    - Critical evaluation
- **Unit II**
  - **Philosophy of Descartes:**
    - Method of Descartes,
    - *Cogito Ergo Sum*,
    - Criterion of Truth,
    - Existence of God,
    - Mind and Body
  - **Philosophy of Spinoza:**

- ❖ Attributes and Modes,
- ❖ Relation between Mind and Body: Parallelism,
- ❖ Degrees of Knowledge.

- **Philosophy of Leibniz:**
  - ❖ Doctrine of Monads and Pre-established Harmony
  - ❖ Truths of Reason and Truths of Fact, Identity of in discemibles

➢ **Unit III**

- **Philosophy of Locke:**
  - ❖ Refutation of Innate Ideas and Principles,
  - ❖ Theory of Ideas,
  - ❖ Distinction between Primary and Secondary Qualities,
  - ❖ Theory of Knowledge,
  - ❖ The Extent and Validity of Knowledge

- **Philosophy of Berkeley:**
  - ❖ Rejection of the Lockean notion of Substance,
  - ❖ Refutation of Abstract Ideas
  - ❖ Rejection of the Distinction between Primary and Secondary Qualities,
  - ❖ *Esse Est Percipii*
  - ❖ God and self
- **Philosophy of Hume:**
  - ❖ Origin of Knowledge : Impressions and Ideas,
  - ❖ Laws of Association,
  - ❖ Distinction between Relations of Ideas and Matters of Fact,
  - ❖ Notion of Causality,
  - ❖ The Problem of Personal Identity,
  - ❖ Hume‟s Scepticism,
  - ❖ rejection of metaphysics

➢ **Unit IV**

- **Philosophy of Kant:**
  - ❖ Idea of the Critical Philosophy,
  - ❖ Possibility of Metaphysics,
  - ❖ Kant‟s Copernican Revolution in Philosophy,
  - ❖ Role of Sensibility and Understanding in the origin of Knowledge,
  - ❖ Possibility of Synthetic *a priori* Judgments,
  - ❖ Space and Time: Metaphysical and Transcendental expositions.
- **Philosophy of Hegel:**
  - ❖ Dialectical Method,
  - ❖ The Absolute.

Recommended Texts:

- Y. Masih: *A Critical History of Western Philosophy*, Matilal Banarsidass Publishers Private limited. Delhi, 1996.

References:

- F. Copleston : *A History of Philosophy* [Vols. I, IV, V, & VII], Continuum Publishers, London (1946-1974)
- B. Russell : *History of Western Philosophy*, George Allen & Unwind Ltd., London,1946
- R. Falckenberg : *History of Modern Philosophy*, Progressive Publishers, Calcutta, 1962
- W.T. Stace : *A Critical History of Greek Philosophy*, MacMillan and St. Martine‟s Press Inc,1967
- W.K. Wright: *A History of Modern Philosophy*, The Macmillan Company, New York, 1958
- Anders Wedberg : *A History of Philosophy*, Vol.-I & II, Clarendon Press, Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy*, Clarendon Press,Oxford,2005

SEMESTER- IV

MAJOR COURSE - 5

Course Name: Indian Logic

Course Code: BAPHIMJ401

Course Type: **Major (Theoretical)**		Course Details: **MJC-5**		L-T-P: 4 - 1 - 0	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:
The objective of this course is to make students familiar with Indian Logic. This course will discuss some of the major Indian logic in the light of *Tarkasaṁgraha* by Annambhatta and *Nyāyabindu* of Dharmakirti It will help the students to understand the logical approach of the Nyāya and Buddha school of Indian philosophy.

Course Outcome:

Students will be benefited by studying Indian Logic; they will learn detailed analysis of Nyāya and Buddha epistemology which will enhance their intelligence.

Half-I: Nyāya Logic

Suggested Topics:

- **Introduction**
- Definition of inference, constituents, process and types
- *pakṣatā*
- *parāmarśa*
- *vyāpti* and *vyāptigrahopāya*
- *hetvābhāsa*

Recommended Text:

- *Annambhatta* : *Tarkasaṁgraha with Dīpikā*

References:

- Gopinath Bhattacharyya (tr. & elucidated) *Tarkasaṁgrahadīpikā on Tarkasaṁgraha,* Progressive Publishers, Calcutta, 1976, Reprint august 2009
- Narayan Chandra Goswami : *Tarkasaṁgraha of Annambhatta*, Snskrit Prakasak Bhander, Kolkata

Half-II: Buddhists Logic

Suggested Topics:

- **Introduction**
- Definition and classification of inference
- Characteristics of a valid mark
- Definition of *pakṣa*, *sapakṣa* and *asapakṣa*
- Different types of *pakṣabhāsa*, *drstāntabhāsa* and
- *hetvābhāsa*

Recommended exts:

- *Nyāyabindu* of Dharmakirti

References:

- Rajendra Prasad : *Dharmakirti's Theory of Inference*, OUP, 2002

MAJOR COURSE - 6

Course Name: Western Logic

Course Code: BAPHIMJ402

Course Type: **Major (Theoretical)**		Course Details: **MJC-6**		L-T-P: 4 - 1 - 0	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:

This course is designed as an introductory course in logic which will bring out the standard forms of Formal reasoning. It introduces the basic logical concepts and provides a clear understanding of the structure of inferential reasoning.

Course Outcome:

After the completion of course, the students will have ability to:

- Students will know the fundamental methods and technique of correct reasoning in their daily life.
- Students will be capable of comparing between traditional logic and symbolic logic and will be well acquainted with the basic terminologies, premises and conclusions.
- They will get more interest from the topic of scientific enquiry, science and hypothesis, probability etc.

Half-I:

Suggested Topics:

- Mediate Inference, Venn diagrams
- **Deduction:** Propositional Logic, 1st Order Predicate Logic up to singly general proposition.
- **Induction:** Kinds of Induction, Postulates of Induction, Hypothesis, Probability

Recommended Texts:

- I. M. Copi, C. Cohen, K. McMahon: *Introduction to Logic* (14th Edition), First published 2014 by Pearson Education, Inc, Reprint Routledge, 2017.

Half-II:

Suggested Topics:

- **Sets**
- **Relations**

Recommended Texts:

- P. Suppes: *Introduction to Logic*, East West Press Private Limited, New Delhi,1957

SKILL ENHANCEMENT COURSE - 3

Course Name : Logical Paradox

Course Code : BAPHISE401

Course Type: **SE (**Theoretical**)**		Course Details: **SEC-3**		L-T-P: **2 - 1 - 0**	
Credit: 3	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

COURSEOBJECTIVES:

This course aimed to focus on the inter-disciplinarily perspectives of Philosophy. The aim of this paper is to highlight the logical paradoxes. From an academic point of view, these paradoxes are thought-provoking.

COURSEOUTCOME:

This course will assist the students to understand and analyze the critical reasoning; it will help the students to develop their analytical power and logical attitude.

Suggested Topics:

- Xeno‟s Paradox
- Sorities Paradox
- Buridan‟s Ass Paradox
- The Surprise Test Paradox
- The Lottery Paradox
- Meno‟s Puzzle
- Moore‟s Puzzle
- Paradoxes of Material Implication
- The Hudded Man
- The Horned Man
- The Heap
- Richards Paradox
- Grelling‟s Paradox
- Raven‟s paradox
- Liar Paradox

Recommended Texts:

- J.L. Mackie(Ed). „Truth, Probability and Paradox‟, Clarendon Press, OUP, 1905
- R.L. Martin(Ed). „Recent Essayson Truthand the Liar Paradox‟, Clarendon Press, 1984
- W.V. Quine: „The Ways of Paradox and Other Essays‟, Harvard University Press, 1976
- W.C. Solomon(Ed). „Xeno‟s Paradox‟, Bobbs-Merrils Publishing, 1970
- Tim Maudlin: Truth & Paradox‟, Clarendon Press, OUP, 1998
- W.V.O. Quine: „On a so-called Paradox‟, *Mind*, Vol.-62, 1953

PHILOSOPHY MINOR

SYLLABUS IN DETAILS

(MINOR COURSES OFFERED BY PHILOSOPHY DEPARTMENT **FOR OTHER DISCIPLINES)**

MINOR COURSE - 1

Course Name: Fundamentals of Indian Philosophy

Course Code: BAPHIMN101

Course Type: **Minor (Theoretical)**		Course Details: **MNC-1**		L-T-P: **4 –1 – 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:

The objective of this course is to make students familiar with Indian Intellectual traditions. This course will be an Introduction to the basic concept of Indian Philosophy.

Course Outcome:

Students will be benefited from studying Indian Philosophy because this subject shares many concepts such as dharma, karma, suffering, renunciation, meditation with almost all of them focusing on the ultimate goal of liberation of the individual through diverse range of spiritual practices.

Suggested Topics:

Unit– I: What is Philosophy?

- Darśana and Philosophy (including a discussion on the distinctive nature of Indian Philosophy)
- Basic Characteristics of Indian Philosophy
- Common Features of Indian Philosophical Schools.

UNIT – II: Some Ethical Concepts of Indian Philosophy

- Cosmic moral order: *Ṛta, Ṛṇa* and *yajña*
- *dharma*: *sādhāraṇadharma* and *viśeṣadharma*
- Concept of *Puruṣārtha*
- *Śreyas* and *Preyas*
- Cārvaka‟s Hedonism
- *Triratna*
- *Pancaśīla*

Unit–III: Some Basic Concepts of Indian Epistemology

- *pramā* and *apramā* (Nyāya, Pūrva Mīmāṁsā, Vedānta)
- Definition and kinds of *pramāṇa*

UNIT – IV: Different Theories of Causation:

- *satkāryavāda*
- *asatkāryavāda*
- *svabhāvavāda*
- *pratītyasamutpādavāda*
- *vivartavāda*

Recommended Texts:

- S. C. Chatterjee & D. M. Dutta: *An Introduction to Indian Philosophy,* Calcutta University Press, Kolkata 700019, 2004
- C. D. Sharma: *A Critical Survey of Indian Philosophy*, Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- S. K. Maitra: *Ethics of the Hindus,* Calcutta University Press, Kolkata , 1963

References:

- J. N. Mohanty: *Classical Indian Philosophy*, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy,* Motilal Banarsidass, Delhi, 2009
- S.N. Dasgupta : *A History of Indian philosophy, Vols. I to V,* Motilal Banarsidass, Delhi, 1988
- R.Puligandla : *Fundamentals of Indian Philosophy,* Abingdon Press, Nashville, New York,1975
- T.R.V.Murti : The *Central Philosophy of Buddhism,* MunshiramMonoharlal Publishers Pvt. Ltd.,New Delhi,2013
- R.D. Ranade : *A Constructive Survey of Upanisadic Philosophy*, Oriental Book Agency,Poona,1926
- P.T.Raju : *Structural Depths of Indian Thought,* south Asian publications, 1985
- Kalikrishna Bandyopadhyay: *Nyayatattva Parikrama,* Papyrus, Kolkata, 1984
- Karuna Bhattacharya: *Nyaya-Vaiśeṣika Darśan,* Paschimbanga Rajya Pustak Parsad, Kolkata, January 2013
- Panchanan Shastri :*Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda
- Panchanan Shastri :*Bauddha Darśan,* Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joygurupustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73
- Rajat Bhattacharya :*Sāṁkhyakārikā* O *Sāṁkhyatattvakaumudī,* Pragatishil Prakasak, Kolkata, 2011
- Haridas Bandyaopadhyay :*Bhāratīya DarśanerMarmakathā* , The New Durga Printing Works, Medinipur, 7th ed.1986

MINOR COURSE - 2

Course Name: Fundamentals of Western Philosophy

Course Code: BAPHIMN201

Course Type: **Minor (Theoretical)**		Course Details: **MNC-2**		L-T-P: **4 –1 – 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective

The objective of this course is to make students familiar with ancient Western tradition and the thinkers of Ancient Greece. It begins with the Pre-Socratic natural philosophers. Then, it discusses theory of knowledge, and the discussion of others western philosophers have also been included in this course to introduce the students with the different views of the western philosophy.

Course Outcome:

It will introduce students with the basic tenets of early Greek Philosophers, with the chief exponents of Rationalism inspiring them for further studies.

Suggested Topics:

Unit-I: An Introduction to Western Philosophy

- Meaning of the Term "Philosophy"
- Nature and Scope of Philosophy
- Philosophy as the analysis of language and conceptual structure
- Branches of Philosophy (Epistemology, Metaphysics, Ethics, Aesthetics, Logic)

Unit-II: Basic Tenets of Early Greek Philosophy

- Sophist, Ionian School, Parmenides, Heraclitus and Democritus,
- Thales and Anaximander, Zeno

Unit- III: Greek Philosophy: Aristotle and Plato

- Plato: Theory of Knowledge, Theory of Ideas
- Aristotle: Refutation of Plato"s Theory of Ideas, Classification of Ideas, Theory of Causation, Form and Matter

Unit- IV: Theories of Knowledge

- Rationalism
- Empiricism
- Critical Philosophy (Kant)

Unit V: Theories of Causation

- Notion of Causal Relation

- ❖ Entailment Theory
- ❖ Regularity Theory

Unit V: Theories of Reality.

- ❖ Universal
- ❖ Realism (naïve, representative)
- ❖ Idealism (subjective, objective)
- ❖ Concept of Substance and quality (Locke, Berkeley, Hume, Descartes, Spinoza, Leibnitz)

Recommended Texts:

- J. Hospers: An introduction to Philosophical analysis, Routledge, London, 1997
- Y. Masih: *A Critical History of Western Philosophy*, Matilal Banarsidass Publishers Private limited., Delhi,1996.

References:

- F. Copleston: *A History of Philosophy* [Vols. I, IV, V, & VII], Continuum Publishers, London (1946-1974)
- B. Russell: *History of Western Philosophy,* George Allen & Unwind Ltd., London,1946
- R. Falckenberg: *History of Modern Philosophy,* Progressive Publishers, Calcutta, 1962
- W.T. Stace: *A Critical History of Greek Philosophy,* Mac Millan and St. Martine‟s Press Inc,1967
- W.K. Wright: *A History of Modern Philosophy,* The Macmillan Company, New York, 1958
- Anders Wedberg: *A History of Philosophy,* Vol.-I & II, Clarendon Press, Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy,* Clarendon Press, Oxford, 2005

MINOR COURSE - 3

Course Name: Classical Indian Philosophy

Course Code: BAPHIMN301

Course Type: **Minor (Theoretical)**		Course Details: **MNC-3**		L-T-P: **4 –1 – 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:
The objective of this course is to make students familiar with Indian Intellectual traditions. This course will be an Introduction to some the major schools of Indian philosophy. This course is designed to introduce the students in understanding the significance of Indian philosophical studies in their daily life, how to overcome the stress, how to manage their life and take challenges in life; hence there will be a focus on the dialectical and analytical method to understand Indian philosophy**.**

Course Outcome:
Students will be benefited by studying Indian Philosophy because this subject shares many concepts dealt by the Indian school of philosophy. Different schools of Indian philosophy with almost all of them focusing on the epistemology, metaphysics and ethics. This subject will help the students to realize the spiritual values of life.

Suggested Topics:

- **Introduction:**
  - General Features of Indian Philosophy
- **Cārvāka Darśana:**
  - Perception as the only Source of Knowledge
  - Refutation of Inference and Testimony as Sources of Knowledge
  - *jaḍavādaand dehātmavāda*
- **Jain Darśana:**
  - *anekāntavāda*
  - *syādvāda* and *nayavāda*
  - Theory of Self and Liberation
- **Buddha Darśana:**
  - Four Noble Truths
  - *pratītyasamutpāda*
  - *kṣaṇabhangavāda*
  - *nairātmyavāda*
  - Schools of Buddhism
- **Nyāya–Vaiśeṣika Darśana:**
  - *Nyāya* Epistemology : Perception, Inference, Comparison and Testimony;,
  - *Vaiśeṣika* Metaphysics : Theory of Causality, *paramanuvāda*, Seven Categories
- **Sāṁkhya Darśana:**
  - Theory of Evolution

- ❖ *prakṛti* and its *guṇa*-s
- ❖ Notion of *puruṣa*, *bahupuruṣavāda*
- ❖ Theory of Causality

- **Yoga Darśana:**
  - ❖ *citta*
  - ❖ *cittabhūmi*
  - ❖ *cittavṛtti*
  - ❖ *cittavṛttinirodha*

- **Advaita Vedānta Darśana:**
  - ❖ Nature of Brahman
  - ❖ *māyā*
  - ❖ *jīva* and *jagat*

Recommended Texts:

- S. C. Chatterjee & D. M. Dutta : *An Introduction to Indian Philosophy*,Calcutta University Press, Kolkata , 2004
- Haridas Bandyaopadhyay: *Bhāratīya Darśaner Marmakathā,* The New Durga Printing Works, Medinipur, 7th ed.1986

References:

- C. D. Sharma : *A Critical Survey of Indian Philosophy*, Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- J. N. Mohanty : Classical Indian Philosophy, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy,* Motilal Banarsidass, Delhi,2009
- S.N.Dasgupta : *A History of Indian philosophy, Vols. I to V,*Motilal Banarsidass, Delhi,1988
- T.R.V.Murti : *Central Philosophy of Buddhism,* Munshiram Monoharlal Publishers Pvt. Ltd., New Delhi ,2013
- R.D.Ranade : *A Constructive Survey of Upanisadic Philosophy,* Oriental Book Agency,Poona,1926
- R.Puligandla : *Fundamentals of Indian Philosophy,* ABINGDON PRESS, Nashville, New York,1975
- P.T.Raju : *Structural Depths of Indian Thought,* south Asian publications, 1985
- Kalikrishna Bandyopadhyay *: Nyayatattva Parikrama*,Papyrus, Kolkata, 1984
- Karuna Bhattacharya : *Nyāya-Vaiśeṣika Darśan,*Paschimbanga Rajya Pustak Parsad, Kolkata, January 2013.
- Panchanan Shastri : *Cārvāk Darśan* , Marmabani Press, Kolkata, 1394 Bangabda.
- Panchanan Shastri : *Bauddha Darśan,* Pratham Sanskaran, 1401(Bangabda), Praptisthan- Joyguru pustakalaya, 12/1B, Bankim Chatterjee street, Kolkata 73.
- Rajat Bhattacharya : *Sāṁkhyakārikā* O *Sāṁkhyatattvakaumudī,* Pragatishil Prakasak, Kolkata, 2011

MINOR COURSE - 4

Course Name: History of Western Philosophy

Course Code: BAPHIMN401

Course Type: **Minor (Theoretical)**		Course Details: **MNC-4**		L-T-P: **4 –1 – 0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Objective:

This course deals with the different questions of western philosophy dealt by Descartes, Spinoza Leibniz, Locke, Berkeley, and Hume. This course has been divided into two parts one from the rationalist point of view and another is from empiricist point of view to introduce the students with most primary differences between t those two schools of western philosophy. Philosophers like Descartes, Spinoza Leibniz, Locke, Berkeley and Hume have been relentlessly working to quench the thirst of the mankind by expounding theories which have broadened the base of human understanding. This course is designed to share the ideas that sprung from the minds of the great philosophers of the modern western world. The syllabus comprises of six philosophers, and aimed to demonstrate methodical development of philosophical thought propounded by them.

Course Outcome:

This course will help the students to know different questions of life and world dealt by the western philosophers. This course will help to share the ideas that sprung from the minds of the great philosophers of the modern western world.

Suggested Topics:

- **Philosophy of Descartes :**
  - Method of Doubt,
  - *Cogito Ergo Sum*,
  - Criterion of Truth,
  - Existence of God,
  - Mind and Body
- **Philosophy of Spinoza :**
  - The Doctrine of Substance, Attributes and Modes,
  - Relation between Mind and Body : Parallelism,
  - Degrees of Knowledge
- **Philosophy of Leibniz :**
  - Doctrine of Monads and Pre-established Harmony
  - Truths of Reason and Truths of Fact,
  - Theory of Knowledge

- **Philosophy of Locke :**
  - Refutation of Innate Ideas and Principles,
  - Theory of Ideas,
  - Theory of Substance,
  - Distinction between Primary and Secondary Qualities,
  - Theory of Knowledge

- **Philosophy of Berkeley :**
  - Rejection of the Lockean notion of Substance,
  - Refutation of Abstract Ideas
  - *Esse Est Percipii*

- **Philosophy of Hume :**
  - Origin of Knowledge : Impressions and Ideas,
  - Laws of Association,
  - Distinction between Relations of Ideas and Matters of Fact,
  - Notion of Causality
  - Hume‟s Scepticism.

- **Philosophy of Kant:**
  - Idea of the Critical Philosophy,
  - Possibility of Metaphysics,
  - Kant‟s Copernican Revolution in Philosophy,
  - Role of Sensibility and Understanding in the origin of Knowledge,
  - Possibility of Synthetic *a priori* Judgments,
  - Space and Time: Metaphysical and Transcendental expositions.

Recommended Texts:

- Y. Masih : *A Critical History of Western Philosophy,* Motilal Banarsidass Publishers Private limited., Delhi, 1996.

References :

- F. Copleston : *A History of Philosophy* [Vols. I, IV, V, & VII],Continuum Publishers, London(1946-1974)
- B. Russell : *History of Western Philosophy,* George Allen & Unwind Ltd., London,1946
- R. Falckenberg : *History of Modern Philosophy,* Progressive Publishers, Calcutta, 1962
- W.T. Stace : *A Critical History of Greek Philosophy,* MacMillan and St. Martine‟s Press Inc,1967
- W.K. Wright: *A History of Modern Philosophy,* The Macmillan Company, New York, 1958
- Anders Wedberg : *A History of Philosophy*, Vol.-I & II, Clarendon Press,Oxford,1982
- Tom Sorell & G. A. J. Rogers (ed.): *Analytic Philosophy and History of Philosophy,* Clarendon Press,Oxford,2005

PHILOSOPHY MULTIDISCIPLINARY COURSES

SYLLABUS IN DETAILS

(MULTIDISCIPLINARY COURSES OFFERED BY PHILOSOPHY DEPARTMENT**)**

MULTIDISCIPLINARY COURSE - 1

Course Name: Yoga for Daily Life

Course Code: MDC115

Course Type: MD (Theoretical)		Course Details: **MDC-1**		L-T-P: 2 - 1 - 0	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

Course objective:

The objective of the course is to make the students from the other disciplines regarding the reflective thinking with the self-directed learning which will help to develop positive and practical sense of livelihood. It is needless to say that Yoga has a great role in our daily life and now a days it has a worldwide importance to promote a healthy lifestyle.

Course Outcome:

Students will be benefited from studying this course in various aspects. They will acquire the knowledge of Indian traditional method of meditation through the practical approach of this course. This course will help any students from any discipline through a lifelong learning.

Suggested Topics:

- **Introduction**
  - Concept of *Yoga*
  - Definition of *yoga*
  - History and Development of Yoga Philosophy
- ***Citta***
  - *cittabhūmi*
  - *cittavṛtti*
  - *cittavṛttinirodha*
- ***Aṣṭāṅgayoga***
  - Meaning of the *sutra* on *aṣṭāṅgayoga (Yogasūtra* 2/29)
- ***Yama***
  - Importance of the five practices of *yama* in daily life
  - Meaning of the sutras on Yama (*Yogasūtra* 2/30, 35-39)
  - Relevance of *yama* in social interactions
- ***Niyama***

- ❖ Importance of the five practices of *niyama* in daily life
- ❖ Meaning of the sutras on *niyama* (*Yogasūtra* 2/32, 40-45)
- ❖ Relevance of *niyama* in social interactions
- ❖ *yama* and *niyama*— the foundation and preparation for higher steps of *yoga*

- ***Āsana***
  - ❖ Definition of *āsana*
  - ❖ Meaning of the sutra on *āsana* (*Yogasūtra* 2/46)
  - ❖ Differences between *āsana* and exercises
  - ❖ *āsana* as a spiritual practice

- ***Prāṇāyāma***
  - ❖ Definition of *prāṇāyāma*
  - ❖ Meaning of the sutra on *prāṇāyāma* (*Yogasūtra* 2/49)
  - ❖ *prāṇāyāma* as a spiritual practice

- ***Karma yoga***
  - ❖ Karma and its Effect on Character
  - ❖ The Secret of Work
  - ❖ What is Duty?
  - ❖ Non-attachment is complete self-abnegation
  - ❖ Freedom from sorrow
  - ❖ The Ideal of Karma-*Yoga*

Recommended Texts:

- Patañjali : *Yogasūtra* with *Yogasūtrabhāṣya of Vyāsa*
- Complete Works of Swami Vivekananda (Volume-1)

References:

- S.N. Dasgupta : *A History of Indian philosophy*, Vols. I to V, Motilal Banarsidass, Delhi, 1988
- S. C. Chatterjee & D. M. Dutta : *An Introduction to Indian Philosophy*, Calcutta University Press, Kolkata, 2004
- C. D. Sharma : *A Critical Survey of Indian Philosophy*, Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- J. N. Mohanty : *Classical Indian Philosophy*, Oxford University Press, New Delhi,2000
- M. Hiriyanna: *Outlines of Indian Philosophy*, Motilal Banarsidass, Delhi, 2009
- S. Radhakrishnan: *Indian Philosophy*. Vol. I. New York: The Macmillan Co., London, George Allen & Unwin Ltd. 1923
- J. H. Woods: *The Yoga-System of Patañjali: Sanskrit text with English translation and commentary, Yoga-bhāshya of Veda-Vyāsa and Tattva-vāiśāradī of Vācaspatimiśra,* Bharatiya Kala Prakashan, Delhi, India, 2009
- Haridas Bandyaopadhyay : *Bhāratīya Darśaner Marmakathā*, The New Durga Printing Works, Medinipur, 7th ed.1986

MULTIDISCIPLINARY COURSE - 3

Course Name: Methodology of Indian Knowledge System

Course Code: MDC308

Course Type: MD (Theoretical)		Course Details: **MDC-3**		L-T-P: 2 - 1 - 0	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

Course Objectives

- To sensitize the students about context in which they are embeded i.e. Indian culture and civilisation including its Knowledge System and Tradition.
- To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system.
- To help to study the enriched scientific Indian heritage.
- To introduce the contribution from Ancient Indian system & tradition to modern science & Technology

Course Outcome:

- This syllabus would provide a comprehensive understanding of Indian philosophy while allowing students to explore specific interests in depth
- The philosophy honours with a specialization in Indian Knowledge Systems would emphasize:
- Critical engagement with classical texts and contemporary interpretations.
- Interdisciplinary approach, integrating philosophy with other aspects of Indian culture, science, and religion.
- Different schools of Indian Philosophy are introduced along with each of their theoretical framework and basic tenets.
- Students will be able to identify major issues, debates, or approaches appropriate to the discipline.
- Students will develop conceptual competence, demonstrate vigour of logical inquiry and produce clarity of expression.
- Develop the capability of applying knowledge and skills within philosophy to areas that require an ability to analyze complex problems, as well as to develop possible solutions from a philosophical perspective.

Suggested Topics:

- **Unit-I**: **Indian Knowledge System**
  - ❖ Introduction to Indian Knowledge Systems: Overview of the Indian intellectual tradition.
  - ❖ Vedic Philosophy: Definition and classification of *Vedas*
  - ❖ Overview of six *Vedāṅgas*
  - ❖ *Darśhana's* (Schools of Indian Philosophy): Overview of the Indian philosophical schools - Sāṃkhya and Yoga, Nyāya and Vaiśeṣika, Pūrva-Mīmāṃsā and Vedānta, Cārvaka, Jain and Buddha

- **Unit-II**: **Indian Methodology**
  - ❖ Meaning of the word *'nyāya'*
  - ❖ The distinct subject-matter(*prthaka-prasthāna*) of *nyāyavidyā*
  - ❖ The method of treatment of *nyāyavidyā*
  - ❖ Doubt etc as the integral factors of the science of reasoning
  - ❖ *kathā* (*vāda*, *jalpa* and *vitaṇḍā*)

- ❖ Processes of the science of reasoning: enunciation, definition and examination
- ❖ The definition of definition and the three faults (dusana-s) of definition.

Recommended Texts:

- B.K. Matilal: *The Word And The World* , Oxford University Press, 2001
- Th. Stcherbatsky: *Buddhist Logic,* Vol.-I, Motilal Banarsidass Publishers Ltd., Delhi,2008
- Bimal Krishna Matilal: *The Character of Logic in India,* Oxford University Press, New York, 1998
- Gautama : *Nyāyasūtra*
- *Annambhatta* : *Tarkasaṁgraha with Dīpikā*
- Kapur K and Singh A.K (Eds) 2005). Indian Knowledge Systems, Vol. 1.

References:

- Textbook on IKS by Prof. B Mahadevan, IIM Bengaluru
- Indian Institute of Advanced Study, Shimla. Tatvabodh of sankaracharya, Central chinmay mission trust, Bombay, 1995.
- B.K. Matilal: Perception , Oxford University Press, 1986
- S.C. Chatterjee & D. M. Datta :An Introduction to Indian Philosophy, Calcutta University Press, Kolkata , 2004
- C. D. Sharma : Critical Survey of Indian Philosophy, Motilal Banarsidass Publishers Private Limited, Delhi, 2009
- Phanibhushan Tarkabagish: *Nyāya Parichay,* Paschimbango Rajya Pustak Parsad, Kolkata,

POOL OF PHILOSOPHY VALUE ADDED COURSES OFFERED BY PHILOSOPHY DEPARTMENT FOR ALL DISCIPLINES ACROSS ALL FACULTIES

VALUE ADDED COURSE

Course Name: Social Values and Ethics

Course Code: VAC402

Course Type: VA (Theoretical)		Course Details: VA**C-2**		L-T-P: 4 - 0 - 0	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

- **Course objective:**
  - Development of a positive character, empathetic human being, responsible citizen, a compassionate and empathetic being.
  - Understanding virtues of volunteerism.
  - Promoting a sustainable life style for the individual, community and man kind
  - Developing a sense of right and wrong leading to practical ethical behavior
  - Inculcating a positive work culture respecting professional ethics
  - Inculcating Leadership
  - To build the sense of Right and Wrong. Both ethically and constitutionally
  - To develop power of Judgment amongst students.
  - Evolving sense of patriotism among students
  - To facilitate growth of an empathetic and compassionate personality.

- **Course Outcome:**
  - This syllabus provides a comprehensive foundation in social values and ethics, equipping students with the knowledge and skills to navigate ethical challenges in various aspects of life.

Suggested Topics:

- **UNIT-I**
  - **Introduction to Ethics:** Definition, scope, and importance of ethics in society
  - **Moral Philosophy:** Concepts of right and wrong, good and evil, moral relativism.
- **UNIT-II**
  - **Social Values:** Definitions, importance, and Sources of Value Systems (family values, cultural values, etc.).
- **UNIT-III**
  - **Civic virtue**: Respect for others, Caring, Sharing, Cooperation, Commitment, Empathy, Human Dignity
- **UNIT-IV**
  - **Personal Ethics:** Integrity, honesty, responsibility, and moral courage.

- **Professional Ethics:** Ethical codes in various professions (medicine, law, business).
- **Workplace Ethics:** Fairness, equality, diversity, and conflict resolution
- **Concept of Social Justice:** Equality, equity, and access to resources.

- **References:**

- W. Frankena, (1973). *Ethics* (2nd ed). Prentice Hall of India Private Limited, Delhi.
- W. Lillie, (1955). *An Introduction to Ethics*. University Paperbacks. London.
- International Human Resource Management by Peter j Dowling, Device E Welch, 4th Edition.
- S. K. Maitra,(1963). Ethics of the Hindus. Calcutta University Press, Kolkata.
- MacIntyre, A. (2007). *After Virtue: A Study in Moral Theory* (3rd ed.). University of Notre Dame Press.
- Sandel, M. J. (2010). *Justice: What's the Right Thing to Do*? Farrar, Straus and Giroux.
- Rawls, J. (1999). *A Theory of Justice* (Revised ed.). Harvard University Press.
- Nussbaum, M. C. (2001). *Upheavals of Thought: The Intelligence of Emotions*. Cambridge University Press.
- Singer, P. (2011). *Practical Ethics* (3rd ed.). Cambridge University Press.
- Aristotle. (2002). *Nicomachean Ethics* (J. A. K. Thomson, Trans.; H. Tredennick, Rev. ed.). Penguin Classics. (Original work published ca. 340 B.C.E.)
- Dewey, J. (1997). *The Public and Its Problems*. Swallow Press.
- Habermas, J. (1996). *Between Facts and Norms: Contributions to a Discourse Theory of Law and Democracy* (W. Rehg, Trans.). MIT Press.
- Gilligan, C. (1982). *In a Different Voice: Psychological Theory and Women's Development*. Harvard University Press.
- Taylor, C. (1989). *Sources of the Self: The Making of the Modern Identity*. Harvard University Press.
- Kant, I. (2002). *Groundwork for the metaphysics of morals* (A. W. Wood, Trans.). Yale University Press. (Original work published 1785)
- Mill, J. S. (2001*). Utilitarianism*. Hackett Publishing Company. (Original work published 1863)
- Cahn, S. M., & Markie, P. (Eds.). (2016). *Ethics: History, theory, and contemporary issues* (6th ed.). Oxford University Press.
- Rachels, J., & Rachels, S. (2019). *The elements of moral philosophy* (9th ed.). McGraw-Hill Education.
- Sandel, M. J. (2010). *Justice: What's the right thing to do*? Farrar, Straus and Giroux.
- Beauchamp, T. L., Bowie, N. E., & Arnold, D. G. (2013). *Ethical theory and business* (9th ed.). Pearson.
- Sen, A. (2009). *The idea of justice*. Harvard University Press.
- Clapham, A. (2007). *Human rights*: *A very short introduction*. Oxford University Press.

NEP SYLLABUS ENVIRONMENTAL SCIENCE

4 Yr. UG Degree Syllabus

According to NEP2023

(For Colleges affiliated to Kazi Nazrul University, Asansol, West Bengal)

Subject: Environmental Science

Semester- I
Course Name: Environment & Ecology
Course Code: BSCENVSCMJ101

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Major	BSCENVSC MJ101	MJC-1	4-1-0	5	100	00	30	00	70

TIME: 3 HOURS
LECTURES: 70
Total MARKS: 100 (30+70)

Marks: 70

Content: Unit wise course content distribution
Theory

Unit-1 Concept of Environment: Concept and types and components of environment; Objectives, nature and scope of the subject; Man-environment relationships; Environmental awareness – Earth Summits, recent Conventions on climate change (15)

Unit-2 Environmental issues and scales: Concepts of micro-, meso-, synoptic and planetary scales; Temporal and special extents of local, regional, and global phenomenon. (10)

Unit-3 Environmental Education: Goals of environmental education; Environmental education at primary, secondary and tertiary level; Green politics; Models for future environmental education; Environmental movements – The Chipko movement, Silent Valley movement, *Narmada Bachao Andolan*, Tehri Dam Conflict. (15)

Unit-4 Concepts of Ecology: Subdivisions and developmental phases of ecology; Ecological classification (hydrophytes, xerophytes, halophytes, mesophytes, lithophytes, chasmophytes, epiphytes) and their anatomical, morphological and physiological adaptation; Ecological factors - climatic, edaphic, physiographic and biotic; Limiting factor & Shelford's Law. (20)

Unit-5 Geology and Ecology: Geological interaction with environment; Concepts of community and keystone species, and relationship with geology; Role of geology in ecological restoration (10)

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:

1. Understanding and knowledge of the environment, man and environment relationships and the role of human beings in shaping the environment
2. Understand various components of the environment and interfaces
3. Understanding the environmental issues, concerns of today
4. Fundamentals of ecology
5. Fundamentals of geological interaction with environment

References/ Suggested Readings

Odum, E.P. and Barrett, G.W., 1971. Fundamentals of ecology (Vol. 3, p. 5). Philadelphia: Saunders
William P. Cunningham, Mary Ann Cunningham, Barbara Woodworth Saigo, Environmental Science: A global concern, McGrawHill 2003
William Cunningham, Mary Cunningham, Principles of Environmental Science: Seventh Edition, McGrawHill 2014
Energy, Ecology and Environment: Richard Wilson and William Jones (Academic Press, Inc)
Rogers PP, Jalal, KF, Boyd JA, An introduction to sustainable development, Earthscan
Roosa SA, Sustainable Development Handbook, CRC Press 2008
Atkinson G., Dietz S., Neumayer E., Agarwala M, Handbook of Sustainable Development, Edward Elger, 2014
Robbins P., Hintz J., Moore S.A., Environment and Society: A critical introduction, Wiley Blackwel 2014

Minor Paper

Semester- I

Course Name: Environment & Ecology
Course Code: BSCENVSCMN101

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Minor	BSCENVSCMNC	MNC-1	4-1-0	5	100	00	30	00	70

TIME: 3 HOURS
LECTURES: 70
Total MARKS: 100 (30+70)

Content: Unit wise course content distribution
Theory

Unit-1 Concept of Environment: Concept and types and components of environment; Objectives, nature and scope of the subject; Man-environment relationships; Environmental awareness – Earth Summits, recent Conventions on climate change. (15)

Unit-2 Environmental issues and scales: Concepts of micro-, meso-, synoptic and planetary scales; Temporal and special extents of local, regional, and global phenomenon. (10)

Unit-3 Environmental Education: Goals of environmental education; Environmental education at primary, secondary and tertiary level; Green politics; Models for future environmental education; Environmental movements – The Chipko movement, Silent Valley movement, *Narmada Bachao Andolan*, Tehri Dam Conflict. (15)

Unit-4 Concepts of Ecology: Subdivisions and developmental phases of ecology; Ecological classification (hydrophytes, xerophytes, halophytes, mesophytes, lithophytes, chasmophytes, epiphytes) and their anatomical, morphological and physiological adaptation; Ecological factors - climatic, edaphic, physiographic and biotic; Limiting factor & Shelford's Law. (20)

Unit-5 Geology and Ecology: Geological interaction with environment; Concepts of community and keystone species, and relationship with geology; Role of geology in ecological restoration (10)

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:

1. Understanding and knowledge of the environment, man and environment relationships and the role of human beings in shaping the environment
2. Understand various components of the environment and interfaces
3. Understanding the environmental issues, concerns of today
4. Fundamentals of ecology
5. Fundamentals of geological interaction with environment

References/ Suggested Readings

Odum, E.P. and Barrett, G.W., 1971. Fundamentals of ecology (Vol. 3, p. 5). Philadelphia: Saunders
William P. Cunningham, Mary Ann Cunningham, Barbara Woodworth Saigo, Environmental Science: A global concern, McGrawHill 2003
William Cunningham, Mary Cunningham, Principles of Environmental Science: Seventh Edition, McGrawHill 2014
Energy, Ecology and Environment: Richard Wilson and William Jones (Academic Press, Inc)
Rogers PP, Jalal, KF, Boyd JA, An introduction to sustainable development, Earthscan
Roosa SA, Sustainable Development Handbook, CRC Press 2008
Atkinson G., Dietz S., Neumayer E., Agarwala M, Handbook of Sustainable Development, Edward Elger, 2014
Robbins P., Hintz J., Moore S.A., Environment and Society: A critical introduction, Wiley Blackwel 2014

SEMESTER- I
PAPER CODE: BSCENVSCSE101 [ENVSC Skill Enhancement: COURSE NO. 1]
ENVIRONMENTAL MONITORING TECHNIQUES
TOTAL CREDITS: 3

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Skill Enhancement Course	BSCENVSC SE101	SEC-1	2-1-0	3	50	00	15	00	35

TIME: 2 Hours
MARKS: 35

Total Lectures: 30

Air quality Monitoring:
Collection of air sample [High volume sampler, particulate matter (PM2.5, PM10)]; Concept of SPM and RSPM. (05)

Water quality monitoring:
Water quality parameters; Water sampling techniques & measurements and instruments (Titrimetric and Gravimetric methods, Portable pH meter, conductivity meter, Spectrophotometer); Standard curve.

(05)

Soil quality Monitoring:
Classification of texture (International pipette and Hygrometer method); Soil sampling and measurement of different soil parameters [pH meter, conductivity meter, Soil organic carbon (Titrimetric method), Nitrogen (modified Kjeldahl's method), & Flame photometer]. (05)

Biological monitoring:
Biological monitoring: Quantification (Sedgwick Rafter counter) & qualification of freshwater plankton (phyto- & zoo-plankton), aquatic macrophytes of importance); Types of plankton net. (05)

Environmental Statistics:
Types of data: Primary and secondary; Methods of collection of environmental data; Measures of central tendency (Mean, median, mode) and variance of a given environmental data set; Frequency distribution; Measures of dispersion; Correlation and Regression, Hypothesis testing, T-test, Chi-square test (10)

Semester- II
Course Name: Biological Environment
Course Code: BSCENVSCMJ201

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Major	BSCENVSC MJ201	MJC-2	2-1-2	5	100	30	15	20	35

TIME: 2 HOURS
LECTURES: 30

Marks: 35

Content: Unit wise course content distribution
Theory

Unit- 1 Taxonomy: Definition of taxonomy, systematic and classification; Morphological and taxonomical studies of flora and fauna. (05)

Unit -2 Cell and Genetics:

Cell: Ultrastructure and functions of plasma membrane, cellular organelles, *e.g.,* Mitochondria, Ribosome, Golgi body, Chloroplast, Endoplasmic reticulum, Nucleus, Chromosome & Cell divisions Fundamentals of genetics: Mendel's Law of inheritance and gene interaction; Darwinism and Modern Synthetic Theory of evolution; Concept on speciation; Hardy Weinberg Equilibrium; Genetic drift. (10)

Unit- 3 Concepts of Ecosystem and Biomes: Structural and functional aspects of major ecosystems; Ecological pyramids, food chain and food.

Biomes: Concept, characteristics of biome types, *viz*., Grass lands, Tropical Rain Forests and Tundra. (07)

Unit- 4 Biotic Community: Basic ideas on population and community; Elementary idea on biogeochemical cycles (*viz.*, N, C, S, P). (08)

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:

1. Understand the taxonomic importance and cellular morphology
2. Understand the ecology and biotic community
3. Appreciate physiology of plants and animals, and relation with environment
4. Appreciate the environmental factors, role of biogeochemical cycles
5. Fundamental of biological community

References/ Suggested Readings

Energy and Environment: Edited by J Dunderdale (Royal Society of Chemistry)
Kormondy E.J. , 2017. Concepts of Ecology, Pearson
Dash M. C. and Dash S.P.(2009) Fundamentals of Ecology, Mcgraw Hill
Ricklefs, R.E. and Miller, G.L., 2000. Ecology. W. H. Freeman & Co.
Smith, R.L., Smith, T.M., Hickman, G.C. and Hickman, S.M., 1998. Elements of ecology. Pearson Benjamin Cummings, San Francisco, CA.
Krebs C.J. 2016. Ecology: The experimental Analysis of Distribution and Abundance, Pearson
Chew, S.C., 2006. The recurring dark ages: ecological stress, climate changes, and system transformation. Rowman Altamira
Bharucha, E. 2017.Changing Landscapes, The Cultural Ecology of India. Harper Collins Publishers, India
Gaston K.J. and Spicer (2004) Biodiversity – An Introduction, Blackwell Publishing
Krishnamurthy K. V. (2008) An Advanced Textbook on Biodiversity: principles and Practice, Oxford & IBH Pub. Co. Pvt. Ltd.
Schulze Ernst-Detlef, Mooney Harold (Eds.) (1994) Biodiversity and Ecosystem Function. Springer-Verlag, London.

Practical CA:
Marks: 30
1. Practical: 15
2. Viva voce: 10
3. Practical Notebook: 05

TIME: 3 HOURS (ESE)
MARKS: 20
Description of Experiment:
1. One Major Experiment: 10
2. Identification with reasons: 05
3. Viva-voce: 05
Practical Courses
1. Major Experiments
a. Cytological preparation of mitotic stages from onion root tips (*Allium cepa*)
b. Cytological preparation of meiotic stages from *Rheo* sp. flower buds
2. Identification with reasons (at least one from each A & B must be set during examination)
Study on Aquatic organisms (Fauna and Flora)
i) Study on *Brachionus, Keratella, Cyclops, Cypris, Diaptomus,* Nauplius larva, *Bosmina, Moina*
ii) Study of *Spirogyra, Zygnema, Pistia, Eichhornia, Hydrilla, Ceratophyllum, Ipomoea, Azolla, Lemna* (minor and major), *Marselia, Nymphae, Nelumbo*
3. Viva-voce

Minor Paper

Semester- II
Course Name: Biological Environment
Course Code: BSCENVSCMN201

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Minor	BSCENVSCMN201	MNC-2	2-1-2	5	100	30	15	20	35

TIME: 2 HOURS
LECTURES: 30

Content: Unit wise course content distribution
Theory

Unit- 1 Taxonomy: Definition of taxonomy, systematic and classification; Morphological and taxonomical studies of flora and fauna. (05)

Unit -2 Cell and Genetics:
Cell: Ultrastructure and functions of plasma membrane, cellular organelles, *e.g.*, Mitochondria, Ribosome, Golgi body, Chloroplast, Endoplasmic reticulum, Nucleus, Chromosome & Cell divisions
Fundamentals of genetics: Mendel's Law of inheritance and gene interaction; Darwinism and Modern Synthetic Theory of evolution; Concept on speciation; Hardy Weinberg Equilibrium; Genetic drift. (10)

Unit- 3 Concepts of Ecosystem and Biomes: Structural and functional aspects of major ecosystems; Ecological pyramids, food chain and food.
Biomes: Concept, characteristics of biome types, *viz.*, Grass lands, Tropical Rain Forests and Tundra. (07)

Unit- 4 Biotic Community: Basic ideas on population and community; Elementary idea on biogeochemical cycles (*viz.*, N, C, S, P). (08)

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the taxonomic importance and cellular morphology
2. Understand the ecology and biotic community
3. Appreciate physiology of plants and animals, and relation with environment
4. Appreciate the environmental factors, role of biogeochemical cycles
5. Fundamental of biological community

References/ Suggested Readings
Energy and Environment: Edited by J Dunderdale (Royal Society of Chemistry)
Kormondy E.J. , 2017. Concepts of Ecology, Pearson
Dash M. C. and Dash S.P.(2009) Fundamentals of Ecology, Mcgraw Hill
Ricklefs, R.E. and Miller, G.L., 2000. Ecology. W. H. Freeman & Co.
Smith, R.L., Smith, T.M., Hickman, G.C. and Hickman, S.M., 1998. Elements of ecology. Pearson Benjamin Cummings, San Francisco, CA.
Krebs C.J. 2016. Ecology: The experimental Analysis of Distribution and Abundance, Pearson
Chew, S.C., 2006. The recurring dark ages: ecological stress, climate changes, and system transformation. Rowman Altamira
Bharucha, E. 2017.Changing Landscapes, The Cultural Ecology of India. Harper Collins Publishers, India
Gaston K.J. and Spicer (2004) Biodiversity – An Introduction, Blackwell Publishing
Krishnamurthy K. V. (2008) An Advanced Textbook on Biodiversity: principles and Practice, Oxford & IBH Pub. Co. Pvt. Ltd.
Schulze Ernst-Detlef, Mooney Harold (Eds.) (1994) Biodiversity and Ecosystem Function. Springer-Verlag, London.

Practical CA:
Marks: 30
1. Practical: 15
2. Viva voce: 10
3. Practical Notebook: 05

TIME: 3 HOURS (ESE)
MARKS: 20
Description of Experiment:
1. One Major Experiment: 10
2. Identification with reasons: 05
3. Viva-voce: 05
Practical Courses
1. Major Experiments
a. Cytological preparation of mitotic stages from onion root tips (*Allium cepa*)
b. Cytological preparation of meiotic stages from *Rheo* sp. flower buds
2. Identification with reasons (at least one from each A & B must be set during examination)
Study on Aquatic organisms (Fauna and Flora)
i) Study on *Brachionus, Keratella, Cyclops, Cypris, Diaptomus,* Nauplius larva, *Bosmina, Moina*
ii) Study of *Spirogyra, Zygnema, Pistia, Eichhornia, Hydrilla, Ceratophyllum, Ipomoea, Azolla, Lemna* (minor and major), *Marselia, Nymphae, Nelumbo*
3. Viva-voce

SEMESTER- II
PAPER CODE: BSCENVSCSE201 [ENVSC Skill Enhancement Course: COURSE NO. 2]
HUMAN HEALTH AND CONSERVATION & ECOTOURISM
TOTAL CREDITS: 3

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Skill Enhancement Course	BSCENVSCSE201	SEC-2	2-1-0	3	50	00	15	00	35

TIME: 2 Hours
MARKS: 35

Total Lectures: 30

Human Health:
Concept of health and disease; Principles of epidemiology and epidemiological methods; Health Programs in India; Nutrition and health; Health education. (05)

Diseases:
Concept on air, water, vector borne diseases; some communicable diseases (Viral hepatitis, dengue); non-communicable diseases (cardiovascular, diabetes); Immunology - elementary ideas about antigens and antibody; Immunodeficiency diseases (10)

Conservation:
Concept of Wildlife Conservation - Reserves design, survey techniques of tiger, birds, elephants and insect; Major conservation policies: *in-situ* and *ex-situ* approaches; Major protected areas; National and International instruments for biodiversity conservation; Role of traditional knowledge; Community based conservation; Gender and conservation; Concept of Zoo management (08)

Ecotourism:
Tourism and Leisure; Types of Tourism; Ecotourism – Growth and developments, Impact and management of ecotourism; Home stay tourism; Elementary idea of Rural tourism; Role of ecotourism for addressing Sustainable Development Goals (SDGs) (07)

SEMESTER- II
VALUE ADDED COURSE
PAPER CODE: VAC-201
ENVIRONMENTAL STUDIES
TOTAL CREDITS: 4
[3:1:0:: 35:15:00]

Course	Type	Course Code	Course details	L-T-P	Cr	Full Marks	CA Marks		ESE Marks	
							P	T	P	T
Env Sc.	Value Added Course	VAC-201	VAC	2-1-0	3	50	00	15	00	35

TIME: 2 Hours **MARKS: 50**
Total Lectures: 30

Unit 1: Basics of Environmental Studies: (02)
Definition; Components of environment: Environmental education

Unit 2: Natural Resources: Renewable and Nonrenewable Resources (08)
Nature and natural resources their conservation and associated problems:

- Forest resources: Uses, types and importance, Joint Forest Management
- Water resources: Use, over exploitation of surface and groundwater; Dams: Benefits and problems; Flood and Drought
- Mineral resources: Mineral resources in India; Use and exploitation.
- Food resources: World food problems and food insecurities
- Energy resources: Renewable and Nonrenewable energy sources; Use of alternate energy sources
- Land resources: Land as a resource; Land degradation, landslides, soil erosion, desertification.

Unit 3: Ecology and Ecosystems (05)
Concept of ecology, Population ecology, Community ecology

- Concept of an ecosystem, different types of ecosystems.
- Food chains, food webs
- Energy flow in the ecosystem

Unit 4: Biodiversity and its conservation (05)
Biodiversity: Levels of biological diversity

- Values of biodiversity
- Hot-Spots of biodiversity, Mega-biodiversity countries
- Threat to biodiversity
- Conservation of biodiversity (*In- situ* and *Ex-situ)*

Unit 5: Environmental Pollution and Management (05)
(a) Nature, Causes, Effects and Control measures of – Air pollution, Water pollution, Soil pollution, Noise pollution, Vision pollution
(b) Solid waste management: Causes, effects and disposal methods; Management of wastes

Unit 6: Environmental Policies and Practices (05)
Constitutional Provisions for protecting environment- Article 48(A), 51A(g)

- Environmental Laws: The Environment (Protection) Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act 1974
- Climate change, Global warming and Protocols, Acid rain

CA: Field Work Report/Project Report/Plantation Program/Preparation of plant sapling Marks: 15 (10+5) [Report+ *Viva voce*]
[Based on any one of the following topics and to be evaluated by internal teachers only)

- Environmental assets - River/Forest/Grassland/Hill/Mountain *etc.*
- Environmental pollution - Urban/Rural/Industrial/Agricultural
- Study of common Plants/Insect /Birds/Wildlife *etc*.

- Study of simple ecosystems: Pond/River/Hill slope *etc*.
- Participation & Report preparation on Medicinal Plants

Semester- III
Course Name: Physical Environment
Course Code: BSCENVMJ301

<table>
<tr><td rowspan="2">Course Type: MJC-3
(Theoretical)</td><td colspan="3" rowspan="2">Course Details:</td><td colspan="2">L-T-P: 3-0-4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks:
100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:

1. Understanding the composition and vertical structureof atmosphere
2. Understanding of the clear distinction between adiabatic lapse rate and the environmental lapse rate and be able to work out temperatures at higher altitudes based on the lapse rate
3. Understand the impact of aerosols on climate through processes of scattering and absorption of radiations
4. Knowledge on types of clouds and their structure, geostrophic winds and cyclones
5. Understand the impact of human activity on the energybalance in the earth atmospheric system

Content: Unit wise course content distribution
Theory

Unit- 1 Forces of nature, states of matter-solid, liquid and gas. Structure of earth, origin and composition of atmosphere, atmospheric mass, gaseous constituents, trace gases, vertical profile of atmosphere, scale height, lapse rates-adiabatic and environmental, mixing height, atmospheric stability classes (10)

Unit- 2 Atmospheric aerosols, types and examples, inorganic and organic aerosols, mass transfer, diffusion and transport, particle impaction, sedimentation velocity, relaxation time, stopping distance (08)

Unit- 3 Transfer of heat, conduction, convection, radiative transfer, radiation laws, solar and terrestrial radiations, Stefan Boltzmann law, Wien's law and Planck's law, irradiance, absorption, transmission, reflection, emission and scattering of radiations, Rayleigh and Mie scattering, diffraction (15)

Unit- 4 Atmospheric dynamics, steady and non-steady motion, Geostrophic winds, cyclones, hurricanes and thunderstorms (07)

Unit-5 Dynamic Meteorology: First and second law of thermodynamics, entropy, enthalpy, heat transfer processes; Diffusion and transport of pollutants (10)

Semester- III
Course Name: Physical Environment
Course Code: BSCENVMJ301

Course Type: **MJC-4 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

Description of Experiment:
1. One Major Experiment: 10
2. Laboratory Notebook: 05
3. Viva-voce: 04

Practical Courses
1. a. Determination of the Value of Stefan's constant; Verification of Stefan's law.
b. Variation of thermo-emf across two junctions of a thermocouple with temperature
c. Verification of Clasius – Clapeyron equation and determination of specific enthalpy
d. To record and analyze the cooling temperature of a hot object as a function of time using a thermocouple and suitable data acquisition system.
e. Construction of wind rose
f. Handling of meteorological data recording equipments; wind speed & direction; relative humidity & temperature
2. Laboratory Notebook containing all practical experiments, Identifications
3. Viva-voce

Semester- III
Course Name: Environmental Chemistry
Course Code: BSCENVMJ302

Course Type: **MJC-4 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Comprehensive understanding of the concept of atom, electronic configuration, periodic properties and bonding
2. Knowledge of the fundamental of thermodynamics, chemical equilibrium and chemical kinetics and a comprehensive understanding of the chemistry of water, air and soil, and influence of human activities pose to alter the chemistry
3. Comprehensive understanding the acid-base concepts, neutralization, and buffer and buffer capacity
4. Functional knowledge on the application on controlling toxic chemicals in the environment, including POPs and emerging pollutants

Content: Unit wise course content distribution
Theory
Unit- 1 Fundamental concepts of general chemistry: Atomic structure, electronic configuration; Molecular weight, equivalent weight, molarity, normality, valency, oxidation state and bonding, oxidation and reduction reactions; Metals and nonmetals; Aromatic and aliphatic organic compounds; Saturated and unsaturated hydrocarbons; Free radicals; Catalytic (15)
Unit- 2 Fundamentals of biochemistry: Elementary ideas on carbohydrates, proteins, lipids and enzymes; Idea on structure of macro-molecules--DNA and RNA, and Chlorophyll; Synthesis of xenobiotic compounds like pesticides, dyes, etc (10)
Unit- 3 Chemical equilibrium and kinetics (Fundamentals): Stoichiometry, chemical equilibrium, chemical potential; Acid-base reactions (acidity, alkalinity, buffers and buffer capacity (10)
Unit- 4 Aquatic chemistry: Principles of sedimentation, coagulation, precipitation; Concept of solubility product; Filtration and adsorption (05)
Unit-5 Atmospheric chemistry: Composition and structure of the atmosphere; Chemistry and sources of atmospheric gases, aerosols, SPM; Photochemical reactions in the atmosphere (photochemical smog (10)

Semester- III
Course Name: Environmental Chemistry
Course Code: BSCENVMJ302
[PRACTICAL]

Course Type: **MJC-4 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

Description of Experiment:
1. One Major Experiment: 10
2. Laboratory Notebook: 05
3. Viva-voce: 04

Practical Courses
1. a. Estimation of protein, sugar from plant tissues, and acidity, alkalinity of water
b. Estimation of chlorophyll from green leaves
2. Laboratory Notebook containing all practical experiments, Identifications
3. Viva-voce

Minor Paper

Semester- III
Course Name: Environmental Chemistry
Course Code: BSCENVMN302

Course Type: **MNC-4 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Comprehensive understanding of the concept of atom, electronic configuration, periodic properties and bonding
2. Knowledge of the fundamental of thermodynamics, chemical equilibrium and chemical kinetics and a comprehensive understanding of the chemistry of water, air and soil, and influence of human activities pose to alter the chemistry
3. Comprehensive understanding the acid-base concepts, neutralization, and buffer and buffer capacity
4. Functional knowledge on the application on controlling toxic chemicals in the environment, including POPs and emerging pollutants

Content: Unit wise course content distribution
Theory
Unit- 1 Fundamental concepts of general chemistry: Atomic structure, electronic configuration; Molecular weight, equivalent weight, molarity, normality, valency, oxidation state and bonding, oxidation and reduction reactions; Metals and nonmetals; Aromatic and aliphatic organic compounds; Saturated and unsaturated hydrocarbons; Free radicals; Catalytic (15)
Unit- 2 Fundamentals of biochemistry: Elementary ideas on carbohydrates, proteins, lipids and enzymes; Idea on structure of macro-molecules--DNA and RNA, and Chlorophyll; Synthesis of xenobiotic compounds like pesticides, dyes, etc (10)
Unit- 3 Chemical equilibrium and kinetics (Fundamentals): Stoichiometry, chemical equilibrium, chemical potential; Acid-base reactions (acidity, alkalinity, buffers and buffer capacity (10)
Unit- 4 Aquatic chemistry: Principles of sedimentation, coagulation, precipitation; Concept of solubility product; Filtration and adsorption (05)
Unit-5 Atmospheric chemistry: Composition and structure of the atmosphere; Chemistry and sources of atmospheric gases, aerosols, SPM; Photochemical reactions in the atmosphere (photochemical smog. (10)

Semester- IV
Course Name: Natural Resources & Sustainable Development
Course Code: BSCENVMJ401

Course Type: **MJC-5 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understanding the natural resource use and management
2. Understand the complexity of natural resource and issues, and sustainability
3. Knowledge of sustainable development
4. Understand the significance/importance of use of renewable and non-renewable resources and their environmental consequences

Content: Unit wise course content distribution
Theory

Unit- 1 Natural resources: Current status of Water, Land, Forest, Minerals resources (05)

Unit- 2 Energy resources: Classification, conventional, non-conventional, renewable, non-renewable; Renewable resources: Solar energy (PV cells, PG cells); Geothermal energy (origin, utilization); Ocean energy; Biomass energy; Hydroelectricity (12)

Unit- 3 Fossil fuels: Coal (composition, origin and classification); Petroleum (origin, mining, chemical composition, classification); Natural gas (concept on LNG, CNG, LPG); Oil (origin, utilization) (08)

Unit- 4 Biological wealth: Value of wild species; Sources of agriculture, forestry, aquaculture; Biodiversity – Concept, value; Decline and reasons of consequences of losing biodiversity; Mega-diversity Hotspots, hotspots of biodiversity, Red Data Book; Conservation of biodiversity (International & National) (15)

Unit-5 Sustainable development: Definition and concept; The Brundtland commission and later developments; Determinants of sustainable development; Indicators of sustainable development; International cooperation; Sustainable development goals, Millennium development goals; Role of ESD (Education for Sustainable Development) (10)

Semester- IV
Course Name: Natural Resources & Sustainable Development
Course Code: BSCENVMJ401
[PRACTICAL]

Course Type: **MJC-5 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20
Description of Experiment:

1. One Major Experiment: 08
2. Biodiversity registers: 04
3. Laboratory Notebook: 03
4. Viva-voce: 05

Practical Courses
1. Major Experiments
a. Quantitative characters of plant community, density, frequency, dominance
2. Preparation of biodiversity registers
a. Study on local flora and fauna (report)
b. Biodiversity of locality
3. Laboratory Notebook containing all practical experiments
4. Viva-voce

Semester- IV
Course Name: Biodiversity & Conservation
Course Code: BSCENVMJ402

Course Type: **MJC-6 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Systematically understand the biodiversity and its vital role in ecosystem function
2. Knowledge on the need of biodiversity conservation in the context of various developmental pathways and policy framework that the mankind has been undergoing
3. Understand the importance of biodiversity in natural environments
4. Critical understanding on biodiversity and human linkages
5. Understand the importance of species conservation and knowledge on extinction

Content: Unit wise course content distribution
Theory
Unit- 1 Concept and definition; Levels of organization; Dimension of biodiversity, Global biodiversity gradient; List of common flora and fauna of India; Endangered and endemic species, extinction and evolution of species (05)
Unit- 2 Values of Biodiversity and ecosystem services: Importance of biodiversity, Direct and indirect used value (03)
Unit- 3 Biodiversity threats, conservation approaches and management: Decline of biodiversity-causes and consequences, Direct and indirect threats; Reason of conservation and conservation approaches, and threats of invasive species (05)
Unit- 4 National Parks, Wildlife Sanctuary, Conservation reserves, Community Reserves, Protected areas; Conservation and management practices, *In situ* and *ex situ* strategy, Advantages, risks and opportunities; Traditional knowledge on conserved areas in India: Sacred Groves, Rivers, Mountains etc. (12)
Unit-5 Biodiversity and climate changes: Impacts of climate change on biodiversity, Climate change and threats to species and ecosystems; Distribution and adaptation pattern of plants and animals; Vulnerability to climate change; Migration/shifting toward higher latitudes (12)
Unit-6 Biodiversity conservation: Legal aspects: Legal Instruments Relevant to Biological Diversity in India, Endangered Species Act, Federal Role in Wildlife Preservation (03)
Unit-7 Major International Conventions: Convention on Biological Diversity, Convention on Migratory Species, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Ramsar Convention, World Heritage Convention (10)

Semester- IV
Course Name: Biodiversity & Conservation
Course Code: BSCENVMJ402
[PRACTICAL]

Course Type: **MJC-6 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One Major Experiment: 10
2. Laboratory Notebook: 05
3. Viva-voce: 05

Practical Courses
Introduction: Orientation towards field biology and natural history; Study of campus flora and fauna; Types of sampling- quantitative and qualitative for flora/fauna; Study of nearby forests and grasslands; study of habitat specificity in birds or small mammals on campus; Current tools in the wildlife management

1. Major Experiments
Estimation of frequency, density, abundance of species (Nested quadrate analysis and plotless vegetation mapping); Line transect, and belt transect method of community study; Comparison of litter-fall (for at least 2-3 plant species)

2. Laboratory notebook containing all practical experiments
3. Viva-voce

Minor Paper

Semester- IV
Course Name: Natural Resources & Sustainable Development
Course Code: BSCENVMN401

Course Type: **MNC-5 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understanding the natural resource use and management
2. Understand the complexity of natural resource and issues, and sustainability
3. Knowledge of sustainable development
4. Understand the significance/importance of use of renewable and non-renewable resources and their environmental consequences
Content: Unit wise course content distribution
Theory
Unit- 1 Natural resources: Current status of Water, Land, Forest, Minerals resources (05)
Unit- 2 Energy resources: Classification, conventional, non-conventional, renewable, non-renewable; Renewable resources: Solar energy (PV cells, PG cells); Geothermal energy (origin, utilization); Ocean energy; Biomass energy; Hydroelectricity (12)
Unit- 3 Fossil fuels: Coal (composition, origin and classification); Petroleum (origin, mining, chemical composition, classification); Natural gas (concept on LNG, CNG, LPG); Oil (origin, utilization) (08)
Unit- 4 Biological wealth: Value of wild species; Sources of agriculture, forestry, aquaculture; Biodiversity – Concept, value; Decline and reasons of consequences of losing biodiversity; Mega-diversity Hotspots, hotspots of biodiversity, Red Data Book; Conservation of biodiversity (International & National) (15)
Unit-5 Sustainable development: Definition and concept; The Brundtland commission and later developments; Determinants of sustainable development; Indicators of sustainable development; International cooperation; Sustainable development goals, Millennium development goals; Role of ESD (Education for Sustainable Development) (10)

Semester- IV
Course Name: Wildlife Ecology & Tourism
Course Code: BSCENVSE401

Course Type: **SEC-3 (Theoretical)**	Course Details:			L-T-P: **2-1-0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Systematically understand the ecological habitat of wildlife and its role in ecosystem function
2. Knowledge on the need of wildlife study and its different aspects of developmental and policy framework for protection
3. Understand the importance of tourism in natural environments
4. Critical understanding on wildlife vs tourism and its linkages
5. Understand the importance of wildlife conservation and knowledge on extinction

Contents

Unit 1: **Wildlife Ecology & Management**

Concept, scope and importance of wildlife; Wildlife values; Concept and importance of population in wildlife studies; Animal-habitat interactions; Effects of intra- and inter-specific competition on wildlife; Prey-predator relationship; Animal movement, concept of home range and territory (10)

Unit 2: **Wildlife Management**

Concept and importance of wildlife management; Construction and importance of lifetables in wildlife management; Habitat manipulation: food, water, shade improvement; Making observations and records: field notes, datasheets; Wildlife photography: types of camera, camera traps; Field equipment: altimeter, pedometer, field compass, binoculars, radio collaring (15)

Unit 3: **Wildlife tourism**

Basic concepts, importance and scope; Sustainable development in wildlife tourism; Negative impact of wildlife tourism: Disruption of breeding behaviour, disruption of parent- offspring bonds, increased mortality, vanity hunts and poaching, increased vulnerability, disruption feeding behaviour; Positive impacts: Habitat restoration by eco-lodges and other tourism operations, conservation breeding, quality interpretation, culling and population maintenance, conservation hunting/harvest, anti-poaching practices and tools (15)

Unit 4: **Ecotourism practices**

Evolution and concept; importance and types of ecotourism; Components and principles of ecotourism; Impacts of ecotourism; Ecotourism criteria; Ecotourists: types and code of ethics; Quebec Declaration on Ecotourism. Ecotourism practices; Community based tourism; Transportation, facilities, service; Examples and case studies of ecotourism in practice (10)

Semester- V
Course Name: RS & GIS and Environmental Modelling
Course Code: BSCENVMJ501

Course Type: **MJC-7 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understanding Remote Sensing and Geographic Information System (RS-GIS) as a powerful tool for geospatial analysis
2. Understating of cartography, digital image, spatial and non-spatial data and geospatial terminology.
3. Knowledge about data and sources (RS based and other sources, field data collection) and integrate those into GIS environment for analysis
4. Understanding application of RS-GIS techniques to Resource management
5. Skill development skills with functional knowledge of the fundamentals to carry out GIS (RS-GIS) based project

Content: Unit wise course content distribution
Theory
Unit-1 Remote Sensing: Definitions and Principles, properties; Electromagnetic radiation and its interaction with atmosphere; Spectral reflectance of Earth's surface features; Types and characteristics of different data acquisition platforms; Satellite geometry, sensors and resolutions; aerial photography and image interpretation; Data products and their characteristics; Basic principle of visual interpretation; Latest Indian operating satellites and their utilities; Advantages and limitations of remote sensing (20)

Unit- 2 GIS: Definitions and components; spatial and non- spatial data; raster and vector data; database generation; database management system; land use/ land cover mapping; overview of GIS software packages; GPS survey, data import, processing, and mapping (15)

Unit- 3 Applications and case studies of remote sensing and GIS in geosciences, water resource management, land use planning, forest resources, agriculture, marine and atmospheric studies (05)

Unit- 4 Monitoring: General monitoring techniques and methodology; Standards of ambient air, drinking water quality; Monitoring of air, water, soil, and noise pollution (10)

Semester- V
Course Name: RS & GIS and Environmental Modelling
Course Code: BSCENVMJ501

[PRACTICAL]

Course Type: **MJC-6 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One Major Experiment: 10
2. Laboratory Notebook: 05
3. Viva-voce: 05

Practical Courses

i) Georeferencing and mosaicking of images/toposheets

ii) Digital image processing: Image enhancement techniques; histogram equalization techniques; FCC, NDVI; classification of image; Interpretation of Satellite Imagery: Stereoscopic study and visual interpretations of satellite imagery and airborne image; image subset and export; cartographic representation

Semester- V
Course Name: Water Resources
Course Code: BSCENVMJ502

Course Type: **MJC-8 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge of water sources and processes involved
2. Knowledge on the design parameters of a water resources system using elementary methods
3. Understand the water resource management systems interaction and significance with respect to the environment
4. Application of knowledge on water resource technology
Content: Unit wise course content distribution
Theory
Unit-1 Water Availability around the globe: Forms of water available in earth, Surface, ground and atmospheric water, Salt water and freshwater (07)
Unit- 2 Hydrologic Cycle and Processes: Precipitation – types and forms, Infiltration, Evaporation, Interception, Runoff. Global atmospheric and oceanic circulation and their impact on weather and climate (10)
Unit- 3 Measurement techniques: Use of Rain-gauges, RADAR and satellites for rainfall measurement, Hyetograph and Mass curve of rainfall, Isohyet maps, Mean precipitation over an area, Measurement of Evaporation, Infiltration and River flow (10)
Unit- 4 Ground Water Hydrology: Aquifers and its types, Flow of groundwater in aquifers, Surface and Groundwater interaction (05)
Unit- 5 Statistical Analysis of Hydrological Processes: Frequency and Return period of hydrologic variables, Probability Analysis, Depth-Area-Duration-Frequency relationship of Rainfall (05)
Unit- 6 Water Resources Engineering: Types of Water Resource Projects, Objectives and principles, Irrigation and water supply, Power Generation, Flood Control, Navigation, Recreation, Reservoir projects and their components, Dams, Types of dams, Diversion headworks, Components and their functions, Run of river projects, Multipurpose projects, Advantage and disadvantages of water resource projects (10)
Unit- 7 Water scarcity, Water sensitization and management (03)

Semester- V
Course Name: Water Resources
Course Code: BSCENVMJ502
[PRACTICAL]

Course Type: **MJC-8 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1.One major experiment- 10
2 .Laboratory notebook- 05
3. Viva-voce- 05

Practical Courses
1. Major Experiments
Measurement of rainfall, mean precipitation, humidity & temperature, river velocity (Floating method)
2. Preparation of Report
Field visit: Visit to dams, river projects, multipurpose projects - advantage and disadvantages of water resource projects

Semester- V
Course Name: Environment & Society
Course Code: BSCENVMJ503

Course Type: **MJC-9 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the human surrounding and the role of human being in shaping the surrounding
2. Understand the need to address the current environmental issues
3. Knowledge on environmental movements, environmental legislations
4. Knowledge on forest and environment, agriculture and environment, and institutional initiatives in the field of environment
5. Knowledge on the role of Indian traditions and culture in environment and its priorities

Content: Unit wise course content distribution
Theory
Unit-1 Human beings and environment: Competition within, environmental degradation, conservation; Current environmental issues – Pollution, trans-boundary issues, biodiversity loss, climate change, urbanization, land degradation; Environmental issues of urban areas (10)
Unit- 2 Role of the society – Interest groups, awareness and conservation, rights and duties; Constitutional provisions – Article 48A and Article 51A(g); Environmental legislations, green benches, international cooperation, Indian commitments (10)
Unit- 3 Economy of the environment, environmental good, natural resources, resource use and depletion; Common property resources, the tragedy of commons, sustainable development (08)
Unit- 4 Issues with Indian agriculture – Modern vs. organic agriculture; Crop biodiversity *vs.* monoculture; energy and water availability, agro-marketing, farmers wellbeing and subsistence; The Panchayati raj, participatory development, institutional initiatives for resource development, sanitation and hygiene, social forestry, joint forest management (12)
Unit-5 Environmental issues of Indian villages, biomass mass burning, exposure risk and gender; water availability, water and gender; migration Indian traditions and conservation; Indian environmental priorities (10)

Semester- V
Course Name: Environment & Society
Course Code: BSCENVMJ503
[PRACTICAL]

Course Type: **MJC-9 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One survey report- 15
2. Viva-voce- 05

Practical Courses
1. Preparation of survey report
Preparation of survey report on any one of the following:
a. Visit to rural village to study on agricultural practices, crop pattern and economic benefits
b. Study on biomass mass burning and its consequences
c. Study on water withdrawal for agricultural crop production and ecological footprint

Minor Paper

Semester- V
Course Name: Environment & Society
Course Code: BSCENVMN503

Course Type: **MNC-9 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the human surrounding and the role of human being in shaping the surrounding
2. Understand the need to address the current environmental issues
3. Knowledge on environmental movements, environmental legislations
4. Knowledge on forest and environment, agriculture and environment, and institutional initiatives in the field of environment
5. Knowledge on the role of Indian traditions and culture in environment and its priorities

Content: Unit wise course content distribution
Theory
Unit-1 Human beings and environment: Competition within, environmental degradation, conservation; Current environmental issues – Pollution, trans-boundary issues, biodiversity loss, climate change, urbanization, land degradation; Environmental issues of urban areas (10)
Unit- 2 Role of the society – Interest groups, awareness and conservation, rights and duties; Constitutional provisions – Article 48A and Article 51A(g); Environmental legislations, green benches, international cooperation, Indian commitments (10)
Unit- 3 Economy of the environment, environmental good, natural resources, resource use and depletion; Common property resources, the tragedy of commons, sustainable development (08)
Unit- 4 Issues with Indian agriculture – Modern vs. organic agriculture; Crop biodiversity *vs.* monoculture; energy and water availability, agro-marketing, farmers wellbeing and subsistence; The Panchayati raj, participatory development, institutional initiatives for resource development, sanitation and hygiene, social forestry, joint forest management (12)
Unit-5 Environmental issues of Indian villages, biomass mass burning, exposure risk and gender; water availability, water and gender; migration Indian traditions and conservation; Indian environmental priorities (10)

Semester- VI
Course Name: Basics of Environmental Statistics & Computer Application
Course Code: BSCENVMJ601

Course Type: **MJC-10 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit**: 5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge of basic statistical parameters
2. Understand the statistical estimation through R Statistical software
3. Knowledge on data processing and visual presentation using R statistical software
4. Understand the basics of computer

Content: Unit wise course content distribution
Theory
Unit-1 Concept of statistics, population, types of data, data management and Frequency (05)

Unit- 2 Sampling, sampling area, sampling unit, types of sampling, advantages of sampling; Graphical representation of statistical data (15)

Unit- 3 Measurement: Mean, Median, Mode; Mean deviation, Standard deviation, Skewness, Kurtosis, Correlation and Regression; Standard error, parametric and non-parametric tests; curve fitting; Ordination; testing of hypothesis, Null and alternate hypothesis, t – test, chi – square test (15)

Unit- 4 Basic elements of statistical analyses: Probability distribution – normal, binomial, poisson (10)

Unit- 5 Introduction of Computer programs (Microsoft Word, Power point presentation, EXCEL, etc.) (05)

Semester- VI
Course Name: Basics of Environmental Statistics & Computer Application
Course Code: BSCENVMJ601
[PRACTICAL]

Course Type: **MJC-9 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. Major experiment- 15
2. Viva-voce- 05

Practical Courses
1. Contents: Lay out of experimental design (RBD; Split-plot etc.); Cluster analysis; sampling techniques and statistical analysis of experimental design
2. Graphical presentation of statistical data; measurement of standard deviation & standard error; t-test, chi-square test, one-way ANOVA, correlation and regression

Semester- VI
Course Name: Solid Waste Management
Course Code: BSCENVMJ602

Course Type: **MJC-11 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the characteristic of wastes and sources of generation, and processes of waste management
2. Understand the pollution potentials of solid wastes
3. Knowledge on solid waste management practices through a cradle-to-grave approach
4. Understanding on generation of recourses from wastes

Content: Unit wise course content distribution
Theory
Unit-1 Definitions, sources, composition; Physico-chemical characterization; and generation of - municipal solid wastes (MSW); biomedical wastes; e-waste; and hazardous wastes at national and global scale (10)
Unit- 2 Effect of Solid Waste Disposal on Environment: Effect of solid waste and industrial effluent discharge on water quality and aquatic life; Mining waste and land degradation; Effect of land fill leachate on soil characteristics and groundwater pollution (10)
Unit- 3 Solid Waste Management: Different techniques used in collection, storage, transportation and disposal of solid waste (municipal, hazardous and biomedical waste); Landfill (traditional and sanitary landfill design); Thermal treatment (pyrolysis and incineration) of waste material (15)
Unit- 4 Concept of Integrated waste management; Methods and importance of Integrated waste management (05)
Unit- 5 Scientific Management**:** Principles of solid management; UN conventions (e.g., Basel Convention); Collection & transportation measures; Segregation techniques (05)
Unit- 6 Environmental regulations**:** Eco-mark & ISO 14000; symbols & color codes; Solid Waste Management Rules, 2016; Plastic Waste Management Rules 2016 (05)

Semester- VI
Course Name: Solid Waste Management
Course Code: BSCENVMJ602
[PRACTICAL]

Course Type: **MJC-11 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One major experiment- 08
2. Identification with reasons- 04
3 .Laboratory notebook- 03
4. Viva-voce- 05

Practical Courses
1. Major Experiments
Proximate analysis; Density & Porosity; pH; Organic C estimation
2. Identification with reasons: Methods of disposal, Eco-marks, Symbols & colour codes
Visit to Landfills & enumeration of waste composition

Semester- VI

Course Name: Environmental Pollution & Human Health
Course Code: BSCENVMJ603

Course Type: **MJC-12 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on the types and the science of environmental pollution
2. Understanding of the effect of polluting on human health
3. Knowledge on pollutants and to link cause-and-effects of pollution
4. Knowledge on developing pollution mitigation/abetment strategies

Content: Unit wise course content distribution
Theory
Unit-1 Environmental pollution – Definition, local, regional and global implications (03)

Unit- 2 Air Pollution: Air pollutants, types and sources, air pollution episodes, air pollution and effects on human health [particulate matter, heavy metals (Pb in particular), Sulphur dioxide (SO_2), nitrogen dioxide (NO_2), volatile organics, surface ozone and PAHs]; and some diseases, viz., respiratory diseases, cardiovascular damage, irritation of eyes, nose and throat (15)

Unit- 3 Water pollution: Sources of water pollutants, organic matter, organic micro-pollutants, microbial pollution, Agriculture and Water pollution, Problems of pesticides and chemical fertilizers;

Geogenic Contamination: Problems of As and F^- in groundwater and human health, Sewage and wastewater, Pharmaceuticals in wastewater (12)

Unit- 4 Sanitation and Drinking Water: Quality of drinking water; Wastewater treatment and water Reuse; Implications on health – Minamata disease, *itai itai* disease, blue baby syndrome (05)

Unit- 5 Noise pollution: Noise categories; Noise effects - hearing loss, Cardiovascular effects, psychological impacts, Stress, Annoyance, control of noise pollution and regulation (05)

Unit- 6 Land pollution: Characterization and impact of MSW on public health; Emissions from waste dumping sites, leaching, biomagnification, Agriculture and land pollution (05)

Semester- VI
Course Name: Environmental Pollution & Human Health
Course Code: BSCENVMJ603
[PRACTICAL]

Course Type: **MJC-12 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One major experiment- 10
2. Laboratory notebook and Report Preparation- 05
3. Viva-voce- 05

Practical Courses
1. Major Experiments
Measurement of particulate matter in air by grab sampling and gravimetric method; Understanding levels of SOx and NOx in ambient air by HVS
2. Report preparation: Understanding and comparing noise levels of localities by dB Meter
Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, sampling, analysis and reporting, visit to industry having air-pollution control measures and reporting

Semester- VI
Course Name: Environmental Impact Assessment & Laws
Course Code: BSCENVMJ604

Course Type: **MJC-13 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the environment and its natural, and socio-economic and cultural components
2. Knowledge on the origin and development of EIA and its implications
3. Knowledge on the EIA process
4. Understand the Indian EIA process and role of MoEFCC, Green Tribunal, and environmental audit

Content: Unit wise course content distribution
Theory
Unit-1 Environmental Impact Assessment: Concept and definition; Goals of impact assessment; Evolution of impact assessment; Strategic Environmental Assessment; Social Impact Assessment; Ecological impact assessment; Hazard and risk assessment; Technology assessment; Environmental inventory; Environmental Impact Statement (EIS); Public involvement with impact assessment (10)

Unit- 2 EIA Process, scope and methodologies; Rapid EIA; Role of project proponents, project developers and consultants; Terms of Reference; Impact identification and prediction; baseline data collection; Public consultation in EIA (05)

Unit- 3 EIA regulations in India; Status of EIA in India; Case study of hydropower projects/ thermal projects (05)

Unit- 4 Biodiversity Impact Assessment; Cost-Benefit analysis; Life cycle assessment; Environmental management - Principles, problems and strategies; Environmental planning; Environmental Management Plan (EMP); Environmental audit (05)

Unit- 5 Risk assessment: Introduction and scope; hazard identification and assessment; risk characterization; risk communication; environmental monitoring; human and ecological risk assessment (05)

Environmental Laws and Policies: Basic concept on law, rules, act, treaty; Public Policy and PILs; Environmental provisions in the Indian Constitution - Article 48A, 51A(g); Powers and Functions of Govt. Agencies for pollution control (CPCB & SPCB) (10)

Environmental Acts: Objectives & Principles of The Environment Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act, 1974; The Noise Pollution (Regulation and Control) Act, 2000; The Wild Life (Protection) Act, 1972; The Forest (Conservation) Act, 1980; The National Green Tribunal Act, 2010; The Biological Diversity Act, 2002; Public Liability Insurance Act, 1991; Green Bench (10)

Students who want to undertake 3-year UG Program will be awarded UG Degree in the relevant Discipline/Subject upon securing 126 credits

Semester- VI
Course Name: Environmental Impact Assessment & Laws
Course Code: BSCENVMJ604
[PRACTICAL]

Course Type: **MJC-12 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One major experiment- 10
2. Laboratory notebook and Report Preparation- 05
3. Viva-voce- 05

Practical Courses
1. Major Experiments: On-Field visit for preparation of report on EIA (based on case studies)
2. Report Preparation: Preparation of report on field visit like industrial effluent treatment plants/water treatment plants/ waste disposal systems/wastewater treatment plants/recycling systems/power generation plants, etc.

Semester- VII
Course Name: Green Chemistry & Environmental Applications
Course Code: BSCENMJ701

Course Type: **MJC-14 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on importance and significance of green technology
2. Knowledge on development and application of innovative technologies in conversion natural forms energy to economically and environmentally feasible forms
3. Ability to develop, fabricate and utilize eco-friendly and cost-effective products and green design in building and infrastructure
4. Understand the role of green technology in resource generation, employment and improvement of livelihood standards
5. Knowledge of various environmental monitoring and assessment tools, and industrial safety and hazard analysis
Content: Unit wise course content distribution
Theory
Unit-1 Green Chemistry: Concept, principles, applications of green chemistry, *e. g.*, use of CO_2, H_2O_2, TiO_2; Chitin; Green technology and sustainability (10)

Unit- 2 Green Technology: Development and applications, Green technology in waste management, Supercritical water oxidation (SCWO) of wastes; Rhizosphere in biodegradation of organic wastes; Green techniques in water treatments: Deionization, Desalinizatation, Electrodialysis, Reverse osmosis; Green sources of energy; Green treatments of industrial effluents - Cyanide, Chromate (20)

Unit- 3 Green Synthesis of Chemicals: Production of 3^{rd}& 4^{th} generation pest controller, Integrated Pest Management (IPM), biodiesel, biopolymers, biogas, biofuel, bioethanol, degradable polymers, bioplastics; Alternative Fluorocarbons (AFCs) (10)

Unit- 4 Development and application: Conversion to natural forms of energy such as hydro-energy, solar energy, wind energy, tidal energy, and geo-thermal energy; Green design, building and infrastructure (10)

Semester- VII
Course Name: Green Chemistry & Environmental Applications
Course Code: BSCENVMJ701
[PRACTICAL]

Course Type: **MJC-14 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One major experiment- 08
2. Report Preparation- 04
3. Laboratory notebook- 03
4. Viva-voce- 05

Practical Courses
1. Major Experiments
Characterization of industrial effluents and wastewater MLSS; MLVSS, COD
2. Report preparation: Preparation of Report on Field visit (Industrial effluents treatment plants/water treatment plants/waste disposal systems/wastewater treatment plants/recycling systems/power generation plants etc.
3. Laboratory notebook containing all experiments

Semester- VII
Course Name: Environmental Economics & Management
Course Code: BSCENVMJ702

Course Type: **MJC-15 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on market and the economics of the environment
2. Identify economic solutions to environmental problems and the role of environmental market-based instruments
3. Apply of economic theories to analyze environmental problems and solutions
4. Appreciate risk analysis in providing economic solutions to environmental problems
5. Apply economic analysis in environmental decision-making process

Content: Unit wise course content distribution
Theory
Unit-1 Environmental Economics: Concept, scope and interrelation; Concept of supply and demand; Ecological economics; Environmental indicators-sustainable accounting; Introduction to economic theories and economic approach to real world environmental problems; Environmental Kuznets's Curve; Economics of pollution control; Cost: Benefit analysis (15)

Unit- 2 Environmental Accounting and Auditing: Environmental accounting - objectives, financial accounting, social accounting (05)

Unit- 3 Depletion of natural resources, climate change impacts, degradation of environmental quality, solid and toxic wastes, best management practice and sustainable development, pollution charge, subsidy, deposit refund system and pollution permit trading system; national and international agreement; Methods of assessing Natural Capital in economic terms (15)

Unit- 4 Environmental goods, public goods, private goods, common property resources, economic valuation, concept of market, market failure, social costs, private costs, externalities (10)

Unit- 5 Risk analysis: Risk assessment and risk management; Economic issues of ABS (Access Benefit Sharing) as per Biodiversity Act 2002 (05)

Semester- VII
Course Name: Environmental Economics and Management
Course Code: BSCENVMJ702
[PRACTICAL]

Course Type: **MJC-15 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One survey report- 15
2. Viva-voce- 05

Practical Courses
1. Survey report:
Preparation of survey report on market economy, cost-benefit analysis; study on agricultural economics *vs*. ecological footprint

Semester- VII
Course Name: Natural Hazards & Disaster Management and Waste Management
Course Code: BSCENVMJ703

Course Type: **MJC-16 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the different types of natural hazard, their major driving forces/factor, and the causes
2. Understand the relationship/interface between geophysical processes and human activities in causing natural hazard
3. Knowledge on hazards scenario at the global as well as national level
4. Understand the mitigation approaches, their choices and alternatives
5. Knowledge of foundations for hazard, risk and vulnerability assessment

Content: Unit wise course content distribution
Theory
Unit-1 Natural Hazards: Definition, concept and types; Risks & vulnerability; Causes, distribution, consequences and mitigation measures; Hazards and risk assessment (10)

Unit- 2 Disaster Management: Definition and concept, capacity and risk; Disaster management cycle
a. Floods: Floods as physical process (river systems, runoff, river activities); Causes and factors of flooding, effects/hazards associated with flooding; Response to flood hazards; Global and India scenario
b. Earthquake: Origin of earthquakes; Seismic waves; World's seismicity with emphasis on Indo-Burma region; Hazards associated with earthquakes; Response to earthquake hazards
c. Drought: Cause and impact; Types of draughts (meteorological, hydrological, agricultural and socio-economic) response to hazards - mitigation and adaptation; Droughts in India
d. Cyclones: Genesis; Tropical cyclones - formation, frequency and trajectory; impact of cyclones, mitigation and adaptation
e. Landslides: Genesis (slope failure mechanism); Causes of landslides, prevention and correction methods; Global and Indian scenario (25)
Unit- 3 Waste Management: Waste generation & characterization; Integrated Solid Waste Management; Hazardous waste management; Hazardous waste treatment technologies; Municipal Solid Waste Management; Biomedical waste management; Industrial Pollution Management (15)

Semester- VII
Course Name: Natural Hazards & Disaster Management and Waste Management
Course Code: BSCENVMJ703
[PRACTICAL]

Course Type: **MJC-16 (Practical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One survey report- 15
2. Viva-voce- 05

Practical Courses
1. Survey report:
a. Preparation of a report based on natural hazards of earlier occurrence after observing/viewing e-resources
b. Report preparation based on perceptions survey of disaster affected areas

Semester- VII
Course Name: Ecotoxicology & Environmental Biotechnology
Course Code: BSCENVMJ704

Course Type: **MJC-17 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on scope of biotechnology in environmental applications
2. Knowledge of microbiology and biochemistry
3. Ability to perform various molecular biological applications, and knowledge of equipment used in molecular biological techniques
4. Ability to apply molecular biological techniques in pollution management and industrial applications
5. Knowledge of advanced biotechnological applications, and biosafety in analytical procedures

Content: Unit wise course content distribution
Theory
Unit-1 Ecotoxicology: Definition and Concept; Mechanism of toxicity; Branches of toxicology; Types of interactions in toxicology; Concept of Dose-Response relationship, LD_{50}, LC_{50}, Threshold Limit Value (TLV), Therapeutic index; Ames test, Bio-assay techniques (10)
Unit- 2 Environmental Biotechnology: Concept on Environmental biotechnology, Fermentation techniques, composting, vermicomposting, bioleaching; biofertilizer, biopesticide, biogas, bioethanol and biopolymers; Application of biotechnology in environmental field (10)
Unit- 3 Molecular biology: Cell as a unit of life, cellular components, biomolecules, enzymes, molecular genetics – nuclear material, central dogma, replication, repair and recombination of genetic material, translation, transcription, mutation (10)
Unit- 4 Microbiology and industrial applications: Classification of microorganisms, environment, pathogenic and useful microorganisms, microbial enzymes in industrial applications (05)
Unit- 5 Biotechnological applications in pollution management: Solid waste management and wastewater treatment; role of microorganisms in sewage treatment and degradation of municipal solid waste; degradation of plastics and polymers using microorganisms (10)
Unit- 6 Advanced environmental biotechnology applications: Biofilms, biosensors and genetically engineered microorganisms in environmental applications; Biosafety in analytical procedures (05)

Semester- VII
Course Name: Ecotoxicology & Environmental Biotechnology
Course Code: BSCENVMJ704
PRACTICAL

Course Type: **MJC-17 (Theoretical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 2 Hours
MARKS: 20

Description of Experiment:
1. One major experiment- 07
2. Identification- 03
3. Laboratory notebook- 05
4. Viva-voce- 05

Practical Courses
Major Experiments

Different parameters of evaluation of air, water, soil and wastewater
Air: Dust fall/SPM/RSPM/SO_x/NO_x
Water: BOD/COD
Demonstration / Theoretical idea on AAS; Bioassay
Demonstration on Fermentation/ Composting/Vermicomposting

Minor Paper

Semester- VII
Course Name: Environmental Economics & Management
Course Code: BSCENVMN702

Course Type: **MNC-15 (Theoretical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on market and the economics of the environment
2. Identify economic solutions to environmental problems and the role of environmental market-based instruments
3. Apply of economic theories to analyze environmental problems and solutions
4. Appreciate risk analysis in providing economic solutions to environmental problems
5. Apply economic analysis in environmental decision-making process

Content: Unit wise course content distribution
Theory
Unit-1 Environmental Economics: Concept, scope and interrelation; Concept of supply and demand; Ecological economics; Environmental indicators-sustainable accounting; Introduction to economic theories and economic approach to real world environmental problems; Environmental Kuznets's Curve; Economics of pollution control; Cost: Benefit analysis (15)

Unit- 2 Environmental Accounting and Auditing: Environmental accounting - objectives, financial accounting, social accounting (05)

Unit- 3 Depletion of natural resources, climate change impacts, degradation of environmental quality, solid and toxic wastes, best management practice and sustainable development, pollution charge, subsidy, deposit refund system and pollution permit trading system; national and international agreement; Methods of assessing Natural Capital in economic terms (15)

Unit- 4 Environmental goods, public goods, private goods, common property resources, economic valuation, concept of market, market failure, social costs, private costs, externalities (10)

Unit- 5 Risk analysis: Risk assessment and risk management; Economic issues of ABS (Access Benefit Sharing) as per Biodiversity Act 2002 (05)

Semester- VIII
Course Name: Wildlife Conservation & Management
Course Code: BSCENVMJ801

Course Type: **MJC-18 (Practical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand basic ecological principles and fundamental concepts in wildlife conservation and management.
2. Understanding of cultural, historical, and current perspectives on the human- wildlife relationship to effectively address wildlife issues.
3. Knowledge on the primary international, national, and state agencies and scientific organizations, responsible for conservation and management of wildlife, and understand the role of private citizens in decision-making at all levels.
4. Understanding the wildlife conservation and management by critically evaluating information sources.
5. Know the threats to biodiversity in relation to protected areas and non- protected areas

Content: Unit wise course content distribution
Theory
Unit- 1 **Introduction:** Definition of wildlife; Indian wildlife; Threats to wildlife; Group living; Migration patterns; Predation behavior; Selfishness and altruism; Climate change and wildlife movement; Ecological services of wildlife; Ecotourism and wildlife; Habitat fragmentation and wildlife corridors (10)
Unit- 2 **Conflicts between man and wildlife:** Elephant-man conflict; Rhino-man conflict; River dolphin-man conflict; Tiger-man conflict; Leopard-man conflict; Conflict management and shifting from extraction to preservation; Response system between human-wildlife conflicts (08)
Unit- 3 **Wildlife heath monitoring:** Rescue measures for wounded animals; First aid for animal injuries; Animal health management; Population viability and habitat analysis (PVHA); Zoonotic disease management; National and International organizations involved in wildlife health management (10)
Unit- 4 **Conservation measures:** Man and Biosphere program (MAB); Issue of food and water scarcity; Captive breeding, relocation and rehabilitation of fauna, corridors for protected areas and significance of landscape management, buffer management , fire control, poaching and illegal activities
Wetland management: structure, function, food chains, food webs, threats and conservation; Eco restoration of wetland
Management of coastal and marine ecosystem: coral reefs, distribution, structure, function, threats and conservation (12)
Unit-5 **Laws in India:** Types of protected areas (Wildlife Sanctuaries, National Parks, Biosphere Reserves); IUCN categories of protected areas, Natural World Heritage sites; Concept of core and buffer area in a protected range; Brief introduction to Wildlife Protection Act of 1972; Forest Dwellers Act, 2006; Biodiversity Conservation Act, 2002); Wildlife trade and role of CITES (10)

Semester- VIII
Course Name: Wildlife Conservation & Management
Course Code: BSCENVMJ801
[PRACTICAL]

Course Type: **MJC-18 (Practical)**	Course Details:			L-T-P:	
Credit: **5**	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One Major Experiment: 08
2. Identification with reasons: 04
3. Laboratory Notebook: 02
4. Field tour report/Assignments/Seminars: 02
5. Viva-voce: 04

Practical Courses
Introduction: Study of campus flora and fauna; Study of nearby forests and grasslands; study of habitat specificity in birds or small mammals on campus; Current tools in the wildlife management; species importance value index (IVI)
One Major Experiment: Ascorbic acid determination of plant; Estimation of frequency, density, abundance of species (Nested quadrate analysis and plotless vegetation mapping); Line transects, and belt transect method of community study; Comparison of litter-fall (for at least 2-3 plant species)
Identification with reasons: Identification of important medicinal and weed species.
Demonstration of Equipment and use tags, collars, radio tracking equipment and bird ringing, GPS

Semester- VIII
Course Name: Energy & Environment
Course Code: BSCENVMJ802

Course Type: **19 (Theoretical)**	Course Details:			L-T-P: **2-0-4**	
Credit: **4**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understanding of solar radiation's spectrum and the energy available from solar radiations
2. Understand the distinction between conventional and renewable energy sources
3. Understanding of the principles of energy conversion in case of each of the energy sources.
4. Knowledge on consumption of fossil fuels and biomass leads and their subsequent adverse impact on health and climate
5. Understanding of the implications of large-scale production of CO_2 and government's energy policy

Content: Unit wise course content distribution
Theory
Unit-1 Concepts of energy, power, heat and work, potential energy, kinetic energy, conservation of energy; Energy conversion factors, global energy flows, sun's radiations, energy budget of earth atmospheric system; Energy in biosphere, photosynthesis (15)

Unit- 2 History of energy use sectorial consumption of energy, energy consumption with time, population growth and projections for future (10)

Unit- 3 Environmental implications of energy use: Air pollution from fossil fuels and biomass, impacts on climate change and health; Impacts of large scale use of energy from solar, wind, hydro, ocean thermal energy, geothermal sources and nuclear energy; Thermal pollution-cooling towers, cooling by river water, lakes and ocean, radioactive waste, oil spills; CO_2 emission reduction potential from use of renewable energy (20)

Unit- 4 Energy storage devices, efficiency of energy use and energy policy of the country; Current status of installed capacity and potential of renewable energy sources (05)

Semester- VIII
Course Name: Industrial Health & Safety
Course Code: BSCENVMJ803

Course Type: **MJC-20 (Theoretical)**	Course Details:			L-T-P: **2-0-4**	
Credit: **4**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the industrial activity with inputs on health and safety
2. Knowledge on internalize ISO 14001 and its implications for an industry
3. Understand the issues related to occupational health and hazards
4. Development of Protocol for an industry on disaster prevention, health issues, safety measures and environment management.

Content: Unit wise course content distribution
Theory
Unit-1 Introduction to industrial pollutants; TOSCA (Toxic Substances Control Act); Concept on occupational health and health hazards; Drug abuse; Federal Hazardous Substances Act (10)

Unit- 2 Safety measures for workers and sensitization of industry managers; Biological method of monitoring; Clinical studies on workers; Test and monitor to industrial health and safety; Ideas on remedies (10)

Unit- 3 Practical applications: Concept of toxic substance standard; Permissible levels of exposure to airborne industrial chemicals; Legislation for control of toxic substances – OSHA (Occupational Safety and Health Act); Rules of Regulatory toxicology; Preparation for designing and recognition of an industry for IS014001 (15)

Unit- 4 Industrial disaster & degradation of environment; Strategic management and planning and tools for implementing health and safety measures; Management of communicable diseases; Principles of accident prevention; Measures for altering organizational behavior and risk management (15)

Semester- VIII
Course Name: Industrial Health & Safety
Course Code: BSCENVMJ803
PRACTICAL

Course Type: **MJC-20 (Theoretical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 2 Hours
MARKS: 20

Description of Experiment:
1. One Major Experiment: 07
2. Identification: 03
3. Laboratory Notebook: 05
4. Viva-voce: 05

Practical Courses
Major Experiments
Risk evaluation, such as the Risk Matrix, Failure Mode and Effects Analysis (FMEA), and the Decision Tree
Guidelines for developing health and safety program; Mental Health Awareness: Stress, anxiety, and depression are just as serious as physical injuries.
Identification
Identification and prevention of workplace injuries, illnesses, and deaths; PPEs are specialized clothing and equipment; Gloves, goggles, and masks: UV and infrared safety helmets for welding, and fall restraint harnesses for working at heights; Hearing Conservation, Blood borne Pathogens.

Semester- VIII
Course Name: Analytical Methods in Environmental Science
Course Code: BSCENVMJ804

Course Type: **MJC-21 (Theoretical)**	Course Details:			L-T-P: **2-0-4**	
Credit: **4**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:

Unit 1: **Separation techniques**

Adsorption, centrifugation, chromatography, crystallization, decantation, distillation, drying, electrophoresis, elutriation, evaporation, leaching, flotation, flocculation, filtration, reverse osmosis, dialysis (biochemistry), fractional distillation, fractional freezing, magnetic separation, precipitation, crystallization, sedimentation, sieving, stripping, sublimation, vapour-liquid separation, winnowing and zone refining's (20)

Unit 2: **Sample Preparation and extraction**

Concept and importance, sample pre-treatment, preparation, post treatment techniques: pressurized liquid and subcritical hot-water extraction, microwave assisted extraction, solid phase extraction, QuEChERS approach of extraction, solid phase micro extraction, single drop micro extraction (SDME), membrane extraction, liquid-liquid extraction (15)

Unit 3: **Chromatography and Mass spectroscopy**

Principle, instrumentation and application of gas, liquid, adsorption, paper, gel, size exclusion, HPLC, TLC, electrophoresis and ion exchange chromatography. Mass spectroscopy: Principle, instrumentation and application of mass spectroscopy, types of mass spectroscopy, fragmentation, ionization and characterization of organic and inorganic materials (15)

Unit 4: **Miscellaneous methods**

Principle, instrumentation and application of classical analytical methods: gravimetric, volumetric and thermal methods); Automatic analytical methods and Hybrid analytical methods (10)

Semester- VIII
Course Name: Analytical Methods in Environmental Science
Course Code: BSCENVMJ804
PRACTICAL

Course Type: **MJC-21 (Theoretical)**	Course Details:			L-T-P:	
Credit:	Full Marks 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	-	**20**	-

TIME: 2 Hours
MARKS: 20

Description of Experiment:
1. One Major Experiment: 07
2. Identification: 03
3. Laboratory Notebook: 05
4. Viva-voce: 05

Practical Courses
Major Experiments
Basic histological and cytological techniques: Fixation & fixatives, Tissue-processing and Microtomy; Staining
Bacteriological examination of water: Standard plate count and coliform test.
Identification
Different types of Microscopes: Different Components of microscope; Types of microscopes – Light, Electron, Phase, Polarized, Fluorescence.
Biological Analysis
Collection and preservation of plankton; Enumeration of net plankton, counting in Sedgwick Rafter cell.
Interpretation of Satellite Imagery
Stereoscopic study and visual interpretations of satellite imagery and airborne image.

Minor Paper

Semester- VIII
Course Name: Wildlife Conservation & Management
Course Code: BSCENVMJ801

Course Type: **MJC-18 (Practical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand basic ecological principles and fundamental concepts in wildlife conservation and management.
2. Understanding of cultural, historical, and current perspectives on the human- wildlife relationship to effectively address wildlife issues.
3. Knowledge on the primary international, national, and state agencies and scientific organizations, responsible for conservation and management of wildlife, and understand the role of private citizens in decision-making at all levels.
4. Understanding the wildlife conservation and management by critically evaluating information sources.
5. Know the threats to biodiversity in relation to protected areas and non- protected areas

Content: Unit wise course content distribution
Theory
Unit- 1 **Introduction:** Definition of wildlife; Indian wildlife; Threats to wildlife; Group living; Migration patterns; Predation behavior; Selfishness and altruism; Climate change and wildlife movement; Ecological services of wildlife; Ecotourism and wildlife; Habitat fragmentation and wildlife corridors (10)
Unit- 2 **Conflicts between man and wildlife:** Elephant-man conflict; Rhino-man conflict; River dolphin-man conflict; Tiger-man conflict; Leopard-man conflict; Conflict management and shifting from extraction to preservation; Response system between human-wildlife conflicts (08)
Unit- 3 **Wildlife heath monitoring:** Rescue measures for wounded animals; First aid for animal injuries; Animal health management; Population viability and habitat analysis (PVHA); Zoonotic disease management; National and International organizations involved in wildlife health management (10)
Unit- 4 **Conservation measures:** Man and Biosphere program (MAB); Issue of food and water scarcity; Captive breeding, relocation and rehabilitation of fauna, corridors for protected areas and significance of landscape management, buffer management , fire control, poaching and illegal activities
Wetland management: structure, function, food chains, food webs, threats and conservation; Eco restoration of wetland
Management of coastal and marine ecosystem: coral reefs, distribution, structure, function, threats and conservation (12)
Unit-5 **Laws in India:** Types of protected areas (Wildlife Sanctuaries, National Parks, Biosphere Reserves); IUCN categories of protected areas, Natural World Heritage sites; Concept of core and buffer area in a protected range; Brief introduction to Wildlife Protection Act of 1972; Forest Dwellers Act, 2006; Biodiversity Conservation Act, 2002); Wildlife trade and role of CITES (10)

Students who want to undertake 4-year UG Honours Program will be awarded UG Degree (Honours) in the relevant Discipline/Subject provided they secure 173 credits

Semester- VII
Course Name: Green Chemistry & Environmental Applications
Course Code: BSCENMJ 701

Course Type: **Core (Theoretical)**	Course Details:			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on importance and significance of green technology
2. Knowledge on development and application of innovative technologies in conversion natural forms energy to economically and environmentally feasible forms
3. Ability to develop, fabricate and utilize eco-friendly and cost-effective products and green design in building and infrastructure
4. Understand the role of green technology in resource generation, employment and improvement of livelihood standards
5. Knowledge of various environmental monitoring and assessment tools, and industrial safety and hazard analysis
Content: Unit wise course content distribution
Theory
Unit-1 Green Chemistry: Concept, principles, applications of green chemistry, *e. g.*, use of CO_2, H_2O_2, TiO_2; Chitin; Green technology and sustainability (10)

Unit- 2 Green Technology: Development and applications, Green technology in waste management, Supercritical water oxidation (SCWO) of wastes; Rhizosphere in biodegradation of organic wastes; Green techniques in water treatments: Deionization, Desalinizatation, Electrodialysis, Reverse osmosis; Green sources of energy; Green treatments of industrial effluents - Cyanide, Chromate (20)

Unit- 3 Green Synthesis of Chemicals: Production of 3^{rd}& 4^{th} generation pest controller, Integrated Pest Management (IPM), biodiesel, biopolymers, biogas, biofuel, bioethanol, degradable polymers, bioplastics; Alternative Fluorocarbons (AFCs) (10)

Unit- 4 Development and application: Conversion to natural forms of energy such as hydro-energy, solar energy, wind energy, tidal energy, and geo-thermal energy; Green design, building and infrastructure (10)

Semester- VII
Course Name: Green Chemistry & Environmental Applications
Course Code: BSCENVMJ 701
[PRACTICAL]

Course Type: **Core (Practical)**	Course Details:			L-T-P: **4-0-4**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**-**	**20**	**-**

Description of Experiment:
1. One major experiment- 08
2. Report Preparation- 04
3. Laboratory notebook- 03
4. Viva-voce- 05

Practical Courses
1. Major Experiments
Characterization of industrial effluents and wastewater MLSS; MLVSS, COD
2. Report preparation: Preparation of Report on Field visit (Industrial effluents treatment plants/water treatment plants/waste disposal systems/wastewater treatment plants/recycling systems/power generation plants etc.
3. Laboratory notebook containing all experiments

Semester- VII
Course Name: Environmental Economics & Management
Course Code: BSCENVMJ 702

Course Type: **Core (Theoretical)**	Course Details:			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on market and the economics of the environment
2. Identify economic solutions to environmental problems and the role of environmental market-based instruments
3. Apply of economic theories to analyze environmental problems and solutions
4. Appreciate risk analysis in providing economic solutions to environmental problems
5. Apply economic analysis in environmental decision-making process

Content: Unit wise course content distribution
Theory
Unit-1 Environmental Economics: Concept, scope and interrelation; Concept of supply and demand; Ecological economics; Environmental indicators-sustainable accounting; Introduction to economic theories and economic approach to real world environmental problems; Environmental Kuznets's Curve; Economics of pollution control; Cost: Benefit analysis (15)

Unit- 2 Environmental Accounting and Auditing: Environmental accounting - objectives, financial accounting, social accounting (05)

Unit- 3 Depletion of natural resources, climate change impacts, degradation of environmental quality, solid and toxic wastes, best management practice and sustainable development, pollution charge, subsidy, deposit refund system and pollution permit trading system; national and international agreement; Methods of assessing Natural Capital in economic terms (15)

Unit- 4 Environmental goods, public goods, private goods, common property resources, economic valuation, concept of market, market failure, social costs, private costs, externalities (05)

Unit- 5 Risk analysis: Risk assessment and risk management; Economic issues of ABS (Access Benefit Sharing) as per Biodiversity Act 2002 (05)

Semester- VII
Course Name: Environmental Economics and Management
Course Code: BSCENVMJ 702
[PRACTICAL]

Course Type: **Core (Practical)**	Course Details:			L-T-P: **4-0-4**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**-**	**20**	**-**

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One survey report- 15
2. Viva-voce- 05

Practical Courses
1. Survey report:
Preparation of survey report on market economy, cost-benefit analysis; study on agricultural economics vs. ecological footprint

Semester- VII
Course Name: Natural Hazards & Disaster Management and Waste Management
Course Code: BSCENVMJ 703

Course Type: **Core (Theoretical)**	Course Details: **CC-14**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand the different types of natural hazard, their major driving forces/factor, and the causes
2. Understand the relationship/interface between geophysical processes and human activities in causing natural hazard
3. Knowledge on hazards scenario at the global as well as national level
4. Understand the mitigation approaches, their choices and alternatives
5. Knowledge of foundations for hazard, risk and vulnerability assessment
Content: Unit wise course content distribution
Theory
Unit-1 Natural Hazards: Definition, concept and types; Risks & vulnerability; Causes, distribution, consequences and mitigation measures; Hazards and risk assessment (10)

Unit- 2 Disaster Management: Definition and concept, capacity and risk; Disaster management cycle
a. Floods: Floods as physical process (river systems, runoff, river activities); Causes and factors of flooding, effects/hazards associated with flooding; Response to flood hazards; Global and India scenario
b. Earthquake: Origin of earthquakes; Seismic waves; World's seismicity with emphasis on Indo-Burma region; Hazards associated with earthquakes; Response to earthquake hazards
c. Drought: Cause and impact; Types of draughts (meteorological, hydrological, agricultural and socio-economic) response to hazards - mitigation and adaptation; Droughts in India
d. Cyclones: Genesis; Tropical cyclones - formation, frequency and trajectory; impact of cyclones, mitigation and adaptation
e. Landslides: Genesis (slope failure mechanism); Causes of landslides, prevention and correction methods; Global and Indian scenario (25)

Unit- 3 Waste Management: Waste generation & characterization; Integrated Solid Waste Management; Hazardous waste management; Hazardous waste treatment technologies; Municipal Solid Waste Management; Biomedical waste management; Industrial Pollution Management (15)

Semester- VII
Course Name: Natural Hazards & Disaster Management and Waste Management
Course Code: BSCENVMJ 703 [PRACTICAL]
PRACTICAL

Course Type: **Core (Practical)**	Course Details:			L-T-P: **4-0-4**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**-**	**20**	**-**

TIME: 3 HOURS
MARKS: 20

Description of Experiment:
1. One survey report- 15
2. Viva-voce- 05

Practical Courses
1. Survey report:
a. Preparation of a report based on natural hazards of earlier occurrence after observing/viewing E-resources
b. Report preparation based on perceptions survey of disaster affected areas

Semester- VII
Course Name: Ecotoxicology & Environmental Biotechnology
Course Code: BSCENVMJ 704

Course Type: **Core (Theoretical)**	Course Details:			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**10**	**-**	**40**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on scope of biotechnology in environmental applications
2. Knowledge of microbiology and biochemistry
3. Ability to perform various molecular biological applications, and knowledge of equipment used in molecular biological techniques
4. Ability to apply molecular biological techniques in pollution management and industrial applications
5. Knowledge of advanced biotechnological applications, and biosafety in analytical procedures

Content: Unit wise course content distribution
Theory
Unit-1 Ecotoxicology: Definition and Concept; Mechanism of toxicity; Branches of toxicology; Types of interactions in toxicology; Concept of Dose-Response relationship, LD_{50}, LC_{50}, Threshold Limit Value (TLV), Therapeutic index; Ames test, Bio-assay techniques (10)

Unit- 2 Environmental Biotechnology: Concept on Environmental biotechnology, Fermentation techniques, composting, vermicomposting, bioleaching; biofertilizer, biopesticide, biogas, bioethanol and biopolymers; Application of biotechnology in environmental field (10)

Unit- 3 Molecular biology: Cell as a unit of life, cellular components, biomolecules, enzymes, molecular genetics – nuclear material, central dogma, replication, repair and recombination of genetic material, translation, transcription, mutation (10)

Unit- 4 Microbiology and industrial applications: Classification of microorganisms, environment, pathogenic and useful microorganisms, microbial enzymes in industrial applications (05)

Unit- 5 Biotechnological applications in pollution management: Solid waste management and wastewater treatment; role of microorganisms in sewage treatment and degradation of municipal solid waste; degradation of plastics and polymers using microorganisms (10)

Unit- 6 Advanced environmental biotechnology applications: Biofilms, biosensors and genetically engineered microorganisms in environmental applications; Biosafety in analytical procedures (05)

Semester- VII
Course Name: Ecotoxicology & Environmental Biotechnology
Course Code: BSCENVMJ 704
PRACTICAL

Course Type: **Core (Theoretical)**	Course Details:			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**10**	**-**	**40**

TIME: 2 Hours
MARKS: 20

Description of Experiment:
1. One major experiment- 07
2. Identification- 03
3. Laboratory notebook- 05
4. Viva-voce- 05

Practical Courses
1. Major Experiments
Different parameters of evaluation of air, water, soil and wastewater
Air: Dust fall/SPM/RSPM/SO_x/NO_x
Water: BOD/COD
Demonstration / Theoretical idea on AAS; Bioassay
Demonstration on Fermentation/ Composting/Vermicomposting

Minor Paper

Semester- VII
Course Name: Environmental Economics & Management
Course Code: BSCENVMN 702

Course Type: **Core (Theoretical)**	Course Details:			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Knowledge on market and the economics of the environment
2. Identify economic solutions to environmental problems and the role of environmental market-based instruments
3. Apply of economic theories to analyze environmental problems and solutions
4. Appreciate risk analysis in providing economic solutions to environmental problems
5. Apply economic analysis in environmental decision-making process

Content: Unit wise course content distribution
Theory
Unit-1 Environmental Economics: Concept, scope and interrelation; Concept of supply and demand; Ecological economics; Environmental indicators-sustainable accounting; Introduction to economic theories and economic approach to real world environmental problems; Environmental Kuznets's Curve; Economics of pollution control; Cost: Benefit analysis (15)

Unit- 2 Environmental Accounting and Auditing: Environmental accounting - objectives, financial accounting, social accounting (05)

Unit- 3 Depletion of natural resources, climate change impacts, degradation of environmental quality, solid and toxic wastes, best management practice and sustainable development, pollution charge, subsidy, deposit refund system and pollution permit trading system; national and international agreement; Methods of assessing Natural Capital in economic terms (15)

Unit- 4 Environmental goods, public goods, private goods, common property resources, economic valuation, concept of market, market failure, social costs, private costs, externalities (05)

Unit- 5 Risk analysis: Risk assessment and risk management; Economic issues of ABS (Access Benefit Sharing) as per Biodiversity Act 2002 (05)

Semester- VIII

Course Name: Tools & Techniques in Environmental Science
Course Code: BSCENVMJ 801

Course Type: **Core (Theoretical)**	Course Details:			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**10**	**-**	**40**

Content: Unit wise course content distribution

Theory

Unit 1: **Statistics**

Types of data: Primary and secondary; Methods of collection of environmental data; Mean, median, mode and variance of a given environmental data set; Frequency distribution; Measures of central tendency; Measures of dispersion; Correlation and Regression, Hypothesis testing, T-test, Chi-square test (15)

Unit 2: **Air quality Monitoring**

Ambient air quality monitoring; Measurement of suspended particulate matter (PM2.5, PM10), carbon monoxide; Oxides of nitrogen; Oxides of sulfur; Determination of RSPM in atmosphere (roadside and classroom) (10)

Unit 3: **Water quality monitoring**

Water quality parameters; Water sampling techniques; Principles and procedures for measurement of pH, conductivity, total solids, hardness, chloride, dissolved oxygen, combined CO_2, phosphate, nitrate, heavy metals (Atomic Absorption Spectrophotometry method); and Total coliform count (10)

Unit 4: **Meteorological parameters**

Light intensity, ambient temperature and relative humidity (05)

Unit 5: **Noise monitoring**

Monitoring of noise level in public area (campus and roadside) (05)

Unit 6: **Remote Sensing and GIS**

Basics of Remote Sensing and GIS; Use of remote sensing and GIS in resource survey and land use mapping (05)

Minor Paper

Semester- VIII
Course Name: Wildlife Conservation & Management
Course Code: BSCENVMN801

Course Type: **MNC-18 (Practical)**	Course Details:			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Learning Outcomes:
(After the completion of course, the students will have the ability to):
Course outcomes:
1. Understand basic ecological principles and fundamental concepts in wildlife conservation and management.
2. Understanding of cultural, historical, and current perspectives on the human- wildlife relationship to effectively address wildlife issues.
3. Knowledge on the primary international, national, and state agencies and scientific organizations, responsible for conservation and management of wildlife, and understand the role of private citizens in decision-making at all levels.
4. Understanding the wildlife conservation and management by critically evaluating information sources.
5. Know the threats to biodiversity in relation to protected areas and non- protected areas

Content: Unit wise course content distribution
Theory
Unit- 1 **Introduction:** Definition of wildlife; Indian wildlife; Threats to wildlife; Group living; Migration patterns; Predation behavior; Selfishness and altruism; Climate change and wildlife movement; Ecological services of wildlife; Ecotourism and wildlife; Habitat fragmentation and wildlife corridors (10)
Unit- 2 **Conflicts between man and wildlife:** Elephant-man conflict; Rhino-man conflict; River dolphin-man conflict; Tiger-man conflict; Leopard-man conflict; Conflict management and shifting from extraction to preservation; Response system between human-wildlife conflicts (08)
Unit- 3 **Wildlife heath monitoring:** Rescue measures for wounded animals; First aid for animal injuries; Animal health management; Population viability and habitat analysis (PVHA); Zoonotic disease management; National and International organizations involved in wildlife health management (10)
Unit- 4 **Conservation measures:** Man and Biosphere program (MAB); Issue of food and water scarcity; Captive breeding, relocation and rehabilitation of fauna, corridors for protected areas and significance of landscape management, buffer management , fire control, poaching and illegal activities
Wetland management: structure, function, food chains, food webs, threats and conservation; Eco restoration of wetland
Management of coastal and marine ecosystem: coral reefs, distribution, structure, function, threats and conservation (12)
Unit-5 **Laws in India:** Types of protected areas (Wildlife Sanctuaries, National Parks, Biosphere Reserves); IUCN categories of protected areas, Natural World Heritage sites; Concept of core and buffer area in a protected range; Brief introduction to Wildlife Protection Act of 1972; Forest Dwellers Act, 2006; Biodiversity Conservation Act, 2002); Wildlife trade and role of CITES (10)

NEP SYLLABUS
EDUCATION

National Curriculum and Credit Framework Syllabus

B.A. in Education

(Honours and Honours with Research)

w.e.f. Academic Session 2023-24

Kazi Nazrul University

Asansol, Paschim Bardhaman

West Bengal 713340

1st Semester

Course Name: **Introduction to Education**

Course Code: **BAEDCMJ101**

Course Type: MAJOR	**Course Details: MJC-1**			**L-T-P: 4-1-0**	
Credit: 5	**Full Marks: 100**	**CA Marks**		**ESE Marks**	
		Practical	**Theoretical**	**Practical**	**Theoretical**
			30		**70**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. understand the meaning, nature, scope, functions, aims and the role of education in emerging Indian society.
2. understand the types of Education.
3. understand the agencies of Education.
4. understand the factors of Education

Course Content: Theory

Unit -I: Concept of Education

- Education: Meaning, Definitions, Nature, Scope and Functions.
- Aims of Education: Individualistic and Socialistic Aims.
- Child Centric Education
- Role of Education: National Integration, International Understanding, Democracy and Empowerment.

Unit-II: Types of Education

- Formal, Informal and Non- formal Education.
- Liberal Education, Professional Education, Vocational Education, Technical Education.
- Face-to-face Education.
- Distance Education.

Unit- III: Agencies of Education

- Home and Family
- School
- Community
- Mass-media: Concept and importance in education in reference to modern Indian society.

Unit- IV: Factors of Education

- Learners: Influence of heredity and environment on the learner.
- Teachers: Qualities and Responsibilities.
- School: Vision and Functions.
- Curriculum: Concept and Types, Co-curricular activities: Meaning, Values and Significance.

Suggested Readings:

- Aggarwal, J. C. (2010). *Psychological Philosophical and Sociological Foundations of Education* (1st Edition). New Delhi: Shipra Publication.
- Aggarwal, J.C. (2010). *Theory and Principles of Education* (13th Edition). S Chand.
- Banerjee, A. *Philosophy and Principles of Education.*
- *Basics in Education*: NCERT
- Chaube, S.P., & Chaube, A. (2003). *Foundations of Education* (2nd Edition). Vikas Publishing House Pvt Ltd.
- Dash, B.N. (1994). *Foundation of Educational Thought and Practice*. Kalyani Publishers
- Gutek, G. L. (2009). *New Perspectives on Philosophy and Education*. Pearson.
- Kundu and Majumder -*Theories of Education.*
- Mukherjee, K. K. *Principles of Education.*
- Nayak, B. K. (2006). *Foundation of Education.* Kitab Mahal.
- Pahuja, N.P. (2007). *Theory and Principles of Education*. Anmol Publications Pvt.Ltd.
- Pathak, R. P. (2009). *Philosophical and Sociological Foundations of Education.* Kanishka Publishers.
- Pathak, R. P. (2012). *Philosophical and Sociological Principles of Education*. Pearson.
- Purkait, B.R. (2000). *Principles and Practices of Education.* New Central Book Agency.
- Samuel Ravi, S. *Philosophical and Sociological Bases of Education*. PHI Learning Pvt. Ltd.
- Sharma, S. N. (1995). *Philosophical and Sociological Foundations of Education*, Kanishka Publishers Distributors.
- Taneja, V.R. (2000). *Educational thought and practice*, Sterling Publishers Pvt. Limited.
- Wingo. G. Max. *Philosophies of Education*. Sterling Publishers.

- রায়, সুশীল - শশক্ষাতত্ত্ব ও শশক্ষাদশশন
- বন্দ্যাপাধ্যায়, অর্শনা - শশক্ষাদশশন ও শশক্ষানীশত
- ইসলাম, নূরুল - শশক্ষাতন্দত্ত্বর রূপন্দরখা
- হালদার, গ ৌরদাস ও শমশা, প্রশান্ত - শশক্ষাতত্ত্ব ও শশক্ষানীশত
- ধ্র, গদবাশশষ ও পাল, গদবাশশষ - শশক্ষার শিশি ও শবকাশ

Course Name: **Principles of Education**

Course Code: **BAEDCMN101**

Course Type: MINOR	**Course Details: MNC-1**			**L-T-P: 4-1-0**	
Credit: 5	**Full Marks: 100**	**CA Marks**		**ESE Marks**	
		Practical	**Theoretical**	**Practical**	**Theoretical**
			30		**70**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. understand the meaning, nature, scope, functions, aims and the role of education in emerging Indian society.
2. understand the types of Education.
3. understand the agencies of Education.
4. understand the factors of Education.

Course Content: Theory

Unit -I: Concept of Education

- Education: Meaning, Definitions, Nature, Scope and Functions.
- Aims of Education: Individualistic and Socialistic Aims.
- Child Centric Education.
- Role of Education: National Integration, International Understanding, Democracy and Empowerment.

Unit- II: Types of Education

- Formal, Informal and Non- formal Education.
- Liberal Education, Professional Education, Vocational Education, Technical Education.
- Face-to-face Education.
- Distance Education.

Unit- III: Agencies of Education

- Home and Family.
- School
- Community
- Mass-media: Concept and importance in education in reference to modern Indian society.

Unit- IV: Factors of Education

- Learners: Influence of heredity and environment on the learner.
- Teachers: Qualities and Responsibilities.
- School: Vision and Functions.
- Curriculum: Concept and Types, Co-curricular activities: Meaning, Values and Significance.

Suggested Readings:

- Aggarwal, J. C. (2010). *Psychological Philosophical and Sociological Foundations of Education* (1st Edition). New Delhi: Shipra Publication.
- Aggarwal, J.C. (2010). *Theory and Principles of Education* (13th Edition). S Chand.
- Banerjee, A. *Philosophy and principles of education*
- *Basics in Education*: NCERT
- Chaube, S.P., & Chaube, A. (2003). *Foundations of Education* (2nd Edition). Vikas Publishing House Pvt Ltd.
- Dash, B.N. (1994). *Foundation of Educational Thought and Practice*. Kalyani Publishers
- Gutek, G. L. (2009). *New Perspectives on Philosophy and Education*. Pearson.
- Kundu and Majumder -*Theories of Education.*
- Mukherjee, K. K. *Principles of Education.*
- Nayak, B. K. (2006). *Foundation of Education.* Kitab Mahal.
- Pahuja, N.P. (2007). *Theory and Principles of Education*. Anmol Publications Pvt. Ltd.
- Pathak, R. P. (2009). *Philosophical and Sociological Foundations of Education.* Kanishka Publishers.
- Pathak, R. P. (2012). *Philosophical and Sociological Principles of Education*. Pearson.
- Purkait, B.R. (2000). *Principles and Practices of Education*. New Central Book Agency.
- Samuel Ravi, S. *Philosophical and Sociological Bases of Education.* PHI Learning Pvt. Ltd.
- Sharma, S. N. (1995). *Philosophical and Sociological Foundations of Education.* Kanishka Publishers Distributors.
- Taneja, V.R. (2000). *Educational thought and practice*. Sterling Publishers Pvt. Limited.
- Wingo. G. Max. *Philosophies of Education.* Sterling Publishers.

- রায়, সুশীল - শশক্ষাতত্ত্ব ও শশক্ষাদশশন
- বন্দ্যাপাধ্যায়, অর্শনা - শশক্ষাদশশন ও শশক্ষানীশত
- ইসলাম, নূরুল - শশক্ষাতন্দত্ত্বর রূপন্দরখা
- হালদার, গ ৌরদাস ও শমশা, প্রশান্ত - শশক্ষাতত্ত্ব ও শশক্ষানীশত
- ধ্র, গদবাশশষ ও পাল, গদবাশশষ - শশক্ষার শিশি ও শবকাশ

Course Name: **Computer Application in Education**

Course Code: **BAEDCSE101**

Course Type: SEC	**Course Details: SEC-1**			**L-T-P: 2-1-0**	
Credit: 3	**Full Marks: 50**	**CA Marks**		**ESE Marks**	
		Practical	**Theoretical**	**Practical**	**Theoretical**
			15		**35**

Course Learning Outcomes:

After going through this course, the students will have ability to-

1. apply various computer applications in the field of education.
2. perform fundamental works in MS WORD.
3. perform fundamental works in MS EXCEL.
4. perform fundamental works in MS POWER POINT.
5. use internet for learning purpose.

Course Content: ***Theory***

Unit -I: Introduction to Computer and Internet in Education

- Computer and its role in education; Basic concept of Hardware and Software.
- Computer Network and Internet.
- E-mail, Search Engines, Safe Surfing Mode, E-learning Resources, Social networking

Unit-II: Basics of MS WORD

- Preparation of a word document.
- Designing a colourful merit certificate.
- Preparation of a reference list using APA format

Unit-III: Basics of MS EXCEL

- Calculating total and Average.
- Mark sheet preparation.
- Graphical representation of data: Pie-Chart & Bar-graph

Unit-IV: Basics of MS POWERPOINT

- Preparation of slides containing text matter, graphs, images, tables etc.
- Animation setting
- Slide designing and presentation

Suggested Readings:

- Jain, A. (2005). *Computer in Education.* Isha Books.
- Rajaraman, V., & Adabala, N. (2015). *Fundamentals of Computers* (6th Edition). PHI Learning Pvt. Ltd.

- পান্দে, প্রণয় - তথ্য ও গÐা ান্দÐা প্রÐুশির ধ্ারণা . রীতা বুক এন্দেশি
- মুখাে শী, অমল শঙ্কর ও গসাম, শম্ভু - শশক্ষণ শশখন্দন কশিউটার
- গসাম, শম্ভু - শশক্ষান্দক্ষন্দে কশিউটান্দরর প্রন্দয়া
- সামন্ত, অরুণাি - শশক্ষায় কশিউটান্দরর প্রন্দয়া

2nd Semester

Course Name: **Development of Indian Education**

Course Code: **BAEDCMJ151**

Course Type: MAJOR	Course Details: MJC-2			L-T-P: 4-1-0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		70

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. understand the aims and curriculum of education, method of teaching, system of evaluation in ancient and medieval period in India.
2. understand the education system of early British period in India.
3. understand different educational policies of India under British rule.
4. understand different educational policies of post-independent India

Course Content: Theory

Unit- I: Education in India during Ancient and Medieval Period

- Vedic Period: Aims, Curriculum, Method of Teaching, System of Evaluation.
- Brahmanic Period: Aims, Curriculum, Method of Teaching, System of Evaluation.
- Buddhist Period: Aims, Curriculum, Method of teaching, System of Evaluation.
- Islamic Period: Aims, Curriculum, Method of Teaching, Women Education.

Unit- II: Education in India during British Period (1800-1853)

- Sreerampore trio
- Charter Act (1813)
- Macaulay's Minute
- Adam's Report

Unit-III: Education in India during British Period (1854-1946)

- Wood's Despatch (1854)
- Hunter Commission
- Educational Contribution of Lord Curzon
- Calcutta University Commission

Unit- IV: Education in India after Independence

- Radhakrishnan Commission
- Mudaliar Commission
- Kothari Commission
- National Policy on Education (1968 & 1986), Programme of Action (POA) (1992), National Education Policy 2020.

Suggested Readings:

- Aggrawal, J.C.(2010). *Landmarks in the history of modern Indian education.* Vikash Publishing Pvt Ltd.
- Altekar, A. S. *Education in Ancient India.*
- Banerjee, J.P. (1994). *Education in India* Vol-I & II. Central Library.
- Banerjee, J.P. *Education in India-Past, Present and Future* Vol. I and II
- Das, K.K. (1993). *Development of Education in India*. Kalyani Publishers.
- Dash, B.N. (1911). *Development of Education in India*. Ajanta Prakashan.
- Mukherjee, S.N. *Education in India, Today and Tomorrow.*
- Naik, J.P., & Syed, N. (1974). *A student's history of education in India*. MacMillan.
- National Education Policy, 2020. MHRD. Govt. of India.
- National Policy on Education, 1968 & 1986.
- Purkait, B.R (1997). *Milestone in Modern Indian Education*. New Central Book Agency Pvt Ltd.
- Purkait, B.R. *Milestones of Modern Indian Education.*
- Rawat, P.L. (1989). *History of Indian Education.* Ram Prasad & Sons.
- Report of Commissions-Radhakrishnan, Mudaliar & Kothari
- S. P. Chaube & Chaube, A. *Education in Ancient and Medieval India.*

- িভিত্তা, িশিক্ষা ষন - িভারতীয় শশক্ষার রূপন্দরখা
- ইসলাম, নূরুল - িভারতীয় শশক্ষা ইশতহান্দসর রূপন্দরখা
- ঠাকু র, শদলীপ কুমার ও হক, গশখ হাশমদুল - শশক্ষার ইশতহাস প্রার্ীন, মধ্য ও আধ্ুশনক
- ঠাকু র, শদলীপ কুমার, হক, গশখ হাশমদুল ও গদবাশশষ পাল - সাম্প্রশতককালীন িভারতীয় শশক্ষার ধ্ারা
- ক্রুবতশী, অশনরুদ্ধ ও ইসলাম, মহ শনোইরুল - শশক্ষার ইশতহাস ও সাম্প্রশতক ঘটনাপ্রবাহ

Course Name: **Yoga Education**

Course Code: **BAEDCMN201**

Course Type: MINOR	**Course Details: MNC-2**			**L-T-P: 4-1-0**	
Credit: 5	**Full Marks: 100**	**CA Marks**		**ESE Marks**	
		Practical	**Theoretical**	**Practical**	**Theoretical**
			30		**70**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. acquaint with the concept of Yoga.
2. understand the historical underpinnings of Yoga.
3. understand Yoga as a means of personal and social upliftment.
4. understand various forms of Yoga.
5. understand eight limbs of Yoga.

Course Content: Theory

Unit- I: Introduction to Yoga

- Meaning and Concept
- Principles of Yoga
- History of Yoga Philosophy (in brief)
- General guideline for performing Yoga practices

Unit- II: Yoga and its relationship with individual and social Upliftment

- Yoga as a way to healthy and integrated living
- Yoga as a way to socio-moral upliftment
- Yoga as a way to spiritual enlightenment
- Yoga as a way to personality development

Unit- III: Types of Yoga

- Karma Yoga
- Bhakti Yoga
- Jnana Yoga
- Raja Yoga

Unit IV: Instrumentals of Yoga

- Yamas, Niyamas, Asanas
- Pranayam, Pratyahara, Dharana
- Dhyana and Samadhi
- Role of the Eight Limbs in contemporary Yoga Practice.

Suggested Readings:

- Bhaskarananda, S. (2001). *Meditation, Mind & Patanjali's Yoga: A Practical Guide to Spiritual Growth for everyone.*
- Chatterjee, T. (1970). *Sri Aurobindo's Integral Yoga*. Aurobindo Ashram, Pondicherry.
- Das, A., & Pandey, P. (2020). *Yoga Education: Self Understanding and Development*. Rita Publications.
- Duggal, S. (1985). *Teaching Yoga.* The Yoga Institute. Santacruz
- Ghorote, M.L. *Yoga Applied to Physical Education* Lonavala; Kaivalyadhama.
- Gore, M.M. (2007). *Anatomy and Physiology of Yogic Practices*. New Age Books. .
- Iyengar, B.K.S. (2009). *Astadal Yoga Mala*, (Vol. I-VIII). Allied Publishers Pvt. Ltd.
- Nagarathna, R., & Nagendra, H.R. (2003). *Integrated Approach of Yoga Therapy for Positive Health.* Swami Vivekananda Yoga Prakashana.
- Nagendra, H.R., & Nagarathna R. (1988). *New Perspectives in Stress Management.* V.K.Yogas, Bangalore.
- NCTE (2015). *Yoga Education diploma in Elementary Education*. New Delhi.
- Pal, T., Rath, S.K., & Roy S.C. (2014). *Yoga Education at a Glimpse.* Bridge Center.
- Prabhupada, S. (ed.). (2007). *Srimagbhat Gita As It Is*. Bhaktibedanto Book Trust.
- Radhakrishnan, S. (1993). *The Bhagavadgītā*, Harper Collins.
- Saraswati, Swami Satyananda (1969). *Asana Pranayama & Mudra Bandha*. Bihar School of Yoga, Munger.
- Satchidananda, S. (1990). *The Yoga Sutras of Patanjali*. Integral Yoga Publications. Yoga Ville, Virginia, USA.
- Satyananda, S. (1990). *Yoga Education for Children Saraswati.* Bihar Schools of Yoga,.Munger.
- Sri Aurobindo. (1999). *The Synthesis of Yoga.* Fifth edition, Sri Aurobindo Ashram Trust 1999.

- Taimni, I.K. *The Science of Yoga*. Theosophical Publishing House, Adyar, Madras.
- Udupa, K.N. *Stress and its Management by Yoga*. Motilal Banarsidass.
- Werner, K. (1998). *Yoga and Indian Philosophy* (1st Edition). Motilal Banarsidass Publishing House.
- White, D. G. (2011). *Yoga, Brief History of an Idea* (Chapter 1 of "Yoga in practice"), Princeton University Press.
- পাল, গদবাশশষ ও দাস, অশেত - গÐা শশক্ষাঃ আত্মন্দবাধ্ ও শবকাশ
- দাস, অশেত - গÐা শশক্ষা ও আত্মশবকাশ
- পাল, সুশেত, কশবরা, উদয় শঙ্কর ও পশিত, অশিশেৎ - গÐা শশক্ষাঃ আত্মউপলশি ও শবকাশ

Course Name: **Educational Philosophy**

Course Code: **BAEDCMD201**

Course Type: MD	**Course Details: MDC-2**			**L-T-P: 3-0-0**	
Credit: 3	**Full Marks: 50**	**CA Marks**		**ESE Marks**	
		Practical	**Theoretical**	**Practical**	**Theoretical**
			15		**35**

Course Learning Outcomes:

After going through this course, the students will have ability to:

1. understand the meaning and relationship of Education and Philosophy.
2. understand the concept of Indian philosophy.
3. understand the concept of western philosophy.
4. understand the contributions of great educators.

Course Content: Theory

Unit-I: Education and Philosophy

- Education: Meaning, Nature and Scope.
- Philosophy: Meaning, Definitions, Nature and Scope of Philosophy of Education.
- Relation between Education and Philosophy.
- Importance of philosophy in education.

Unit-II: Indian Schools of Philosophy

- Vedic school - Sankhya
- Vedic school - Yoga
- Non-vedic School - Buddhism
- Non-vedic School - Jainism

Unit-III: Western Schools of Philosophy

- Idealism
- Naturalism
- Pragmatism
- Realism

Unit- IV: Contributions of Great Educators

- Swami Vivekananda
- Rabindranath Tagore
- Rousseau
- Froebel

Suggested Readings:

- Aggarwal, J. C. (2010). *Psychological Philosophical and Sociological Foundations of Education* (1st Edition). Shipra Publication.
- Aggarwal, J.C., & Gupta, S. (2014). *Great Philosophers and Thinkers on Education*. Shipra Publication.
- Brubacher, R. S.(1955). *Modern Philosophies of Education*. Chicago: University Press.
- Chatterjee, S., & Datta, D. (1948). *An Introduction to Indian Philosophy* (3rd Edition). University Press.
- Dash, B.N. (1994). *Foundation of Educational Thought and Practice*. Kalyani Publishers
- Gupta, S. (2009). *Education in Emerging India*. Shipra Publications.
- Hiriyanna, M. *Outlines of Indian Philosophy*. Motilal Banarsidass Publishers Private Limited.
- Hospers. John (1988). *An Introduction to Philosophy Analysis*. Allied Publishers Private Limited.
- Kneller, G. F. V. (1971). *Introduction to Philosophy of Education.* John Witty & Sons.
- Nayak, B. K. (2006). *Foundation of Education.* Kitab Mahal.
- Ozman, H., & Craver, S. (2007). *Philosophical Foundations of Education* (8th Edition). New Jersey Prentice-Hall.
- Pahuja, N.P. (2007). *Theory and Principles of Education*. Anmol Publications Pvt.Ltd.
- Pandev. R. S. (1996). *An Introduction to major Philosophies of Education.* Vinod Pustak Mandir.
- Purkait, B.R. (2000). *Principles and Practices of Education*. New Central Book Agency.
- Samuel Ravi, S. *Philosophical and Sociological Bases of Education*. PHI Learning Pvt. Ltd.
- Sharma, C. (2009). *A Critical Survey of Indian Philosophy*. Motilal Baranasidass Publishers Private Limited.
- Sharma, R.N. *Social-Political Philosophy and Philosophy of religion*. Surjeet Publications.
- Sharma, S. N. (1995). *Philosophical and Sociological Foundations of Education.* Kanishka Publishers Distributors.
- Shrivastava, K.K. (2003). *Philosophical Foundations of Education.* Kanishka Publishers Distributors.

- পাল, অশিশেৎ কুমার - শশক্ষা দাশশন্দনর রূপন্দরখা
- হালদার, তাশরনী ও ক্রবতশী, প্রনব কুমার - শশক্ষার দাশশশনক ও সমাোতাশত্ত্বক শিশি
- দি, গববী ও গুহ, গদবীকা - শশক্ষাদশশন ও দাশশশনন্দকর অবদান
- পাি া, উজ্জল, ন্দটাপাধ্যায়, শমশহর ও গসন, স্বপন - শশক্ষার দাশশশনক ও সামাশেক শিশি
- পাল, গদবাশশষ ও ন্দটাপাধ্যায় , শমশহর - শশক্ষার দাশশশনক শিশি
- রায়, সুশীল -শশক্ষাতত্ব ও শশক্ষাদশশন
- চট্টোপাধ্যায়, শমশহর কুমার ও ক্রবতশী, কশবতা – কন্দয়কেন মহান শশক্ষাশবদ ও শশক্ষা সমাোতত্ত্বশবদ

Course Name: **Teaching and Learning**

Course Code: **BAEDCSE151**

Course Type: SEC	**Course Details: SEC-2**			**L-T-P: 2-1-0**	
Credit: 3	**Full Marks: 50**	**CA Marks**		**ESE Marks**	
		Practical	**Theoretical**	**Practical**	**Theoretical**
			15		**35**

Course Learning Outcomes:

After going through this course, the students will have ability to:

1. understand the meaning and nature of Teaching and Learning.
2. state the differences between teaching and learning.
3. Compare the traditional and constructivist teaching
4. know the Factors of Teaching and Learning.
5. know the Phases of Teaching and Learning.
6. understand the General Principles and Maxims of Teaching.
7. understand and explain the nature of classroom teaching and functions of a teacher.
8. know and understand the various influencing factors of teaching methods.
9. know about various teaching methods and their utilities in classroom teaching learning process.

Course Content: <u>Theory</u>

Unit- I: Teaching and Learning

- Teaching: Meaning and Nature of Teaching,
- Learning: Meaning and Nature of Learning.
- Differences between Teaching and Learning. Comparison between Traditional Teaching and Constructivist Teaching.

Unit- II: Factors of Teaching and Learning

- Factors of effective classroom teaching.
- Factors of Learning.
- Phases of Teaching: Pre-active, Inter-active and Post-active.

Unit-III: Classroom Teaching and Teacher

- General and Psychological Principles of Teaching. Maxims of Teaching.
- Functions of a teacher as a planner, as a facilitator, as a counsellor, as a researcher.
- 21st Century Skills and Teacher.

Unit-IV: Teaching Methods and Theories

- Demonstration, Story Telling, Lecture and Problem Solving.
- Capability Pedagogy –Amartya Sen
- Pedagogy of the Oppressed –Paulo Freire

Suggested Readings:

- Aggarwal J C (2014), *Essentials of Educational Technology* (3rd Edition). Vikash Publishing House.
- Borich, Gary D. (2011). *Effective Teaching Methods: Research-Based Practice.* Pearson India.
- Chauhan, S. S. (2007). *Advanced Educational Psychology* (7th Edition). Vikas Publishing House Pvt. Ltd.
- Freire, P. (2005). *Pedagogy of the Oppressed* (30th Edition). The Continuum International Publishing Group Inc.
- Gupta, M. (2007). *Intelligence Creativity and Education* (1st Edition). Khel Sahitya Kender.
- Hergenhahn (1996). *Introduction to Theories of Learning*. Pearson Higher Education.
- Hergenhahn, B. R., and Olson, Matthew H. (2013). *An Introduction to Theories of Learning* (9th Edition). Prentice Hall.
- Hilgard, E. O. (1976). *Theories of Learning* (4th Edition). Appleton Century.
- Hilgard, E.R. & Bower, S.H. (1975). *Theories of Learning.* Cliffs: Prentice Hall.
- Hurlock, E.B. (1981). *Developmental Psychology: A Life Span Approach.* New York: Tata McGraw Hill.
- Johonnot, James (2010). *Principles and Practices of Teaching.* Mitchell Press.
- Kakkar, S. B. (2009). *Educational Psychology* (1st Edition). PHI Learning Private Limited.
- Mangal, S. K., & Mangal, U. (2009). *Essentials of Educational Technology*, PHI Learning Pvt. Ltd.
- Mangal, S. K. (2009). *Essentials of Educational Psychology* (1st Edition). PHI Learning Private Limited.
- Mangal, S. K. (2010). *Advanced Educational Psychology* (2nd Edition). PHI Learning Private Limited.

- Mangal, S.K., & Mangal, S. (2019). *Learning and Teaching*. PHI Learning Private Limited.
- Misra, G., Jha, A., & Woolfolk, A. (2012). *Fundamentals of Educational Psychology* (11th Edition). Pearson India.
- Mohanty, J. (2001). *Educational Technology*. Deep & Deep publication.
- Nag, S., Nag, S., & Pandey, P. (2020). *Learning and Teaching* (1st Edition). Rita Publications.
- Nayak, A. K. (2004). *Classroom Teaching: Methods and Practices* (01 Edition). APH. Publishing Corporation.
- Ram, S. (1998). *Modern Teaching Methods*. Sarup Book Publishers (P) Ltd.
- Santrock, John W. (2011). *Educational Psychology* (4th Edition). Mcgraw Hill Education.
- Sen, A (1985). *Commodities and Capabilities*. Oxford University Press India.
- Sharma, S.K., & Tomar, M. (2006). *Learning and Teaching: Learning Process*. Isha Books.
- Shukla, Chhaya (2003). *Principles of Teaching in Elementary Schools*. Mohit Publications.
- Sindhu, I. S. (2012). *Educational Psychology*. Pearson India.

- অশধ্কারী, এস. (২০১৫)- শশক্ষায় মন্দনাশবদযা. ক্লাশসক বই
- গহান্দসন, এম.এস.- শশক্ষার আন্দলান্দক মন্দনাবিজ্ঞান. িুকসবিবনক
- সরকার, শবেন - শশখন ও শশক্ষণ
- পাল, গদবাশীষ, গবন্দহরা, সন্দন্তাষ কুমার ও পান্দে, প্রণয়- শশক্ষায় প্রযুশিশবদযা রীতা পাবশলন্দকশন.
- বিট্োরো, সট্তোষ কুমোর ও আনসোরী, মোজোর শোমসী (২০২১-২০২২). বেডোগবজ (প্রথম প্রকোশ). এডু বিল্ড.

NEP SYLLABUS
POLITICAL SCIENCE

B.A. in Political Science Syllabus under NCCF 2020
3 Year UG Degree in Political Science
4 Year UG Degree (Honours) in Political Science
4 Year UG Degree (Honours with Research) in Political Science

Semester- I
Course Name: Political Theory-1
Course Code: BAPLSMJ101

Course Type: MAJOR	**Course Details: MJC-1**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To gather in-depth knowledge on different approaches to Political theory.
2. To understand the nature of the state through theories.
3. To understand democracy.
4. To understand some concepts.

Course Content: Unit-wise course content distribution -

Unit -1: What is Politics-Approaches to the study of politics: Normative and Empirical, Behavioral & post-Behavioral.
Unit-2: Concept of State: Social contract Theory. (Hobbes, Locke, Rousseau)
Unit-3: Nature of State: Idealist, Liberal and Neo-liberal Theories.
Unit-4: Sovereignty: Monistic and Pluralistic Theories.
Unit-5: Democracy: Basic Concepts and Classifications.
Unit-6: Liberty, Equality, and Rights: Concepts and its interrelations.
Unit-7: Justice: Theory of Rawls and Robert Nozick.

Course Learning Outcomes:

1. Students will be able to learn key concept sand various approaches to understand politics.

2. They will come to know about the nature of various types of states and theories.

3. Students will come to know how liberal tradition looks at and understand politics.

4. They will earn the concept of state Sovereignty and learn also various theories of sovereignty, theory of justice etc.

Suggested Readings

1. R. Bharagava and A.Acharyaeds. *Political Theory*(Delhi:Longman,2008).

2. O.P.Guaba .*Introduction toPolitical Theory*.(New Delhi:Macmillan,2011).

3. J.C.Johari. *Contemporary Political Theory*.(New Delhi:AdventBooks).

4. S.Ramaswamy. *Political Theory:Ideasa nd Concept.(*NewDelhi:Macmillan).

5. A.Roy and M.Bhattacharya. *PoliticalTheory: Ideas and Institutions*.(Kolkata: WorldPress.

6. S.P.Verma. *Modern Political Theory*.(NewDelhi: Vikash).

7. D.C.Bhattacharyya. *Political Theory*.(Kolkata:VijoyaPublishingHouse).

8. David Held, Models of Democracy (Stanford University Press, 1996).

9. G. Sabine, History of Political Theory

10. Amal Kr. Mukhopadhyay, *Western Political Thought* (Kolkata: K.P. Bagchi and Company, 1980). (in Bengali and English)

Semester-I
Course Name: Political Theory-1
Course Code: BAPLSMN101

Course Type: MINOR	**Course Details: MNC-1**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To gathering-depth knowledge on different approaches to Political theory.
2. To understand the nature of the state through theories.
3. To understand democracy.
4. To understand some concepts.

Course Content: Unit-wise course content distribution -

Unit -1: What is Politics-Approaches to the study of politics: Normative and Empirical, Behavioral & post-Behavioral.

Unit-2: Concept of State: Social contract Theory. (Hobbes, Lock, Rousseau)
Unit-3: Nature of State: Idealist, Liberal and Neo-liberal Theories.
Unit-4: Sovereignty: Monistic and Pluralistic Theories.
Unit-5: Democracy: Basic Concepts and Classifications.
Unit-6: Liberty, Equality, and Rights: Concepts and their interrelations.
Unit-7: Justice: Theory of Rawls and Robert Nozick.

Course Learning Outcomes:

1. Students will be able to learn key concepts and various approaches to understand politics.

2. They will come to know about the nature of various type of state sand theories.

3. Students will come to know how liberal tradition looks at and understand politics.

4. They will learn the concept of States Sovereignty and learn also various theories of sovereignty, theory of justice etc.

Suggested Readings

1. R.Bharagava and A.Acharyaeds .*Political Theory*(Delhi:Longman,2008).

2. O.P.Guaba. *Introduction toPolitical Theory*.(New Delhi:Macmillan,2011).

3. J.C.Johari. *Contemporary Political Theory*.(New Delhi:AdventBooks).

4. S.Ramaswamy.*Political Theory:IdeasandConcept.(*NewDelhi:Macmillan).

5. A.RoyandM.Bhattacharya.*Political Theory: Ideas and Institutions*.(Kolkata: WorldPress.

6. S.P.Verma.*Modern Political Theory*.(NewDelhi: Vikash).

7. D.C.Bhattacharyya. *Political Theory*.(Kolkata:VijoyaPublishingHouse).

8. David Held, Models of Democracy (Stanford University Press, 1996).

9. G. Sabine, History of Political Theory

10. Amal Kr. Mukhopadhyay, *Western Political Thought* (Kolkata: K.P. Bagchi and Company, 1980). (in Bengali and English)

Semester-I
Course Name: Human Rights
Course Code: MDC-103

Course Type: MD	Course Details: MDC-1			L-T-P: 2 - 1- 0	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. The aim of the course is to prepare the students aware of the different strands in the debates on human rights and its evolution through historical and contemporary times. The course aims at providing students with conceptual tools to understand what the different generations of rights are; and the new concerns that have emerged in the recent past.

2. It will make students aware of the institutionalization of the human rights and will provide knowledge on the constitutional frameworks of human rights in India. It further intends to develop the analytical skills of students to reflect on the issues of Terrorism, Counter terrorism and human rights in developing countries.

3. The objective is to enable students to gain knowledge about state responses to the issues withspecial reference to the National Human Rights Commission and give them an idea about the Human Rights and its role in the countering the Terrorism

Course Content: Unit-wise course content distribution -

Unit1: Concepts of Human Rights, Meaning, Nature and Scope-Evolution of human rights.
Unit 2: Indian Constitution and protection of human rights.
Unit 3: National Human Rights Commission-Composition, functions, and role.
Unit4: Human Rights – Terrorism and Counter–terrorism

Course Learning Outcomes

1. The course will equip students with an understanding of debates on human rights through a study of human rights concerns in India.

2. Keeping India as a common case study in all thematic analyses will familiarize students with the historical evolution of human rights and the theoretical frameworks and core themes that inform the debates on human rights.

3. The course will enhance the student's understanding of state response to issues and human rights questions pertaining to structural violence, such as terrorism and counter-terrorism, and rights of Adibasi from the human rights perspective.

Suggested Readings

1. Baxi,Upendra, *The Future of Human Rights*(New Delhi: Oxford)

2. Donnely, Jack, Universal Human Rights in Theory and Practice (Cornel University Press).

3. Clapham, Andrew, *Human Rights: A very short introduction* (Oxford University Press)

4. Narayan,S,*Human Rights Dynamics in India* (Kalpaz Publications).

5. Nickel, James, W.,*Making Sense of Human Rights***,** Wiley Blackwell**.**

6. Das, Jayanta Kumar, *Human Rights Law and Practice,* PHI Learning, New Delhi

Semester-I
Course Name: Democratic Awareness with Legal Literacy
Course Code: BAPLSSE101

Course Type: SE	**Course Details: SEC-1**			**L-T-P: 2 - 1 - 0**	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. To understand the fundamental rights and duties and other constitutional rights of citizens of India.
2. To understand anti-terrorist laws, the dowry system , sexual harassment and violence against women.
3. To understand the role of the judiciary in the protection of women.

Course Content: Unit-wise course content distribution -

Unit 1: Constitution - Fundamental Rights, Fundamental Duties, Other Constitutional Rights.
Unit 2: Laws relating to dowry, sexual harassment and violence against women–National Commission for women.
Unit 3: Laws relating to consumer rights and Consumers' Protection Act 1986 and Cyber crimes.
Unit 4: Right to Information Act, 2005 & Right to Free and Compulsory Education Act 2009.

Learning Outcomes

1. This course will be helpful to understand the fundamental rights and duties and other constitutional rights of citizens of India.
2. This course will be helpful to understand anti-terrorist laws, dowry system, sexual harassment and violence against women.
3. The students will be able to understand the role of the judiciary in protection of women.

Suggested Readings

1. Basu, D. D, *Introduction to the Constitution of India* (Nagpur: Lexis Nexis)

2. Kashyap, S. *Our Constitution* (New Delhi: National Book Trust)

3. Gender Study Group, (1996*) Sexual Harassment in Delhi University*, A Report, Delhi: University of Delhi.

4. C. Kumar and K. Chockalingam (eds) *Human Rights, Justice, and Constitutional Empowerment*, Delhi: Oxford University Press.

5. J. Kothari,(2005)'Criminal Law on Domestic Violence',*Economic and Political Weekly*, Vol.40(46),pp.4843-4849.

SEMESTER-II
Course Name: Political Theory-II
Course Code: BAPLSMJ201

Course Type: MAJOR	**Course Details: MJC-2**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives
1. To understand the theoretical base of Marxism.
2. To understand various concepts of Marxism.
3. To understand some important debates of Marxism.

Course Content: Unit wise course content distribution -
Unit-1: Marxist approach to the study of Politics: Dialectical Materialism, Historical Materialism and, Class and Class Struggle.
Unit-2: The question of relative autonomy of the State -Ralph Miliband and Nicos Poulantzas
Unit-3: Gramsci's concept of hegemony.
Unit-4: Theory of Revolution: Lenin and Mao.
Unit-5: Marxian theory of Party: Lenin's contribution; Lenin-Rosa Luxemburg Debate on Party.

Course Learning Outcomes
1. Comprehending one of the major developments of the nineteenth and twentieth century period, when the Socialist tradition, known to the wider world as Marxism, appeared as one of the prominent alternative discourses opposed to the Liberal school of thought.

2. Assessing the importance of the progress of mankind from the historical perspective of class phenomenon and its related notion of economic progression.

3. Grasping the key concepts of Marxism such as dialectic, labour, theory of surplus-value, alienation, revolution, the working class, the idea of party and communism.

Suggested Readings

1. David McLellan, *Marxism After Marx*,4th Edition(Palgrave Macmillan).

2. PaulLe Blanc, *From Marx to Gramsci:A Reader in revolutionary MarxistPolitics*(Haymet Books).

3. T.Bottomore, *A Dictionary of Marxist Thought* (Oxford: Blackwell).

4. O.P.Gauba, *Introduction to Political Theory* (New Delhi: Macmillan,2011).

5. J.C.Johari, *Contemporary Political Theory* (New Delhi: Advent Books).

6. S.Ramaswamy, *Political Theory: Ideas and Concept* (New Delhi: Macmillan).

7. B.D.Mahajan, *Political Theory: Principles of Political Science*(New Delhi: S. Chand).

8. H. Abbas andR. Kumar, *Political Theory*(Delhi: Pearson).

9. Hoffman, J andGraham, P., *Introduction to Political Ideologies* (Noida: Pearson).

10. Ralph Miliband, *Marxism and Politics* (OUP, 1977)

11. Nicos Poulantzas, *Political Power and Social Classes* (Verso, 1978).

12. John James Pipoly, *Western Marxism- A Critical Reader* (Canada: Knopf Doubleday Publishing Group)

SEMESTER-II
Course Name: Political Theory-II
Course Code: BAPLSMN201

Course Type: MINOR	**Course Details: MNC-2**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–	30	–	70

Course Objectives

4. To understand the theoretical base of Marxism.

5. To understand various concepts of Marxism.

6. To understand some important debates of Marxism.

Course Content: Unit-wise course content distribution -

Unit-1: Marxist approach to the study of Politics: Dialectical Materialism, Historical Materialism, and Class and Class Struggle.

Unit-2: The question of the relative autonomy of the State -Ralph Miliband and Nicos Poulantzas

Unit-3: Gramsci's concept of hegemony.

Unit-4: Theory of Revolution: Lenin and Mao.

Unit-5: Marxian theory of Party: Lenin's contribution; Lenin-Rosa Luxemburg Debate on Party.

Course Learning Outcomes

4. Comprehending one of the major developments of the nineteenth and twentieth century period, when the Socialist tradition, known to the wider world as Marxism, appeared as one of the prominent alternative discourses opposed to the Liberal school of thought.

5. Assessing the importance of the progress of mankind from the historical perspective of class phenomenon and its related notion of economic progression.

6. Grasping the key concepts of Marxism such as dialectic, labour, theory of surplus-value, alienation, revolution, the working class, the idea of party and communism

Suggested Readings

1. David McLellan, *Marxism After Marx*,4th Edition (Palgrave Macmillan).

2. Paul Le Blanc, *From Marx to Gramsci:A Reader in revolutionary Marxist Politics*(Haymet Books).

3. T. Bottomore, *A Dictionary of Marxist Thought* (Oxford: Blackwell).

4. O. P. Gauba, *Introduction to Political Theory* (New Delhi: Macmillan,2011).

5. J. C. Johari, *Contemporary Political Theory* (New Delhi: Advent Books).

6. S. Ramaswamy, *Political Theory: Ideas and Concept* (NewDelhi: Macmillan).

7. B.D. Mahajan ,*Political Theory: Principles of Political Science* (New Delhi: S. Chand).

8. H. Abbas and R. Kumar, Political *Theory*(Delhi: Pearson).

9. Hoffman, J and Graham, P.,*Introduction to Political Ideologies* (Noida:Pearson).

10. Ralph Miliband, *Marxism and Politics* (OUP, 1977)

11. Nicos Poulantzas, *Political Power and Social Classes* (Verso, 1978).

12. John James Pipoly, *Western Marxism- A Critical Reader* (Canada: Knopf Doubleday Publishing Group

Semester – II
Course Name: Women Empowerment in India: Issues and Dimensions
Course Code: MDC219

Course Type: MD	**Course Details: MDC-2**			**L-T-P: 2 - 1- 0**	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. This course engages with contemporary representations of women feminities, gender-parity and power. The course aims to help students to develop a robust understanding of how discourses of gender underlie and shape our very lives, experiences, emotions and choices. The course exposes students to a broad range of political, historical periods and contexts, so that they are able to examine the socially-constructed nature of gendered and gendering process.
2. To understand women's rights in India.
3. To understand the Gender-based participation in politics.

Content: Unit wise course content distribution

Theory

Unit – 1: Conceptual Definition: Women and Women empowerment - Sex and Gender – Patriarchy

Unit – 2: Women and caste, religion, Women and environment, development; Women and access to resources: employment, health, education - Public sphere participation of women in politics

Unit – 3: The women's questions in pre-Independence era - sati-reform, widow remarriage; post-Independence campaign against sexual harassment, dowry, violence; debates around the Uniform Civil Code,

Unit – 4: Women, the Law and the State: Constitutional remedies and rights against gender-based violence; The history of constitutional protections for women (Hindu Code Bill, right to property, personal laws).

Learning Outcomes

The course will help students

1. Read, understand and examine closely narratives that seek to represent women, femininities and, by extension, gendering itself;
2. Understand how gender norms intersect with other norms, such as those of caste, race, religion and community to create further specific forms of privilege and oppression;
3. Identify how gendered practices influence and shape knowledge production and circulation of such knowledges, including legal, sociological, and scientific discourses;
4. Students will be able to understand the Gender-based participation in politics by this course.
5. They will be able to understand conceptual differences between women and trans gender.
6. This course will be beneficial for the students to understand Gender identity.
7. Student will also learn how patriarchy operates as a power structure in our society.

Suggested Readings:

1. Baby Kamble, 'Our Wretched Lives', Women Writing in India: 600 BC to the early twentieth century, eds Susie Tharu and K Lalitha (Delhi: OUP, 1997) pp. 307-11.
2. Rassundari Devi, From Amar Jiban, in Women Writing in India: 600 BC to the early twentieth century, eds Susie Tharu and K Lalitha (Delhi: OUP, 1997) pp. 190-202.
3. V Geetha, Patriarchy, Theorizing Gender Series (Kolkata: Stree, 2007) pp. 3-61.
4. Mary John, 'Feminism Poverty and the Emergent Social Order', in Handbook of Gender, ed. Raka Ray (Delhi: Oxford University Press, 2012).
5. Leela Kasturi, 'Report of the Sub-Committee Women's Role in Planned Economy National Planning Committee (1947), in Feminism in India, ed. Maitrayee Chaudhuri (Delhi: Zed, 2005) pp. 136-55.
6. Vandana Shiva, Staying Alive: Women Ecology and Development, Chapters 2&4
7. Kumkum Sangari, 'Politics of Diversity: Religious Communities and Multiple Patriarchies, Economic and Political Weekly 3052 (1995).
8. Urmila Pawar and Meenakshi Moon, We also made history: Women in the Ambedkarite Movement, (Delhi: Zubaan, 2008).
9. Janaki Nair, 'The Foundations of Modern Legal Structures in India', in Handbook of Gender, ed Raka Ray (Delhi: OUP, 2012).

Semester- II
Course Name: Indian Constitutional Development
Course Code: BAPLSSE201

Course Type: SEC	Course Details: SEC-2			L-T-P: 2 - 1- 0	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. To understand the constitutional development from the British period
2. To understand how the different Acts were incorporated and played a key role in the making of our Constitution.

Course Content: Unit-wise course content distribution -

Unit1: Brief history of Indian Constitutional Development since 1858-1909.
Unit2: Government of India Act 1919 or Montague Chelmsford Reforms 1919: Main Provisions (in details) and Dyarchy.
Unit 3: Simon Commission.
Unit4: Nehru Report.
Unit5: Government of India Act of 1935: Main Provisions (in detail), Provisional Autonomy and Federal System.
Unit6: Cripp's Mission Plan.
Unit 7: Cabinet Mission Plan
Unit 8: Indian Independence Act of 1947: Main Provisions.

Learning Outcomes

1. Students will be able to understand the brief history regarding our constitutional development.
2. This course will be helpful to understand how the British period broadened the path for our Constitutional Development.

Suggested Readings

1. Sharma, L.P, *Indian National Movement and Constitutional Development* (Agra: Lakshmi Narain Agarwal,1996)
2. Agarwal, R.C. and M. Bhatnagar, *Constitutional Development and National Movement of India* (New Delhi : S. Chand and Company Ltd, 2005)
3. Singh,K.D, *Modern Indian History and Constitutional Development.* (K.D Sikhsha Sansthaan Pvt. Ltd., 2019).
4. Gupta, D.C, *Indian National Movement and Constitutional Development.* (Delhi: Vikas Publishing House Pvt.Ltd, 1973).
5. Bhagwan and Vishnoo, *Constitutional History of India and National Movement* (The University of California : Atma Ram ,1973).

Semester- III

Course Name: Western Political Thought – I

Course Code: BAPLSMJ301

Course Type: MAJOR	**Course Details: MJC-3**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. The purpose of this module is to introduce to the students some classical political thinkers from the West who shaped the ideas and key concepts of political Science in the Anglo-American tradition.
2. Developing a 'just society' and a 'just state' has been a perennial question for all civilizations. But the answers are not alike. They are different across civilizations and times.
3. This course examines the ideas of some of the prominent classical political thinkers beginning from Plato, whose response to political questions vividly influenced political thinking. The seeds of the conceptual themes which seem to be so enriched today also found expressions in older times with different accentuation and nodes.
4. The course seeks to the trace that ideas and tradition and examine them critically.

Course Content: Unit-wise course content distribution

Theory

Unit – 1: Background of Western Political Thought: A brief outline with special emphasis on Stoics and Sophists.

Unit – 2: Greek Political Thoughts:

A] Plato: Theory of Ideal State and Justice

B] Aristotle: concepts of state and constitution.

Unit – 3: Roman Political Thought: Law and Jurisprudence Medieval Political Thought in Europe: Features.

Unit – 4: Post Medieval Political Thought in Europe: Niccole Machiavelli – Secularization of politics and statecraft.

Unit – 5: Jean Badin: Theories of state and sovereignty.

Learning Outcomes

1. The students will know the key ideas of all the political philosophers given in the course.

2. They will be able to explain what was the justice according to Plato

3. They will be able to answer how Aristotle explain the concept of state and constitution.

4. They will be able to answer how and why Machiavelli gave an overriding priority to pragmatism above ethics and values in operation of statecraft.

5. They will be able to answer how Bodin define state.

Semester-III

Course Name: Comparative Politics

Course Code: BAPLSMJ302

Course Type: MAJOR	**Course Details: MJC-4**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Objectives of the Course

1. To understand the difference between the Comparative Politics and Comparative Government.
2. To understand nature, scope, and approaches of Comparative Politics.
3. To understand relevant theories of Comparative Politics.
4. To understand Comparative Political System.

Content: Unit wise course content distribution

Theory

Unit – 1: Distinction between Comparative Politics and Comparative Government-Development of Comparative Politics.

Unit – 2: Scope, Purpose and method of Comparison-Approaches to the study of Comparative Politics.

Unit – 3: Theories of Political System. Easton, Almond and Powell.

Unit – 4: Theories of Political Modernization and Political Development: Pye and Huntington.

Unit – 5: Dependency Theory: Andre Gunder Frank.

Unit – 6: Constitutionalism: Evolution of the Idea of Constitutionalism, Post-colonial Constitutionalism and Rule of Law

Unit – 7: Electoral System: Definition and procedures: Types of electoral systems (First Past the Post, Proportional Representation, Mixed Representation

Course Learning Outcomes:

1. Students will be able to Learn key concepts of Comparative politics and Comparative Governments, distinction between them and development of Comparative politics.
2. They will come to know the purpose, Scope and methods of comparison and different approaches to the study of Comparative politics.
3. Students will come to know different theories of Political System.
4. They will learn the concept of Political Modernization and Political Development.
5. They will come to understand Dependency Theory.
6. Students will understand the different types of electoral system.

Suggested Readings

1. Almond, G and others Eds. *Comparative Politics Today: A World View (New Delhi :Pierson).*

2. Rakhahari Chatterjee. *Introduction to Comparative Political analysis. (*Kolkata:Sarat).

3. S.P.Verma. *Modern Political Theory.* (New Delhi: Vikash).

4. S.N.Roy. *Modern Comparative Politics*. (Delhi: PHI Learning).

5. S.Mukherjee and S. Ramaswamy.*Theoretical Foundations of Comparative Politics*.(Hyderabad: Orient Black Swan).

6. A. Heywood (2002) 'Representation, Electoral and Voting', in *Politics*. New York: Palgrave Macmillan, pp. 223-245.

7. Downs, W. M. (2011) 'Electoral Systems in Comparative Perspectives', in Ishiyama, J. T. and Breuning, M. (eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 159-167.

8. A. Evans (2009) 'Elections Systems', in J. Bara and M. Pennington (eds.) *Comparative politics*, New Delhi: Sage, pp. 93-119.
9. C. Mcllwain (1940 [2007]), *Constitutionalism: Ancient and Modern*, Cornell University Press.
10. U. Baxi (2000) 'Postcolonial Legality', in Henry and Sangeeta Ray eds., *A Companion to Postcolonial Studies*, Blackwell, pp.540-555.

Semester-III

Course Name: Comparative Government and Politics

Course Code: BAPLSMN301

Course Type: MINOR	**Course Details: MNC-3**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the development of Comparative Politics.
2. To understand scope and purposes of Comparative Politics.
3. To understand typologies of Comparative Politics.
4. To understand comparative analysis of legislature, executive, and judiciary.
5. To understand the manner in which power exists in society
6. Analytical capacity to engage with contemporary debates on welfare, populism, and authoritarianism.

Content: Unit wise course content distribution

Theory

Unit - 1: Distinction between Comparative Politics and Comparative Government: Development of Comparative Politics.
Unit - 2: Comparative Politics: Nature, Scope, Purposes, and Methods of Comparison.
Unit - 3: Theories of Political Systems: Easton, Almond and Powell.
Unit - 4: Typology of Constitutional Systems: Unitary and Federal, Parliamentary and Presidential
Unit - 5: Executive, Legislature and Judiciary: UK, USA and PRC.
Unit - 6: Political Parties and Pressure Groups: UK and USA.

Learning Outcome

1. Students will be able to understand the development of Comparative Politics.
2. They will understand scope and purposes of Comparative Politics.
3. Students will gather typologies of Comparative Politics.

4. Students will acquire knowledge on comparative analysis of legislature, executive, and judiciary.
5. Analytical capacity to engage with contemporary debates on welfare, populism, and authoritarianism.

Suggested Readings

1. Almond, G and Others(eds.), *Comparative Politics Today: A World View* (New Delhi: Pearson).
2. Rakhahari Chatterjee, *Introduction to Comparative Political Analysis* (Sarat Book House: Kolkata).
3. S.N. Ray, *Modern Comparative Politics* (Delhi: PHI Learning).
4. Rod Hague, Martin Harrop and Shaun Breslin, *Comparative Government and Politics: An Introduction* (London: Macmillan).
5. S. Mukherjee and S. Ramaswamy, *Theoretical Foundations of Comparative Politics* (Hyderabad: Black Swan).
6. J.C. Johari, *Comparative Politics* (New Delhi: Sterling).
7. J.C. Johari, *Major Modern Political Systems* (New Delhi: Sterling).
8. A.K Kapur and K.K. Mishra, *Select Constitutions* (New Delhi: S. Chand).
9. Lindstaedt N. (2020) Authoritarian Regimes, in D. Caramani (ed.), Comparative Politics, Oxford University Press, Ch 6. Pp.103-115
10. Busch, Andreas (2015), The Changing Architecture of the National Security State', in Stephan Leibfried, Evelyn Huber, Mattew Large, Jonah D. Levy and John D. Stephens (eds.), *The Oxford Handbook of Transformations of State*, Oxford, Oxford University Press.
11. Webb, E. (2011) 'Totalitarianism and Authoritarianism', in Ishiyama, J. T. and Breuning, M.(eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 249-257.
12. Mudde Cas and Kaltwasser Cristóbal Rovira (2017), What is Populism (Ch 1), Populism around the world (Ch 2) in *Populism: A Very Short Introduction*, OUP
13. Garland, David (2016) Ch 1, Ch 6, Ch 7, in *The Welfare State: A Very Short Introduction*, OUP.

Semester - III
Course Name: Indian Polity and Economy
Course Code: MDC307

Course Type: MD	**Course Details: MDC-3**			**L-T-P: 2 - 1 - 0**	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. This course introduces to the students the significant linkages that exist between politics and economics in the domain of Indian economy and polity by apprising them about the meaning, nature and conceptual foundations of the field of Indian Political Economy.
2. Students will learn about the traditional as well as critical theoretical frameworks employed to examine the nature and functioning of Indian political economy. These theories include economic nationalism, liberalism and structuralism.

Unit – 1: Introduction: Understanding the intersectionality between politics and economy; The nature of state in India

Unit – 2: Theoretical Perspectives. Economic Nationalism, Liberalism and Structuralism

Unit – 3: Planning and Economic Development: Nehruvian and Gandhian perspectives; Role of planning and public sector; Green Revolution, land reforms and agrarian relations;

Unit – 4: Liberalization and economic reforms, Political and social constraints on Indian development.

Learning Outcomes

1. Develop a basic understanding of the structural functional linkages that connect the realms of politics and economics.

2. Learn to use the conceptual tools and theoretical frameworks for understanding the nature and basic functioning of the Indian political economy.
3. Understand the structural drivers that determine the contours of Indian political economy.
4. Students will expose to land reforms and agrarian relations.
5. Students will expose to the nature of state in India i.e. developmental, welfare and regulatory.

Semester- IV

Course Name: Western Political Thought - II

Course Code: BAPLSMJ401

<table>
<tr><td colspan="2">Course Type: MAJOR</td><td colspan="2">Course Details: MJC-5</td><td colspan="2">L-T-P: 4 - 1 - 0</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>–</td><td>30</td><td>–</td><td>70</td></tr>
</table>

Course Objectives

1. The main objective of this course is to introduce to the students some modern political thinkers from the West who shaped the ideas and key concepts of Political Science in Anglo American tradition.

2. This course examines the ideas of some of the prominent modern thinkers beginning from Thomas Hobbes to Karl Marx whose response to political questions vividly influenced political thinking. The course seeks to the trace that ideas and tradition and examine them critically.

Content: Unit wise course content distribution

Theory

Unit 1: Thomas Hobbes: Materialism, Human nature, State of nature and State & Sovereignty.
Unit 2: John Locke: Natural rights, and Property; & J.J. Rousseau: Concept of General Will.
Unit 3: Hegel: Dialectics and State.
Unit 4: Karl Marx and Frederick Engels: Dialectical, Historical Materialism and Revolution.
Unit 5: Jeremy Bentham: Utilitarianism; & J.S. Mill: Utilitarianism and Liberalism.

Course Learning Outcomes

1. The students will know the ideas of all the political philosophers given in the course.

2. Students will be able to make a distinction among Hobbes, Locke and Rousseau on the stat of nature, law of nature, nature and from of contract and emergence of state from the contract.

3. Students will be able to understand the theory of dialectical and historical materialism of Marx and Engels.

4. Students will be able to understand the meaning of utilitarianism and how Bentham and Mill differ from each other.

Suggested Readings

1. G.H. Sabine, *A History of Political Theory* , (USA: Wadsworth Publishing Co. Inc,)

2. S. Mukherjee and S. Ramaswamy, *A History of Political Thought* (New Delhi: PHI)

3. Shefali Jha, *Western Political Thought* (Delhi: Pearson)

4. C.B. Macpherson, *Political Theory of progressive individualism: from Hobbes to Locke,* (Canada: Oxford)

5. Amal Kr. Mukhopadhyay, *Western Political Thought* [in Bengali]

6. Shobhanlal Dattagupta, *Marxist Thought* [in Bengali]

Semester – IV
Course Name: Indian Government and Politics
Course Code: BAPLSMJ402

Course Type: MAJOR	**Course Details: MJC-6**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. The main purpose of the course is to familiarize the student with the key elements of Indian constitution and enable them to critically access the working of government institutions in the broader framework of constitutionally and factors and forces which attempts to influence them.

2. The course has been designed to cover the journey of the map of India that emerge from partition to subsequent integration of princely states and how the decision on the key significant symbols such as national flag, national anthem, national song, etc. of the Constitution was arrived at through comprehensive debate in the Constituent Assembly.

3. Students also understand the fundamental rights and duties of the citizens, directive principles of State policy, nature of Indian federalism and other institution as described by the Constitution of India.

Content: Unit wise course content distribution

Theory

Unit - 1: Framing of the Indian Constitution: Role of the Constituent Assembly; Features of Indian Constitution; the Preamble

Unit - 2: Fundamental rights and duties; Directive principles of State policy.

Unit - 3: Nature of Indian Federalism: Constitutional provisions; changing nature of center-state relations.

Unit - 4: Union executive: President and vice President- election power and position. Prime Minister- power and position; Council of Ministers; Relationship of President and Prime Minister.

Unit - 5: Union legislature: Rajya Sabha and Lok Sabha: composition and functions: Speaker.

Unit - 6: The judiciary: Supreme Court and high courts- compositions and functions.

Unit - 7: Constitutional amendment: Procedures; Religion and politics: debates on secularism and communalism in India

Learning Outcomes

1. Students will be able to know the importance of the preamble in the constitutional design of India.

2. Students will be able to know the fundamental rights and duties of the Indian citizens.

3. Students also know about the nature of the Indian federalism and all about the the union state relationship in India.

4. Student will be able to know the legislative process of India.

5. Students also able to answer the questions about the functions and role of the President, Prime Minister and Parliament

Suggested Readings

1. D.D. Basu, *Introduction to the Constitution of India*, (Nagpur: Lexis Nexis).
2. S.C. Kashyap, *Our Constitution*, (New Delhi: National Book Trust).
3. S.C. Kashyap, *Our Political System*, (New Delhi: National Book Trust).
4. G.C. Hiregowder, et al., *The Indian Constitution: An Introduction*, (New Delhi: Orient Black Swan).
5. J.C. Johari, *Indian Government and Politics, Vol. I & II* (New Delhi: Vikash Publication).
6. Madhab Khosla, *The Indian Constitution*, (New Delhi: Oxford).
7. T. Pantham (2004) 'Understanding Indian Secularism: Learning from its Recent Critics', in R. Vora and S. Palshikar (eds.) *Indian Democracy: Meanings and Practices*, New Delhi: Sage, pp. 235-256.
8. N. Chandhoke (2010) 'Secularism', in P. Mehta and N. Jayal (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp. 333-346.
9. R Bhargava (ed.) (2006) *Secularism and its Critics*, Oxford India Paperback

Semester – IV
Course Name: Politics of Globalization
Course Code: BAPLSMN401

<table>
<tr><td colspan="2">Course Type: MINOR</td><td colspan="2">Course Details: MNC-4</td><td colspan="2">L-T-P: 4 - 1 - 0</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>_</td><td>30</td><td>_</td><td>70</td></tr>
</table>

Course Objectives

1. To understand meaning and debates of globalization.
2. To understand impact of globalization on economy.
3. To understand the impact of globalization on international order.

Content: Unit wise course content distribution

Theory

Unit - 1: Globalization: Meaning, Historical Perspective and debates of globalization.
Unit - 2: Globalization to de-globalization, and post-globalization
Unit - 3: Sovereign State in a Globalised World: Political Dimensions; Shift from State to Market?
Unit - 4: Globalization and new international order.
Unit- 5: Globalization and Localization: Dimensions of cultural change; Globalization and Terrorism.

Learning Outcome

1. The students will be able to understand meaning and debates of globalization.
2. The students will be able understand impact of globalization on economy.
3. They will understand the impact of globalization on international order.
4. Understand the nature, significance, and principal debates in the literature on globalisation and the concept of globalization as both a historical process and, a socio-cultural phenomenon.

Suggested Readings:

1. Baylis, J. And S. Smith (eds.), *The Globalization of World Politics: An Introduction.*

2. Nayyar, Deepak (ed.), *Governing Globalisation: Issues and Institutions*, Oxford University Press.

3. Keohane, Rebert and Nye, Joseph S., *Globalisation: What is new, what is not.*

4. O'Meara, Patrick and others, *Globalization and the Challenges of a New Century: A Reader*, Indiana University Press.

5. Susan Strange, "The Declining Authority of States," in in Frank J. Lechner and John Boli (eds.), *The Globalization Reader*, Oxford: Blackwell, 2004: pp. 219-224.

Semester – IV

Course Name: Political Communication and Leadership

Course Code: BAPLSSE401

Course Type: SE	Course Details: SEC-3			L-T-P: 2 - 0 - 1	
Credit: 3	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		15		_	35

Learning Objectives

1. The Learning Objectives of this course are as follows:
2. To understand the cross-cutting multi-disciplinary linkage of the subject.
3. To gain a basic understanding of specific concepts and critical review of political communication and election campaign studies.
4. To be able to construct a linkage between political communication and leadership.
5. To learn conceptual frameworks and qualitative research skills for the analysis of modes and techniques of political communication and leadership

Content: Unit wise course content distribution

Theory

Unit- 1: Explaining Political Communication: Meaning, Nature and Scope; Evolution and Transformation

Unit- 2: Exploring Leadership: Themes, Theories and Typologies; Participation and Performance

Unit- 3: Expanding Political Communication and Leadership: Orientation and Action: Developing Communication and Leadership through Research; Strengthening Techniques of Communication and Leadership

Unit- 4: Extending Political Communication and Leadership: Research Issues and Challenges: Researching Communication and Leadership through Survey: Opinion Poll, Exit Poll; Examining Contemporary Issues and Challenges in Communication and Leadership, Exploring Career Options.

Learning outcomes

The Learning Outcome of this course is as follows:

After studying this course, students will be able to have a professional/career-oriented insight by facilitating their journey as Media managers, policy makers, political analysts, Journalists, Public relations officers in government agencies, political parties and higher education.

Guidelines for Practical: The assessment for the course may include Class participation, Assignments, Projects, Field Work, Presentations, amongst others as decided by the faculty. Special emphasis will be given on **field work/educational tour/excursion** for 4th semester students.

Suggested Readings:

1 Pole (2009). Blogging the Political: Politics and Participation in a networked Society. New York: Routledge.
2 D. A. Graber (2005). 'Political Communication Faces the 21st Century', Journal of Communication, September: 479-507.
3 Frank Esser and Barbara Pfetsh (eds.). (2004). Comparing Political CommunicationTheories, Cases and Challenges. Cambridge: Cambridge University Press.
4 G. Gerbner, L. Gross, M. Morgan and N. Signorielli (1982). 'Charting the Mainstream: Television's Contribution to Political Orientations', Journal of Communication, 32(2): 100-27.
5 H. A. Semetko and M. Scammell (eds.) (2012). The SAGE Handbook of Political Communication. London: Sage.
6 John C Maxwell (2008). Developing the Leader Within You. New Delhi: Harper Collins.
7 Kiran Prasad (ed.) (2003). Political Communication: The Indian Experience. New Delhi: B.R. Publishers.
8 Max Depree (2004). Leadership is an Art. RHUS Publications.
9 Yogesh Atal (2014). 'Matdataoin Ka Sansar', Pratiman, Vol.2, No.1.
10 Yogesh Atal (2018). 'Chunav Shastra Aur Rajniti', Pratiman, No.11.

Semester – IV
Course Name: Basics of Indian Constitution
Course Code: VAC407

Course Type: VA	**Course Details: VAC-2**			**L-T-P: 4 - 0 - 0**	
Credit: 4	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–		–	

Course Objectives

1. The main purpose of the course is to familiarize the student with the key elements of Indian constitution.
2. The course has been designed to cover the journey of the map of India that emerge from partition to subsequent integration of princely states and how the decision on the key significant symbols such as national flag, national anthem, national song, etc. of the Constitution was arrived at through comprehensive debate in the Constituent Assembly.

3. Students also understand the fundamental rights and duties of the citizens, directive principles of State policy, nature of Indian federalism and other institution as described by the Constitution of India.

Content: Unit wise course content distribution
Theory
Unit - 1: Framing of the Indian Constitution: Role of the Constituent Assembly; Features of Indian Constitution; the Preamble
Unit - 2: Fundamental rights and duties; Directive principles of State policy.
Unit - 3: Nature of Indian Federalism: Constitutional provisions; changing nature of center-state relations.
Unit - 4: Organs of Constitutional Governance- Legislature (Lok Sabha & Rajya Sabha), Executive (The President, Prime Minister and Vice President) and Judiciary (Supreme Court) in India: Composition, procedure, powers & functions.
Unit - 5: Constitutional amendment: Procedures; Election Commission of India.

Learning Outcomes
1. Students will be able to know the importance of the preamble in the constitutional design of India.

2. Students will be able to know the fundamental rights and duties of the Indian citizens.

3. Students also know about the nature of the Indian federalism and all about the union state relationship in India.

4. Student will be able to know the legislative process of India.

5. Students also able to answer the questions about the functions and role of the President, Prime Minister and Parliament

Suggested Readings
1. D.D. Basu, *Introduction to the Constitution of India*, (Nagpur: Lexis Nexis).
2. S.C. Kashyap, *Our Constitution*, (New Delhi: National Book Trust).
3. S.C. Kashyap, *Our Political System*, (New Delhi: National Book Trust).
4. G.C. Hiregowder, et al., *The Indian Constitution: An Introduction*, (New Delhi: Orient Black Swan).
5. J.C. Johari, *Indian Government and Politics, Vol. I & II* (New Delhi: Vikash Publication).
6. Madhab Khosla, *The Indian Constitution*, (New Delhi: Oxford).

Semester – V

Course Name: Basis Theories of International Relations
Course Code: BAPLSMJ501

Course Type: MAJOR	Course Details: MJC-7			L-T-P: 4 - 1 - 0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the theories to the study of International Relations.

2. To understand the basic concepts of International Relations.

3. To Understand the major approaches to the study of International Relations.

Content: Unit wise course content distribution

Theory

Unit – 1: International Relations as a discipline: Emergence and evolution.

Unit – 2: Basic concepts of International Relations: (a) National power, (b) Balance of power, (c) Collective security, (d) Bipolarity, (e) Unipolarity, (f) Multipolarity, (g) National interest, (h) Globalization and (i) deterrence

Unit – 3: Approaches to the Study of International Relations: Realist, Liberalism, Functionalist and World System Theory.

Unit – 4: Techniques of implementation of Foreign Policy: Diplomacy, Propaganda and Foreign Aid.

Unit – 5: United Nations: Envisaged role and actual record; Specialized UN agency – WHO - aims and functioning; the need for UN reforms.

Learning Outcomes

1. This course will be helpful to understand the theories to the study of International Relations.
2. The students will be able to understand the basic concepts of International Relations.
3. They will understand the major approaches to the study of International Relations.

Suggested Readings

1. Burchill, S. et al. (eds.), *Theories of International Relations*, Palgrave Macmillan, 2001.

2. Bandyopadhyaya, Jayantanuja, *A General Theory of International Relations.*

3. Reus-Smit, Christian and Duncan Snidal (eds.), *The Oxford Handbook of International Relations.*

4. Sterling-Folker, Jennings (ed.), *Making sense of International Relations Theory.*

5. Waltz, Kenneth, *Theory of International Politics*

6. Wendt, Alexander, *Social Theory of International Politics.*

7. Chris Brown, Understanding International Relations, St. Martin Press, New York, 1997.

8. Jennifer Sterling Folker (ed.) Making Sense of International Relations Theory, Lynne Rienner Publisher, London, 2006.

9. Robert Jackson and Georg Sorensen, *Introduction to International Relations: Theories and Approaches,* Oxford University Press, 1999.

10. Tim Dunne, Milja Kurki and Steve Smith (ed.) *International Relations Theories: Discipline and Diversity,* Oxford University Press, 2007.

Semester – V
Course Name: Political Sociology
Course Code: BAPLSMJ502

Course Type: MAJOR	**Course Details: MJC-8**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the difference between Sociology of Politics and Politics of Sociology.
2. To understand the concepts of Political Sociology and their applicability.

Content: Unit wise course content distribution

Theory

Unit1: Nature and Scope of Political Sociology: Sociology of Politics and Political Sociology.
Unit2: Political Culture: key aspects and classifications.
Unit 3: Social Stratification: Caste and Class.
Unit4: Power, Legitimacy and Authority- Max Weber.
Unit5: Political Socialization: Meaning and Agencies.

Unit6: Elite theories- Moska, Michels & Pareto.

Learning Outcomes

1. Students will be able to understand the difference between Sociology of Politics and Political Sociology.
2. This course will be helpful to understand the concepts of Political Sociology and their applicability.
3. Students will be able to analyse socio-political events and issues in the framework of interaction between society and politics as a two way process.

Suggested Readings

1. Bottomore,Tom,*Political Sociology*(NewDelhi:B.I.Publication).
2. Chakraborty,Satyabrata(ed.),*PoliticalSociology*(NewDelhi:Trinity).
3. Ashraf,AliandSharma,L.N.,*Political Sociology:A New Grammar of Politics*(Hyderabad: University Press).
4. Mukhopadhyay,AmalKumar, *Political Sociology*(Kolkata:K.P.Bagchi).
5. Bhattachariya,D.C.,*Political Sociology*(Kolkata: VijoyaPublishingHouse).
6. Dasgupta,Samir,*Political Sociology*(NewDelhi:Pearson).
7. Gupta,Dipankar,*Political Sociology in India*(Delhi:OrentLongman).
8. Weber Max, *Politics as vocation* (USA: Hackett Publishing Company,2004)
9. Gerth & Mills (eds.) *From Max Weber: Essays in Sociology* (Routledge,1948)

Semester – V
Course Name: Basic Theories of Public Administration
Course Code: BAPLSMJ503

Course Type: MAJOR	**Course Details: MJC-9**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand evolution of Public Administration.
2. To understand nature and scope of Public Administration.
3. To understand various models of Public Administration.

Content: Unit wise course content distribution

Theory

Unit -1: Nature, Scope and Evolution of Public Administration- Private and Public Administration.

Unit - 2: Theories of Public Administration:
A. Classical Theories – i) Scientific Management (F.W. Taylor) ii) Administrative Management (Fayol)
B. Neo-Classical Theories – i) Human Relations Theory (Elton Mayo), ii) Rational Decision-Making (Herbert Simon)
C. Contemporary Theories – i) Ecological Approach (Fred Riggs)

Unit - 3: Major concepts of Organization: a) Hierarchy, b) Unity of Command, c) Span of Control, d) Authority, e) Centralization, Decentralization and Delegation, f) Line and Staff.

Unit - 4: Weber's bureaucratic model its critique.
Unit - 5: Development Administration: Fred W. Riggs.

Unit - 6: Public Policy: Concept, scope and relevance.

Learning Outcomes

1. Studying Public administration students will develop the leadership and management skills.
2. Students will be taught how to manage people efficiently
3. The student will be introduced to the evolution of the discipline, its changing contours through a study of the different theories, ranging from the classical, neo-classical and contemporary theories.

Suggested Reading

1. Mohit Bhattacharya , *New Horizons of Public Administration*(New Delhi : Jawahar Publishers).

2. S.R . Maheswari, *Administrative Theory: An Introduction* (Delhi : Macmillan).

3. S. R . Maheshwari, *A Dictionary of Public Administration* (New Delhi : Orient Blackswan).

4. Rumki Basu , *Public Administration: Concepts and Theories* (New Delhi: Sterling).

5. Bidyut Chakraborty and Prakash Chand, *Public Administration in a Globalizing World: Theories and Practices* (New Delhi: Sage).

6. Alka Dhameja and Sweta Mishra (eds.), *Public Administration : Approaches and Applications* (Noida: Pearson).

7. Rajashri Basu, *Public Administration* [in Bengali] (Calcutta: Paschim Banga Rajya Pustak Parshad)

Semester – V
Course Name: Indian Political Thought
Course Code: BAPLSMN501

Course Type: MINOR	**Course Details: MNC-5**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. This course intends to acquaint students with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.

2. In India, academic sages and philosophers produced huge treasures of wisdom on politics, kingship, the functioning of government including the monarchy and bureaucracy, and their relationship with the people.

3. This course module will make them understand the ideas of some prominent ancient political thinkers of India.

4. This course has been designed to familiarize the students with key ideas of some of political thinkers of the modern India whose writings and ideas have impacted the society and polity significantly

Content: Unit wise course content distribution

Theory

Unit - 1: Kautilya's Political Thought: Saptanga and Dandaniti.
Unit - 2: Medieval Political Thought in India: A broad outline.
Unit - 3: Raja Rammohan Roy: Rule of Law and Freedom of thought.
Unit- 4: Bankim Chandra, Rabindranath Tagore, Swami Vivekananda, Sri Aurobindo: Nationalism.
Unit - 5: Gandhi: Swaraj and trusteeship.
Unit - 6: Ambedkar: Social justice.

Learning Outcomes

1. The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government.

2. They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual thinkers.

3. Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.

4. Students will be able to explain the key ideas of Raja Rammohan Roy.

5. They will come to understand how Bankim Chandra Chattopadhyay,

Suggested Readings

1. Ambedkar, B. R. (1946). Prospects of Democracy in India. *In Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Dept.,* Government of Maharashtra, Mumbai, pp. 519-523.

2. *Basu, S. (2002). Religious Revivalism as Nationalist Discourse: Swami Vivekananda and New Hinduism in Nineteenth-Century Bengal.* London: Oxford University Press.

3. Chatterji, B. C. (2006). *In Roy, B. K. (translated) Anandamath.* New Delhi: Orient Paperbacks.

4. Chakraborty, B and Pandey R.K , *Modern Indian Political Thought,* New Delhi, Sage.

5. Das, R., & Das, R. (2012), *The Nation and the Community: Hindus and Muslims in the Novels of Bankim Chandra Chatterjee. Proceedings of the Indian History Congress,* 73, pp. 578-587

6. Dhar, S. (1981). *Kautilya and the Arthashastra*. New Delhi: Marwah publication.

7. Dutt, M. N. (2003), *Manusmriti.* New Delhi. Vedic Books.

8. Haldar, M. K. (1977). *Renaissance and Reaction in Nineteenth Century Bengal: Bankim Chandra Chattopadhyay (Translation of Bengali Essay).* Calcutta: Minerva Associates.

9. Jolly, J. (1923). *Kautiliyam Arthashastram- Arthashastra of Kautilya. New Delhi: Motilal Banarasi Dass.*

11. Parekh, B. (1997). *The Critique of Modernity. In: Gandhi: A Brief Insight. Delhi: Sterling Publishing Company, pp. 63-74.*

12. Parel, A. J. (Ed.). (2002). *Introduction. In: Gandhi, freedom and Self Rule. Delhi: Vistaar Publication.*

Semester – VI
Course Name: India's Foreign Policy in a Globalizing World
Course Code: BAPLSMJ601

Course Type: MAJOR	Course Details: MJC-10			L-T-P: 4 - 1 - 0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the changing dynamics of India's foreign policy in the globalized world.

2. To understand the major issues of India's foreign policy in the globalized world.

3. To gather knowledge, the relational dynamics between India and the USA and UK.

4. To understand India's economic engagements with various economic forum.

Content: Unit wise course content distribution

Theory

Unit - 1: India's Foreign Policy in the era of Globalization: Emerging Issues (a) India's global trade and market economy, (b) Environmental issue in India's foreign policy, (c) Terrorism, (d) National Security, and (e) Nuclear issue – Pokhran Issue.

Unit - 2: India's Foreign Policy towards Selected Neighbours: China, Myanmar, Sri Lanka, Pakistan, and Bhutan.

Unit - 3: The Changing Contours of Indo-U.S. relations in the Era of Globalization.

Unit - 4: India and U.K: The Changing Dimensions of Relations in a Globalized World.

Unit - 5: India's Foreign Policy: From Non-Alignment to Strategic Engagements in a Multipolar World; BRICS and G-20.

Unit - 6: Recent developments in Indian Foreign Policy: India's Position on the Recent Crises in Afghanistan and Myanmar, Growing Relations with US and Israel; India's Vision of a New World Order.

Learning Outcome

1. The students will be able understand the changing dynamics of India's foreign policy in the globalized world.

2. They will gather the major issues of India's foreign policy in the globalized world.

3. This course will be beneficial for the students to assume the relational dynamics between India and the USA and UK.

4. This course will be helpful to understand India's economic engagements with various economic forum.

Suggested Readings

1. Ganguly, Sumit, *Indian Foreign Policy*, Oxford University Press, New Delhi.

2. Kothari, Raj Kumar, *India in the New World Order: The Changing Contours of Her Foreign Policy Under Narendra Modi*, Atlantic, New Delhi.

3. Dubey, M, *India's, Foreign Policy*, Orient Black Swan.

4. Dutt, Sagarika, *India in a Globalized World*, Manchester University Press.

5. Chakrabory, Biswanath, and Nandy, Debasish (eds.) *An Outline of India's Foreign Policy and Relations*, Mitram, Kolkata.

6. Nandy, Debasish, *Revisiting India's Post-Cold War Foreign Policy since 1991 to Present Day*, Avenel Press, Kolkata.

Semester – VI
Course Name: Comparative Constitutional Systems
Course Code: BAPLSMJ602

Course Type: MAJOR	**Course Details: MJC-11**			**L-T-P: 4 - 1 - 0**
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand conceptual base of comparative constitutionalism.
2. To understand the role of legislature, executive, and judiciary of major countries.
3. To understand the different types of state and regimes.

Content: Unit wise course content distribution

Theory

Unit - 1: Typology of Constitutional Systems: Unitary and Federal, Parliamentary and Presidential

Unit - 2: Comparing State and Regime Types: Capitalist, Welfare, Populist and Security State.
Unit - 3: Legislature in UK and PRC: composition and functions – role of second chambers in UK and USA – role of speakers in parliamentary and presidential systems (UK and USA);
Unit - 4: Executive in UK, USA and PRC – Prime Minister in UK, President in USA and State Council in PRC.
Unit - 5: Relation between executive and legislature in UK, USA and PRC.
Unit - 6: Judiciary in UK, USA and PRC (with special reference to the procuratorate).

Course Learning Outcomes

1. Understand the importance of comparative analysis required for a proper assessment of the different constitutional systems;
2. Comprehend the various historical, political, social, cultural, economic and diplomatic aspects of UK, USA and PRC;
3. Assess the relation between the political systems of UK, USA and PRC and to understand the importance of their relative position in the world order.
4. Analytical capacity to engage with contemporary debates on welfare, populism, and authoritarianism.

Suggested Readings

1. Rod Hague, Martin Harrop and Shaun Breslin, *Comparative Government and Politics – An Introduction* (London: Macmillan).
2. J.C. Johari, *Major Modern Political Systems* (New Delhi: Sterling).
3. J.C. Johari, *Comparative Politics* (New Delhi: Sterling).
4. Rakhahari Chatterjee, *Introduction to Comparative Political Analysis* (Kolkata: Sarat Book House)
5. K.K. Ghai, *Major Governments* (New Delhi: Kalyani Publication)
6. S.N. Ray, *Modern Comparative Politics: Approaches, Methods and Issues* (Delhi: PHI)
7. A.C. Kapur and K.K. Mishra,
8. *Select Constitutions* (New Delhi: S. Chand)
9. Lindstaedt N. (2020) Authoritarian Regimes, in D. Caramani (ed.), Comparative Politics, Oxford University Press, Ch 6. Pp.103-115
10. Busch, Andreas (2015), The Changing Architecture of the National Security State', in Stephan Leibfried, Evelyn Huber, Mattew Large, Jonah D. Levy and John D. Stephens (eds.), *The Oxford Handbook of Transformations of State*, Oxford, Oxford University Press.
11. Webb, E. (2011) 'Totalitarianism and Authoritarianism', in Ishiyama, J. T. and Breuning, M.(eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 249-257.
12. Mudde Cas and Kaltwasser Cristóbal Rovira (2017), What is Populism (Ch 1), Populism around the world (Ch 2) in *Populism: A Very Short Introduction*, OUP
13. Garland, David (2016) Ch 1, Ch 6, Ch 7, in *The Welfare State: A Very Short Introduction*, OUP.

Semester-VI

Course Name: Issues in Indian Administration and Governance
Course Code: BAPLSMJ603

Course Type: MAJOR	**Course Details: MJC-12**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand Indian Administration.

2 To understand key issues in India Administration.

3 To understand aspects of governance.

Content: Unit wise course content distribution
Theory Unit 1: Salient features and value premises of Indian administration. Constitutionalism. Political and administrative culture. Bureaucracy and democracy.

Unit 2: Major issues in Indian Administration: a) Ethics in Administration: Integrity vs. Corruption b) Accountability: RTI, Lokpal, Citizens' Charter c) Relationship between Political Executive and Permanent Executive d) Generalists and Specialists

Unit 3: Social Welfare Policies a) Education: Right to Education b) Health: National Health Mission c) Food: Right to Food Security d) Employment: MGNREGA

Unit 4: Citizen and administration. Pressure groups and interest groups. Self- help groups.

Unit 5: Governance and reforms-Meaning and concepts. Good governance. Innovation in Administration and Governance.

Unit 6: E-Governance- Critical Issues: Digital India & Digital Divide in India, Cyber security.

Learning Outcomes

1 This course will be helpful to the students to understand the administration from an Indian perspective.

2 The students will be able to understand the contemporary issues related to governance and administration.

3 The students will be able to understand the functions and importance of Administration and governance in the present scenario.

Suggested Readings

1. Hoshiar Singh and Mohinder Singh: Public Administration in India: Theory & Practice. New Delhi, Sterling Pub., Reprint, 1990.
2. Hoshiar Singh and D.P. Singh : Indian Administration Current Issues and Problems, Jaipur, Aalekh Publishers, 1990.
3. Pilani, G.P. and Singh, Hoshiar: Administration and Social Changes, Jaipur; Printwell Pub., 1985.
4. Avasthi: Central Administrative, Tata McGraw Hill Pub. Co. Pvt. Ltd., New Delhi, 1988.
5. Jain, R.B.: Contemporary Issues in Indian Administration, Delhi; Vishal Pub., 1976.
6. Maheshwari, S.R.: Indian Administration, Delhi; Orient Longman, 1989.
7. Bhambri, C.P.: Public Administration in India, Delhi, Vikas, 1973.
8. Sarkar Siuli, Public Administration in India, PHI, New Delhi,2010.
9. Arora and Goyal, Indian Public Administration, New age International, Delhi. 2014
10. E Governance Initiatives in India http://www.arc.gov.in/11threp/ARC_11thReport_Ch4.pdf
11. National e Governance Plan, http://www.arc.gov.in/11threp/ARC_11thReport_Ch4.pdf
12. Vandana Gupta and Ajay Sharma, *E Governance in India: Problems, Challenges and Prospects*, Research Journal of Economic and Business Studies, Vol.1 No.9, 2012 http://www.theinternationaljournal.org/ojs/index.php?journal=rjebs&page=article&op=view&p ath%5B%5D=1110

13. B. Muthukumaran, Information Technology for Management, Oxford University Press, New Delhi, 2010

14. Misra and Puri (2010), *Indian Economy*, New Delhi: Himalaya Publishing House

15. Ministry of Finance, Government of India (2014) Economic Survey

16. Economic and Political Weekly, Special articles on Indian Economy

17. Frankel, Francine (2009) India's Political Economy: The Gradual Revolution, New Delhi, OxfordUniversity Press

Semester – VI
Course Name: Political Process in India
Course Code: BAPLSMJ604

Course Type: MAJOR	**Course Details: MJC-13**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Learning Objectives

1. This course aims at familiarising the students with the processes through which politics makes itself manifest in India. It involves looking at the different modes through which power is exercised and dispersed in society along the axes of caste, class, religion, ethnicity and gender.
2. It seeks insights from political sociology to understand how political process is mediated through and structured by various forms of social power.
3. It enables students to comprehend the relationship between caste, religion and politics, the constitutional recognition and institutional arrangements for self-government, autonomy and development in the context of tribal communities as reflected in the Fifth and Sixth Schedules, and the various constitutional and legal provisions that enable the state to empower the marginalised and vulnerable in society.
4. The course enables the students to understand the party system in India, its changing form in response to democratic churnings and electoral competition, and the role played by them in the articulation of political power. It draws attention to the constitutional, statutory and institutional

arrangements for regulating electoral competition through the study of electoral reforms and the Election Commission of India.

Content: Unit wise course content distribution

Theory

Unit 1: Political Parties and the Party System: National and State Parties; Trends in the Party System: One party dominant system (the Congress System), fragmented and regionalized multi-party system, binodal system to ascendancy of Bhartiya Janata Party

Unit 2: Elections and Electoral Processes: Electoral Process, Representation and social determinants of voting behaviour in India; Election Commission and Electoral Reforms in India.

Unit 3: Religion and Politics: Debates on Secularism and Communalism since Independence

Unit 4: Caste and Politics: Caste in Politics and the Politicization of Caste; Intersectionality of Caste and Class, reservation and affirmative action policies

Unit 5: Tribes and Politics: Policies and Challenges: Fifth and Sixth Schedules; Forest Rights Act.

Learning outcomes

On successful completion of the course, the students will demonstrate:

1. Understanding of political process in India and its interaction with social cleavages of caste, class, gender, ethnicity and religion
2. Familiarity with the ways in which the state in India responds to social groups and vulnerable sections
3. Knowledge of political parties and the party system in India
4. Awareness of the manner in which representation and electoral competition play out in Indian politics.

Suggested Readings:

1. R. Kothari (2002) 'The Congress System', in Z. Hasan (ed.) Parties and Party Politics in India, New Delhi: Oxford University Press, pp 39-55.
2. Pradeep Chibber and Rahul Verma (2019) 'The Rise of the Second Dominant Party System in India: BJPs New Social Coalition in 2019' in Studies in Politics, Vol. 7, No.2, Pp.131-148.
3. N. G. Jayal (2006) Representing India: Ethnic Diversity and the Governance of Public Institutions, Palgrave Macmillan, London. Yogendra Yadav (2010), 'Representation', in Niraja Gopal Jayal and Pratap Bhanu Mehta (eds), The Oxford Companion to Politics in India, New Delhi: Oxford University Press, 347- 360.
4. T. Pantham (2004) 'Understanding Indian Secularism: Learning from its Recent Critics', in R. Vora and S. Palshikar (eds.) Indian Democracy: Meanings and Practices, New Delhi: Sage, pp. 235-256.
5. N. Chandhoke (2010) 'Secularism', in P. Mehta and N. Jayal (eds.) The Oxford Companion to Politics in India, New Delhi: Oxford University Press, pp. 333-346.

6. R. Kothari (1970) 'Introduction', in Caste in Indian Politics, Delhi: Orient Longman, pp.3- 25.
7. M. Weiner (2001) 'The Struggle for Equality: Caste in Indian Politics', in Atul Kohli (ed.) The Success of India's Democracy, New Delhi: Cambridge University Press, pp. 193-225.
8. G. Omvedt (2002) 'Ambedkar and After: The Dalit Movement in India', in G. Shah (ed.) Social Movements and the State, New Delhi: Sage Publications, pp. 293-309
9. B. Sharma (2010), 'The 1990s: Great Expectations'; 'The 2000s: Disillusionment Unfathomable', in Unbroken History of Broken Promises: Indian State and Tribal People, Delhi: Freedom Press and SahyogPustakKuteer, pp. 64-91.
10. V. Xaxa (2019) 'Isolation, Inclusion and Exclusion: the case of Adivasis in India', in V.S.Rao, Adivasi Rights and Exclusion in India, Oxon and New York: Routledge, pp.27-40

Semester – VI
Course Name: Summer Internship
Course Code: SI601
(To be prepared later on as per the directions of the University)

4 Year UG Degree (Honours) in Political Science
Semester – VII
Name of the Course: Understanding South Asia
Course Code: BAPLSMJ701

Course Type: MAJOR	**Course Details: MJC-14**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the strategic importance of South Asian region.

2 To understand the major border disputes in South Asia.

3 To explore the reasons of civil wars and conflicts in South Asian region.

4 To understand democratic systems of South Asia and regional integration process.

Content: Unit wise course content distribution
Theory

Unit 1: South Asia: As a region and its strategic importance.

Unit 2: Border Disputes: (a) India-Pakistan and (b) India-China.

Unit 3: Civil Wars and Ethnic Conflicts in South Asia: (a) Sinhala-Tamil conflict in Sri Lanka, and Baluchistan movement in Pakistan.

Unit 4: Democracy and state system in South Asia: Case study of Pakistan, Bangladesh, Maldives, Sri Lanka, Nepal, and Bhutan.

Unit 5: Regional Integration in South Asia: SAARC; ASEAN

Suggested Readings

1. Farmer, B.H., *An Introduction to South Asia*, Rutledge, London.
2. Baxter et, al.(ed.), *Government and Politics in South Asia*, West view, Boulder.
3. Mitra, Debashis and Nandy, Debasish(eds.), *South Asia and Democracy: Contextualizing Issues and Institutions*, Kunal Books, New Delhi.
4. Nandy, Debasish, *Understanding Pakistan*, Kunal Books, New Delhi.
5. Nandy, Debasish (ed.) *Mapping South Asia: State, Society and Security Dilemmas*, Blue Roan Publishers, Ahmedabad.
6. Phandis, Urmila and Ganguly Rajat, *Ethnicity, and Nation Building in South Asia*, Sage, New Delhi.

Semester – VII
Name of the Course: Politics of Developing Societies

Course Code: BAPLSMJ702

Course Type: MAJOR	**Course Details: MJC-15**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical

	100	_	30	_	70

Course Objectives:

1 The course offers a conceptual understanding of the political processes in the ThirdWorld.
2 It hastens the knowledge organism to familiarize with different cause-effect imprint inthe developing world.

Content: Unit wise course content distribution
Theory

Unit 1: Approaches to the study of developing societies in the post-Cold war era changingdimensions of such societies.
Unit 2: Economic Dimension – Globalization and Liberalization: Their Impacts – Inequality as an issue.
Unit 3: The State in developing societies – state formation, state building, and state transition.

Unit 4: Political Dimension – from authoritarianism to democratization.
Unit 5: Civil Society – Role of Intellectual
Unit 6: Religion and Politics in developing societies.

Learning Outcome:

1. The students will be able to cultivate an acquaintance of different concepts and issues of theThird World.

Suggested Readings:

1. Burnell, Peter and Vicky Randell eds. – Politics in the Developing World
2. Clapham, Christopher – Third World Politics: An Introduction
3. Fawcett, Louise, and Yezid Sayigh eds. – The Third World Beyond the Cold War: Continuity andChange
4. Gonzales, Alfonso and Jim Norwine eds. – The New Third World
5. Huntington, Samuel – The Third Wave: Democratization in the Late Twentieth Century
6. Keane, J – Global Civil Society
7. Ravenhill, John – Global Political Economy.

Semester – VII
Course Name: Indian Political Thought
Course Code: BAPLSMJ703

Course Type: MAJOR	**Course Details: MJC-16**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. This course intends to acquaint students with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.
2. In India, academic sages and philosophers produced huge treasures of wisdom on politics, kingship, the functioning of government including the monarchy and bureaucracy, and their relationship with the people.
3. This course module will make them understand the ideas of some prominent ancient political thinkers of India.
4. This course has been designed to familiarize the students with key ideas of some of political thinkers of the modern India whose writings and ideas have impacted the society and polity significantly

Content: Unit wise course content distribution

Theory

Unit - 1: Kautilya's Political Thought: Saptanga and Dandaniti.
Unit - 2: Medieval Political Thought in India: A broad outline.
Unit - 3: Raja Rammohan Roy: Rule of Law and Freedom of thought.
Unit- 4: Bankim Chandra, Rabindranath Tagore, Sri Aurobindo, Swami Vivekananda: Nationalism.
Unit - 5: Gandhi: Swaraj and trusteeship.
Unit - 6: Ambedkar: Social justice.

Learning Outcomes

1. The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government.

2. They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual thinkers.

3. Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.

4. Students will be able to explain the key ideas of Raja Rammohan Roy.

5. They will come to understand how Bankim Chandra Chattopadhyay,

Suggested Readings

1. Ambedkar, B. R. (1946). Prospects of Democracy in India. *In Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Dept.,* Government of Maharashtra, Mumbai, pp. 519-523.

2. *Basu, S. (2002). Religious Revivalism as Nationalist Discourse: Swami Vivekananda and New Hinduism in Nineteenth-Century Bengal.* London: Oxford University Press.

3. Chatterji, B. C. (2006). *In Roy, B. K. (translated) Anandamath.* New Delhi: Orient Paperbacks.

4. Chakraborty, B and Pandey R.K , *Modern Indian Political Thought,* New Delhi, Sage.

5. Das, R., & Das, R. (2012), *The Nation and the Community: Hindus and Muslims in the Novels of Bankim Chandra Chatterjee. Proceedings of the Indian History Congress,* 73, pp. 578-587

6. Dhar, S. (1981). *Kautilya and the Arthashastra*. New Delhi: Marwah publication.

7. Dutt, M. N. (2003), *Manusmriti.* New Delhi. Vedic Books.

8. Haldar, M. K. (1977). *Renaissance and Reaction in Nineteenth Century Bengal: Bankim Chandra Chattopadhyay (Translation of Bengali Essay).* Calcutta: Minerva Associates.

9. Jolly, J. (1923). *Kautiliyam Arthashastram- Arthashastra of Kautilya. New Delhi: Motilal Banarasi Dass.*

11. Parekh, B. (1997). *The Critique of Modernity. In: Gandhi: A Brief Insight. Delhi: Sterling Publishing Company, pp. 63-74.*

12. Parel, A. J. (Ed.). (2002). *Introduction. In: Gandhi, freedom and Self Rule. Delhi: Vistaar Publication.*

Semester – VII
Course Name: Politics in West Bengal
Course Code: BAPLSMJ704

Course Type: MAJOR	Course Details: MJC-17			L-T-P: 4 - 1 - 0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the dynamics of West Bengal Politics.
2 To understand the role of leadership in West Bengal Politics.
3 To assess the role of civil society in West Bengal.

Content: Unit wise course content distribution
Theory
Unit 1: Dynamics of politics in West Bengal: An overview.

Unit 2: Leadership role: Caste and class and elite.

Unit 3: Politics of Ethnicity: Gorkhaland Movement and Kamtapur Movement.

Unit 4: Civil Society in West Bengal – nature and role.

Unit 5: Role of Bhadralok in Bengal Politics.

Learning Outcomes

1 This course will help to understand the dynamics of West Bengal Politics.
2 This course will be helpful to understand the role of leadership in West Bengal Politics.
3 This course will be helpful to assess the role of civil society in West Bengal.

Suggested Readings

1. Franda, Marcus F., *Radical politics in West Bengal* (MIT Press).
2. Chatterjee, Partha, *State and Politics in India* (Delhi: Oxford).
3. Kaviraj, Sudipta and Khilnani, Sunil (eds.), *Civil Society: History and Possibilities* (Delhi: Cambridge).
4. Bagchi, Romit, Gorkhaland: *Crisis of Statehood* (Delhi: Sage).
5. Rakhahari Chatterjee and Partha Pratim Basu(eds.) *West Bengal*

Under the Left 1977- 2011. Sarat Books, Kolkata.

6. *The Kamtapur Movement* Ch. 8 (Ph.D. thesis of Ramesh Dural), Available at: http://shodhganga.inflibnet.ac.in/bitstream/10603/137574/8/08_chapter_04.pdf

Semester: VII
Course Name: Nation Building and National Integration in India
Course Code: BAPLSMN701

Course Type: MINOR	**Course Details: MNC-6**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:
Students will understand the followings:
1. To understand various aspects of effective nation building.
2. Difference between nation and state.
3. Various ingredients of Nation Building.
3. About India and its Nationhood.
4. Hindrances on the way of Nation Building in India.

Content: Unit wise course content distribution
Theory
Unit – 1: Nation-Building in India, theoretical, historical and cultural perspective
Unit – 2: Challenges to National Integration: Communalism, Regionalism, Linguism, Castism, Separatism and Globalization.
Unit – 3: Role of Planning and Bureaucracy in nation building.
Unit – 4: National Movement
Unit – 5: Nation building in India: Problems and prospects.

Learning Outcomes:
Students will understand the followings:
1. Various aspects of effective nation building.
2. Difference between nation and state.

3. Various ingredients of Nation Building.
4. About India and its Nationhood.
5. Hindrances on the way of Nation Building in India.

Suggested Readings:

1. Mohanty, Susama, *Political Development & Ethinic Identity in Africa*, Radiant Publishers, New Delhi, 1992
2. Ramakant & Upreti, B.C. (ed.), *Nation-Building in South Asia (Vol.2):* South –Asian Publishers, New Delhi, 1991
3. Brass, P.R., *Ethnicity and Nationalism – Theory and Comparison*, Sage Publication, New Delhi, 1991
4. Shah, Ghanshyam, *Minorities and Nation-Building – A Case of Muslim and Scheduled Tribes in India.*
5. W. Andersen and S. Damle, *The Brotherhood in Saffron: The Rashtriya Swayamsevak Sangh and Hindu Revivalism*, New Delhi, Vistaar/Sage Publications. 1987
6. A. Basu, *Two Faces of Protest: Contrasting Modes of Women's Activism, Berkeley,* University of California Press, 1992
6. D.D. Basu, *An Introduction to the Constitution of India*, New Delhi, Prentice Hall, 1994.
7. U. Baxi, *The Indian Supreme Court and Politics*, Delhi, Eastern Book Company, 1980
8. U. Baxi and B. Parekh (ed.), *Crisis and Change in Contemporary India*, New Delhi, Sage 1994
9. P.R. Brass, *Language, Religion and Politics in North India*, London, Cambridge University Press, 1974,
10. P. Chatterjee, *The Nation and its Fragments: Colonian and Postcolonial Histories*, Princeton NJ, Princeton University Press, 1993
11. S. Cobridge and J. Harriss, *Reiventing India: Liberalization, Hindu Nationalism and Popular Democracy*, Delhi, Oxford University Press, 2001
12. F.R. Frankel and et.al., *(eds.), Transforming India: Social and Political Dynamics of Democracy*, New Delhi, Oxford University Press, 2000
13. S. Harrison, *India: The Most Dangerous Decades*, Princeton NJ, Princeton University Press, 1960
14. P. Karat, *Language and Nationality Politics in India*, Bombay, Orient Longman, 1973
15. S. Khilnani, *The Idea of India*, London, Hamish Hamilton, 1997
16. A. Kumar (ed.), *Nation-Building in India: Culture, Power and Society*, New Delhi, Radiant Publishers, 1999
17. R. Kothari, *State Against Democracy: In Search for Humane Governance*, Delhi, Ajanta, 1988
18. R. Kothari, *Caste and Politics in India*, New Delhi, Orient Longman, 1970
19. R. Kothari, *Politics in India*, New Delhi, Orient Longman, 1970
20. R. Kothari, *Party System and Election Studies*, Bombay, Asia Publishing House, 1967
21. N.C. Sahni, (ed.), *Coalition Politics in India*, Jullunder, New Academic Publishing Company, 1971

Semester- VIII
Course Name: Theory as Discourse
Course Code: BAPLSMJ801

Course Type: MAJOR	**Course Details: MJC-18**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. The paper will familiarize the students with the concepts that are central to the study of political science.
2. It will be helpful to explore, evaluate, justify, and interrogate public life and institutions.
3. This course will enable the students to acquire knowledge about the debates and discourse around the issues in the changing social and political context.

Content: Unit wise course content distribution
Theory

Unit 1: Political Theory: Concepts and Critique- Liberty, Equality, Rights, Justice, Democracy, Citizenship and Power.

Unit 2: Critique of Liberalism- Communitarianism, Multiculturalism, Deliberative Democracy.

Unit 3: Interrogating Enlightenment: Post-Modernism, Post-Colonialism, Feminism.

Unit 4: Contemporary theories – Nationalism, Globalization and Environmentalism

Learning Outcomes

1 This course will help to understand the dynamics of Political Theory.

2 This course will help to understand Key concepts in Political Theory.

3 This course will be helpful in assessing the role of contemporary ideas in Political Theory like

globalization and environmentalism.

Suggested Readings

1. Andrew Heywood: *Political Ideologies : An Introduction*

2. Rajiv Bhargava, Ashok , Acharya: *Political Theory : An Introduction*

3. Peri Robert and Peter Sutch : *An Introduction to Political Thought: A Conceptual Toolkit*

4. Isaiah Berlin : *Four Essays on Liberty*

5. Ronald Dworkin : Taking Rights Seriously

6. Will Kymlicka: *Contemporary Political Philosophy*

7. J. Rawls : *A Theory of Justice*

8. R. Noick: *Anarchy, State and Utopia*

9. R. Dworkin: *Sovereignty Virtue: The Theory and Practice of Equality*

10. J.Waldrone(ed): *Theories of Rights*

11. Andrew Vincent(ed) *Political Theory: Tradition and Diversity*

12. C.B Macpherson: *Democratic Theory: Essays in Retrieval*

13. Daphne Halikiopoulou, Sofia Vasilopoulou (ed) : *Nationalism and Globalization: Conflicting or Complementary?*

14. James Goodman and Paul James (Ed): *Nationalism and Global Solidarities*

15. Paul Hawken: *Blessed Unrest: How the Largest Movement in the World Came into Being and Why No One Saw It Coming*

16. Javier Auyero and Débora Swistun: *Flammable: Environmental Suffering in an Argentine Shantytown*

17. Terry L. Anderson, Donald R. Leal: *Free Market Environmentalism*

18. Charles T. Rubin: *The Green Crusade*

19. James Gustave Speth: *Red Sky at Morning: America and the Crisis of the Global Environment*

Semester-VIII
Course Name: Social Movements in Contemporary India
Course Code: BAPLSMJ802

Course Type: MAJOR	**Course Details: MJC-19**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Learning Objectives

1. The basic objective of the course is to build a theoretical as well as a practical understanding of the concept of social movement and develop awareness about the impact of such people-based movements with special reference to India.
2. To understand the currents of Social Movements in India.

Content: Unit wise course content distribution

Theory

Unit - 1: Meaning and features of Social Movements.
Unit - 2: Social Movement and New Social Movement.
Unit - 3: Peasant Movement – Telengana and Singur.
Unit - 4: Tribal Movements – POSCO and Niyamgiri.
Unit - 5: Environmental Movement – Chipko, Narmada Bachao and Silent Valley.
Unit - 6: Women's movement - POCSO, Anti-caste movements – Savitri Bai Phule and BAMCEF.

Course Learning Outcomes

1. To develop an understanding about the concept of social movements-its origin, development and impact on all aspects of human life.
2. To critically examine the concept of social change which can be ushered in through the process of combined and collective efforts.
3. To theoretically reflect on the significance of social movement by studying the nature of various types of movements including peasants, tribal and environmental, women's, caste and civil liberties movements.

Suggested Readings

1. Shah, Ghanshyam, Social Movements in India: A Review of Literature (New Delhi: Sage)
2. Shah, Ghanshyam, Social Movements and the State (New Delhi: Sage)
3. Ray, Raka and Katzenstain, Mary Fainsod, Social Movements in India: Poverty, Power, and Politics, (Rowman and Littlefield Publishers)

4. Singh, A. P., Development Process and Social Movements in Contemporary India (Pinnacle Learning) 5. Kumar, Bijendra, Social Movement in Modern India (DPS Publishing House)
6. Joshi, Sarat. C., Contemporary Social Mobility and Social Movements: Views and Reviews (Akansha Publication)
7. Banerjee, Parthasarathi, "Land Acquisition and Peasant Resistance at Singur", Economic and Political Weekly November 18, 2006. Available at: http://sanhati.com/wp-content/uploads/2007/03/acquisitionsingur.pdf
8. Ghatak, Maitreesh and et al., Land Acquisition and Compensation in Singur: What Really Happened?, March 29, 2012. Available at: http://ibread.org/bread/system/files/bread_ppapers/p035.pdf
9. Singh, Samal Jayaram, Displacement and Resistance: A Case Study of Posco Project, Odisha (LAP Lambert)
10. Jena, Manipadma, 'Voices from Niyamgiri', Economic and Political Weekly (Online). Available at: http://www.epw.in/node/128306/pdf

11. G. Shah, (2004) *Social Movements in India: A Review of Literature*, New Delhi: Sage Publications.
12. A. Roy (2010) 'The Women's Movement', in N.Jayal and P. Mehta (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp.409-422
13. A.R. Desai, (ed.), (1986) *Agrarian Struggles in India After Independence*, Delhi: Oxford University Press, pp. xi-xxxvi
14. D.N. Dhanagare (2017), Understanding the Farmers' Movement in Maharashtra: Towards an Analytical Framework, in *Populism and Power Farmers' movement in western India, 1980—2014*, Routledge
15. S. Shyam (2003) 'Organizing the Unorganized', in *Seminar*, [Footloose Labour: A Symposium on Livelihood Struggles of the Informal Workforce, 531] pp. 47-53.
16. G. Omvedt (2012) 'The Anti-caste Movement and the Discourse of Power', in N. Jayal (ed.) *Democracy in India*, New Delhi: Oxford India Paperbacks, sixth ed., pp.481-508.
17. R. Guha, *Environmentalism: A Global History*, Longman Publishers, 1999

Semester – VIII
Course Name: Themes in Political Thought
Course Code: BAPLSMJ803

Course Type: MAJOR	**Course Details: MJC-20**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–	30	–	70

Course Objectives

1. To learn about core concepts of thought through eminent thinkers.

2. To understand comparative thoughts of Western and Indian thinkers.

Content: Unit wise course content distribution
Theory
Unit 1: Distinctive features of Indian and Western Political Thought
Unit 2: Western Thought: Thinkers and Themes
a) Aristotle on Citizenship

b) Locke on Rights

c) Rousseau on Inequality

d) J.S. Mill on Liberty and Democracy

Unit 3: Indian Thought: Thinkers and Themes
a) Kautilya on State

b) Tilak and Gandhi on Swaraj

c) Ambedkar on Social Justice

d) Nehru and Jayprakash Narayan on Democracy

Course Learning Outcomes
1. Students will get aware from different major western political thoughts. By this course student will understand the political enquiry of Aristotle, Locke, Rousseau and J.S. Mill.
2. Further, students will also get aware from different major Indian political thoughts. By this course student will understand the views of Kautilya, Tilak, BR Ambedkar, Nehru and Jayprakash Narayan.

Suggested Readings
1. G. H. Sabine, *A History of Political Theory* (USA: Wadsworth Publishing Co Inc,).
2. S. Mukherjee and S. Ramaswamy, *A History of Political Thought* (New Delhi: PHI).
Shefali Jha, Western Political Thought (Delhi: Pearson).
3. Altekar, A.S., *State and Government in Ancient India* (Delhi: Motilal Banarsidass).

4. Varma, V. P., *Modern Indian Political Thought* (Agra: Lakshmi Narayan Agarwal).

5. Pantham, T and Deutsch, K. L., *Political Thought in Modern India* (ed.), (New Delhi: Sage Publications).

6. Chakraborty, B and Pandey, R. K., *Modern Indian Political Thought*, (New Delhi: Sage)

7. Singh, M. P. and Roy, H, *Indian Political Thought: Themes and Thinkers*, (New Delhi: Pearson).

Semester – VIII
Course Name: State Politics in India
Course Code: BAPLSMJ804

Course Type: MAJOR	**Course Details: MJC-21**			**L-T-P: 4 - I - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:
1. To explain how subject of state politics has evolved in India.
2. Stress on different paradigms of Indian states.
3. This course emphasizes on electoral and voting pattern in Indian states.
4. This course aims to analyze the regional and identity politics in Indian states.

Content: Unit wise course content distribution
Theory
Unit – I: State Politics in India: Approaches to the Study State Politics: Liberal and Marxist
Unit – II: Region and Regionalism: Autonomy and Separatism: Tamil Nadu and Punjab; Ethno-Nationalism: North East India; Sub-Sate Regionalism: Gorkhaland and Bodoland.
Unit – III: Dynamics of Party Politics and Electoral Politics in Indian States: Regionalization of Party System: One Party Dominant System to Coalition Party System, Pattern of coalition politics; Language and State Politics: Andhra Pradesh and Maharashtra; Caste in State Politics: Uttar Pradesh and Bihar; Religion in State Politics: Gujarat and West Bengal
Unit – IV: Development and State Politics: State Development Models of West Bengal, Gujarat and Maharashtra; Green Revolution: Punjab and Rajasthan.

Unit – V: Marxist politics and governments: West Bengal and Kerala.

Unit – VI: Identity Politics in Indian States: SCs, STs, OBCs and Women: West Bengal, Uttar Pradesh and Bihar

Learning Outcomes
1. Student will understand the asymmetries in Indian polity.

2. Students will know the nature of autonomy and separatist movements in India.
3. Students will know the patterns of ethnicity in northeast region.
4. Student will understand the regionalization & fragmentation in Indian polity and dynamics of party system in Indian states.
5. Student will understand the background of demands of statehood, new states and special status of states.

Suggested Readings:

1. Brass, Paul R. (2002). "India, Myron Weiner and the Political Science of Development". Economic and Political Weekly 37 (29), July 20-26: 3026-3040.
2. Narain, Iqbal (1970). "Democratic Politics and Political Development in India". Asian Survey 10 (2), February: 88-9
3. Pai, Sudha (1989). "Towards A Theoretical Framework For The Study Of State Politics In India: Some Observations". The Indian Journal of Political Science 50 (1): 94-1
4. Singh, Mahendra Prasad (2012). "State Politics in India". Dialogue 14 (1), July-September. Available at https://www.asthabharati.org/Dia_Jul%20012/m.p.%20singh.htm
5. Kothari, Rajni (1970) *Politics in India*. India: Orient Black Swan, New Delhi
6. Francine R. Frankel and M.S.A. Rao (eds.) (1989), *Dominance and State Power in Modern India: Decline of Social Order* Vol. I, Oxford University Press, Delh
7. Narain, Iqbal (1976), *State Politics in India*, Meenakshi Prakashan, Meerut
8. Weiner, Myron (eds.) (1968) *State Politics in India*, Princeton University Press.
9. Bhambhri, C.P., (1989) "The Indian State: Conflicts and Contradiction", in Zoya Hasan, S.N. Jha and Rasheeduddin Khan (eds.), *The State, Political Processes and Identity: Reflections on Modern India*, Sage Publications, New Delhi.
10. Chatterjee, Partha, State Politics in India.
11. Pai, Sudha, Handbook of Politics in Indian States.
12. T.J. Nossiter, *Marxist State Governments in India*

Semester- VIII
Course Name: Gender and Politics in India
Course Code: BAPLSMN801

Course Type: MINOR	**Course Details: MNC-7**			**L-T-P: 4 - I - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the Gender-based participation in politics.

2 To understand conceptual differences between women and trans gender.

3 To understand Gender identity.

Content: Unit wise course content distribution

Theory

Unit 1: Conceptualizing Gender in Politics: Political Participation, policy making and development.

Unit 2: Security concern for Women and Third Gender/Transgender.

Unit 3: Effective participation of Women in Decision making structures: Issue of Reservation Impact.

Unit 4: Gender Identity: Women in riot and War.

Learning Outcome

1 Students will be able to understand the Gender-based participation in politics by this course.

2 They will be able to understand conceptual differences between women and trans gender.

3 This course will be beneficial for the students to understand Gender identity.

Suggested Readings

1. Geetha, V. *Gender*. (Calcutta: Stree).
2. Geetha, V. *Patriarchy*. (Calcutta: Stree).
3. Menon, Nivedita, *Gender and Politics in India*, Oxford India Paperbacks.
4. Saigol, Rubina, *Feminism in India*, (Women Unlimited Publication).
5. John, Mary E., *Women Studies in India: A reader* (ed.), (Penguin India Publication).

4 Year UG Degree (Honours with Research) in Political Science

Semester – VII
Name of the Course: Understanding South Asia
Course Code: BAPLSMJ701

Course Type: MAJOR	**Course Details: MJC-14**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the strategic importance of South Asian region.

2 To understand the major border disputes in South Asia.

3 To explore the reasons of civil wars and conflicts in South Asian region.

4 To understand democratic systems of South Asia and regional integration process.

Content: Unit wise course content distribution
Theory

Unit 1: South Asia: As a region and its strategic importance.

Unit 2: Border Disputes: (a) India-Pakistan and (b) India-China.

Unit 3: Civil Wars and Ethnic Conflicts in South Asia: (a) Sinhala-Tamil conflict in Sri Lanka, and Baluchistan movement in Pakistan.

Unit 4: Democracy and state system in South Asia: Case study of Pakistan, Bangladesh, Maldives, Sri Lanka, Nepal, and Bhutan.

Unit 5: Regional Integration in South Asia: SAARC; ASEAN

Suggested Readings

7. Farmer, B.H., *An Introduction to South Asia*, Rutledge, London.
8. Baxter et, al.(ed.), *Government and Politics in South Asia*, West view, Boulder.

9. Mitra, Debashis and Nandy, Debasish(eds.), *South Asia and Democracy: Contextualizing Issues and Institutions*, Kunal Books, New Delhi.

10. Nandy, Debasish, *Understanding Pakistan*, Kunal Books, New Delhi.

11. Nandy, Debasish (ed.) *Mapping South Asia: State, Society and Security Dilemmas*, Blue Roan Publishers, Ahmedabad.

12. Phandis, Urmila and Ganguly Rajat, *Ethnicity, and Nation Building in South Asia*, Sage, New Delhi.

Semester – VII
Name of the Course: Politics of Developing Societies

Course Code: BAPLSMJ702

Course Type: MAJOR	**Course Details: MJC-15**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:

1 The course offers a conceptual understanding of the political processes in the ThirdWorld.
2 It hastens the knowledge organism to familiarize with different cause-effect imprint inthe developing world.

Content: Unit wise course content distribution
Theory

Unit 1: Approaches to the study of developing societies in the post-Cold war era changingdimensions of such societies.
Unit 2: Economic Dimension – Globalization and Liberalization: Their Impacts – Inequality as an issue.
Unit 3: The State in developing societies – state formation, state building, and state transition.

Unit 4: Political Dimension – from authoritarianism to democratization.
Unit 5: Civil Society – Role of Intellectual
Unit 6: Religion and Politics in developing societies.

Learning Outcome:

The students will be able to cultivate an acquaintance of different concepts and issues of theThird World.

Suggested Readings:

8. Burnell, Peter and Vicky Randell eds. – Politics in the Developing World
9. Clapham, Christopher – Third World Politics: An Introduction
10. Fawcett, Louise, and Yezid Sayigh eds. – The Third World Beyond the Cold War: Continuity andChange
11. Gonzales, Alfonso and Jim Norwine eds. – The New Third World
12. Huntington, Samuel – The Third Wave: Democratization in the Late Twentieth Century
13. Keane, J – Global Civil Society
14. Ravenhill, John – Global Political Economy.

Semester – VII
Course Name: Indian Political Thought
Course Code: BAPLSMJ703

Course Type: MAJOR	**Course Details: MJC-16**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. This course intends to acquaint students with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.

2. In India, academic sages and philosophers produced huge treasures of wisdom on politics, kingship, the functioning of government including the monarchy and bureaucracy, and their relationship with the people.

3. This course module will make them understand the ideas of some prominent ancient political thinkers of India.

4. This course has been designed to familiarize the students with key ideas of some of political thinkers of the modern India whose writings and ideas have impacted the society and polity significantly

Content: Unit wise course content distribution
Theory
Unit - 1: Kautilya's Political Thought: Saptanga and Dandaniti.
Unit - 2: Medieval Political Thought in India: A broad outline.
Unit - 3: Raja Rammohan Roy: Rule of Law and Freedom of thought.
Unit- 4: Bankim Chandra, Rabindranath Tagore, Sri Aurobindo, Swami Vivekananda: Nationalism.
Unit - 5: Gandhi: Swaraj and trusteeship.
Unit - 6: Ambedkar: Social justice.

Learning Outcomes
1. The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government.

2. They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual thinkers.

3. Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.

4. Students will be able to explain the key ideas of Raja Rammohan Roy.

5. They will come to understand how Bankim Chandra Chattopadhyay,

Suggested Readings
1. Ambedkar, B. R. (1946). Prospects of Democracy in India. *In Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Dept.,* Government of Maharashtra, Mumbai, pp. 519-523.

2. *Basu, S. (2002). Religious Revivalism as Nationalist Discourse: Swami Vivekananda and New Hinduism in Nineteenth-Century Bengal.* London: Oxford University Press.

3. Chatterji, B. C. (2006). *In Roy, B. K. (translated) Anandamath.* New Delhi: Orient Paperbacks.

4. Chakraborty, B and Pandey R.K , *Modern Indian Political Thought,* New Delhi, Sage.

5. Das, R., & Das, R. (2012), *The Nation and the Community: Hindus and Muslims in the Novels of Bankim Chandra Chatterjee. Proceedings of the Indian History Congress,* 73, pp. 578-587

6. Dhar, S. (1981). *Kautilya and the Arthashastra*. New Delhi: Marwah publication.

7. Dutt, M. N. (2003), *Manusmriti.* New Delhi. Vedic Books.

8. Haldar, M. K. (1977). *Renaissance and Reaction in Nineteenth Century Bengal: Bankim Chandra Chattopadhyay (Translation of Bengali Essay).* Calcutta: Minerva Associates.

9. Jolly, J. (1923). *Kautiliyam Arthashastram- Arthashastra of Kautilya. New Delhi: Motilal Banarasi Dass.*

11. Parekh, B. (1997). *The Critique of Modernity. In: Gandhi: A Brief Insight. Delhi: Sterling Publishing Company, pp. 63-74.*

12. Parel, A. J. (Ed.). (2002). *Introduction. In: Gandhi, freedom and Self Rule. Delhi: Vistaar Publication.*

Semester – VII
Course Name: Politics in West Bengal
Course Code: BAPLSMJ704

Course Type: MAJOR	**Course Details: MJC-17**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the dynamics of West Bengal Politics.
2 To understand the role of leadership in West Bengal Politics.
3 To assess the role of civil society in West Bengal.

Content Theory

Unit 1: Dynamics of politics in West Bengal: An overview.

Unit 2: Leadership role: Caste and class and elite.

Unit 3: Politics of Ethnicity: Gorkhaland Movement and Kamtapur Movement.

Unit 4: Civil Society in West Bengal – nature and role.

Unit 5: Role of Bhadralok in Bengal Politics.

Learning Outcomes

1 This course will help to understand the dynamics of West Bengal Politics.
2 This course will be helpful to understand the role of leadership in West Bengal Politics.
3 This course will be helpful to assess the role of civil society in West Bengal.

Suggested Readings

7. Franda, Marcus F., *Radical politics in West Bengal* (MIT Press).
8. Chatterjee, Partha, *State and Politics in India* (Delhi: Oxford).
9. Kaviraj, Sudipta and Khilnani, Sunil (eds.), *Civil Society: History and Possibilities* (Delhi: Cambridge).
10. Bagchi, Romit, Gorkhaland: *Crisis of Statehood* (Delhi: Sage).
11. Rakhahari Chatterjee and Partha Pratim Basu(eds.) *West Bengal Under the Left 1977- 2011.* Sarat Books, Kolkata.
12. *The Kamtapur Movement* Ch. 8 (Ph.D. thesis of Ramesh Dural), Available at: http://shodhganga.inflibnet.ac.in/bitstream/10603/137574/8/08_chapter_04.pdf

Semester: VII
Course Name: Nation Building and National Integration in India
Course Code: BAPLSMN701

Course Type: MINOR	**Course Details: MNC-6**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:
Students will understand the followings:
1. To understand various aspects of effective nation building.
2. Difference between nation and state.
3. Various ingredients of Nation Building.
3. About India and its Nationhood.
4. Hindrances on the way of Nation Building in India.

Content: Unit wise course content distribution

Theory

Unit – 1: Nation-Building in India, theoretical, historical and cultural perspective

Unit – 2: Challenges to National Integration: Communalism, Regionalism, Linguism, Castism, Separatism and Globalization.

Unit – 3: Role of Planning and Bureaucracy in nation building.

Unit – 4: National Movement

Unit – 5: Nation building in India: Problems and prospects.

Learning Outcomes:

Students will understand the followings:

1. Various aspects of effective nation building.
2. Difference between nation and state.
3. Various ingredients of Nation Building.
4. About India and its Nationhood.
5. Hindrances on the way of Nation Building in India.

Suggested Readings:

1. Mohanty, Susama, *Political Development & Ethinic Identity in Africa*, Radiant Publishers, New Delhi, 1992
2. Ramakant & Upreti, B.C. (ed.), *Nation-Building in South Asia (Vol.2):* South –Asian Publishers, New Delhi, 1991
3. Brass, P.R., *Ethnicity and Nationalism – Theory and Comparison,* Sage Publication, New Delhi, 1991
4. Shah, Ghanshyam, *Minorities and Nation-Building – A Case of Muslim and Scheduled Tribes in India.*
5. W. Andersen and S. Damle, *The Brotherhood in Saffron: The Rashtriya Swayamsevak Sangh and Hindu Revivalism,* New Delhi, Vistaar/Sage Publications. 1987
6. A. Basu, *Two Faces of Protest: Contrasting Modes of Women's Activism, Berkeley,* University of California Press, 1992

6.D.D. Basu, *An Introduction to the Constitution of India*, New Delhi, Prentice Hall, 1994.

7. U. Baxi, *The Indian Supreme Court and Politics,* Delhi, Eastern Book Company, 1980
8. U. Baxi and B. Parekh (ed.), *Crisis and Change in Contemporary India*, New Delhi, Sage 1994
9. P.R. Brass, *Language, Religion and Politics in North India*, London, Cambridge University Press, 1974*,*
10. P. Chatterjee, *The Nation and its Fragments: Colonian and Postcolonial Histories*, Princeton NJ, Princeton University Press, 1993
11. S. Cobridge and J. Harriss, *Reiventing India: Liberalization, Hindu Nationalism and Popular Democracy,* Delhi, Oxford University Press, 2001
12. F.R. Frankel and et.al., *(eds.), Transforming India: Social and Political Dynamics of Democracy,* New Delhi, Oxford University Press, 2000

13. S. Harrison, *India: The Most Dangerous Decades*, Princeton NJ, Princeton University Press, 1960
14. P. Karat, *Language and Nationality Politics in India*, Bombay, Orient Longman, 1973
15. S. Khilnani, *The Idea of India*, London, Hamish Hamilton, 1997
16. A. Kumar (ed.), *Nation-Building in India: Culture, Power and Society*, New Delhi, Radiant Publishers, 1999
17. R. Kothari, *State Against Democracy: In Search for Humane Governance*, Delhi, Ajanta, 1988
18. R. Kothari, *Caste and Politics in India*, New Delhi, Orient Longman, 1970
19. R. Kothari, *Politics in India*, New Delhi, Orient Longman, 1970
20. R. Kothari, *Party System and Election Studies*, Bombay, Asia Publishing House, 1967
21. N.C. Sahni, (ed.), *Coalition Politics in India*, Jullunder, New Academic Publishing Company, 1971

Semester- VIII
Course Name: Theory as Discourse
Course Code: BAPLSMJ801

Course Type: MAJOR	**Course Details: MJC-18**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–	30	–	70

Course Objectives

1. The paper will familiarize the students with the concepts that are central to the study of political science.
2. It will be helpful to explore, evaluate, justify, and interrogate public life and institutions.
3. This course will enable the students to acquire knowledge about the debates and discourse around the issues in the changing social and political context.

Content: Unit wise course content distribution
Theory
Unit 1: Political Theory: Concepts and Critique- Liberty, Equality, Rights, Justice, Democracy,

Citizenship and Power.

Unit 2: Critique of Liberalism- Communitarianism, Multiculturalism, Deliberative Democracy.

Unit 3: Interrogating Enlightenment: Post-Modernism, Post-Colonialism, Feminism.

Unit 4: Contemporary theories – Nationalism, Globalization and Environmentalism

Learning Outcomes

1 This course will help to understand the dynamics of Political Theory.

2 This course will help to understand Key concepts in Political Theory.

3 This course will be helpful in assessing the role of contemporary ideas in Political Theory like globalization and environmentalism.

Suggested Readings

1. Andrew Heywood: *Political Ideologies : An Introduction*

2. Rajiv Bhargava, Ashok , Acharya: *Political Theory : An Introduction*

3. Peri Robert and Peter Sutch : *An Introduction to Political Thought: A Conceptual Toolkit*

4. Isaiah Berlin : *Four Essays on Liberty*

5. Ronald Dworkin : Taking Rights Seriously

6. Will Kymlicka: *Contemporary Political Philosophy*

7. J. Rawls : *A Theory of Justice*

8. R. Noick: *Anarchy, State and Utopia*

9. R. Dworkin: *Sovereignty Virtue: The Theory and Practice of Equality*

10. J.Waldrone(ed): *Theories of Rights*

11. Andrew Vincent(ed) *Political Theory: Tradition and Diversity*

12. C.B Macpherson: *Democratic Theory: Essays in Retrieval*

13. Daphne Halikiopoulou, Sofia Vasilopoulou (ed) : *Nationalism and Globalization: Conflicting or Complementary?*

14. James Goodman and Paul James (Ed): *Nationalism and Global Solidarities*

15. Paul Hawken: *Blessed Unrest: How the Largest Movement in the World Came*

into Being and Why No One Saw It Coming

16. Javier Auyero and Débora Swistun: *Flammable: Environmental Suffering in an Argentine Shantytown*

17. Terry L. Anderson, Donald R. Leal: *Free Market Environmentalism*

18. James Gustave Speth: *Red Sky at Morning: America and the Crisis of the Global Environment*

Semester- VIII
Course Name: Research Methodology and Ethics
Course Code: BAPLSSRP801

(To be prepared later on as per the directions of the University)

Course Type: RP	**Course Details: RPC-1**			**L-T-P: 4 - 0 - 0**	
Credit: 4	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–		–	

Semester- VIII
Course Name: Research Project / Dissertation
Course Code: BAPLSSRP802

Course Type: RP	**Course Details: RPC-2**			**L-T-P: 0 - 0 - 16**	
Credit: 8	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–		–	

1. A permanent faculty with Ph. D. degree and at least two publications in peer reviewed journals can supervise a candidate.
2. The topic of Research Project/Dissertation paper must be related within the major discipline of Political Science.
3. The student must have secure 75% marks and above in the first six semesters.

Semester- VIII
Course Name: Gender and Politics in India
Course Code: BAPLSMN801

Course Type: MINOR	**Course Details: MNC-7**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the Gender-based participation in politics.

2 To understand conceptual differences between women and trans gender.

3 To understand Gender identity.

Content: Unit wise course content distribution
Theory
Unit 1: Conceptualizing Gender in Politics: Political Participation, policy making and development.

Unit 2: Security concern for Women and Third Gender/Transgender.

Unit 3: Effective participation of Women in Decision making structures: Issue of Reservation Impact.

Unit 4: Gender Identity: Women in riot and War.

Learning Outcome

1 Students will be able to understand the Gender-based participation in politics by this course.

2 They will be able to understand conceptual differences between women and trans gender.

3 This course will be beneficial for the students to understand Gender identity.

Suggested Readings

1. Geetha, V. *Gender*. (Calcutta: Stree).
2. Geetha, V. *Patriarchy*. (Calcutta: Stree).

3. Menon, Nivedita, *Gender and Politics in India*, Oxford India Paperbacks.

4. Saigol, Rubina, *Feminism in India*, (Women Unlimited Publication).

5. John, Mary E., *Women Studies in India: A reader* (ed.), (Penguin India Publication).

NEP SYLLABUS COMPUTER APPLICATION

National Curriculum and Credit Framework (NCCF)

Syllabus

for

Major, Minor and Skill Enhancement Courses

of

Bachelor of Computer Application

w.e.f. Academic Session 2023-24

KaziNazrul University

Asansol, Paschim Bardhaman

West Bengal 713340

Semester- I

MAJOR COURSE - 1

Course Name: Introduction to Programming using C

Course Code: BCAMJ101

<table>
<tr><td>Course Type: Major (Theoretical & Practical)</td><td colspan="2">Course Details:MJC-1</td><td colspan="2">L-T-P: 3–0–4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

UNIT I. Introduction to computers, Evolution, Generation of Computers, Computers Hierarchy, Different components of computer (CPU, ALU, different types of memory etc.), Number System – Binary, Hexa, Octal, BCD System, Introduction to operating environment.

UNIT II. Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Flowcharts, Types of Programming Methodologies, Introduction to C Programming - Basic Program Structure in C, Variables and Assignments, Input and Output, Selection and Repetition Statements.

UNIT III. Top-Down Design, Predefined Functions, Programmer-defined Function, Local Variable, Recursion - Developing Recursive Definition of Simple Problems and their implementation.

UNIT IV. Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays.Arrays in Functions, Multi-Dimensional Arrays, Searching in Array.

UNIT V. Pointers - Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Call-By-Value and Call-By-Reference Parameters.

UNIT VI. Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions.

UNIT VII. Strings - Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions.

UNIT VIII. File Handling – File opening modes, use of files for data input and output. merging and copy files.

Practical

UNIT I. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:

a) To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.

b) Learn how to use functions and parameter passing in functions, writing recursive programs.

UNIT II. Students should be given assignments on following:

a) Write Programs to learn the use of strings and string handling operations.

b) Problems which can effectively demonstrate use of Arrays. Structures and Union.

c) Write programs using pointers and functions.

d) Write programs to use files for data input and output.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks) – one from each unit, Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks) – one from each unit, Viva-voce (10 marks)

References/ Suggested Readings:

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson.
2. C Programming, Karnighan&Ritchie, PHI
3. Programming through C, Richard Johnsonbaugh and Martin Kalin, Pearson Education
4. Programming in C, B.S. Gottfried, Sahaum Series.
5. Programming in ANSI C, E. Balaguruswami, TMH

MINOR COURSE - 1

Course Name: Financial Accounting

Course Code: BCAMN101

Course Type: **Minor (Theoretical)**	Course Details:**MNC-1**			L-T-P: **4–1–0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Content:

Theory

UNIT I: Basic idea of Book Keeping and Accounting: Definition, Nature, Importance, Limitations, Difference between Book Keeping and Accounting. Accounting Principles: Generally Accepted Accounting Principles (GAAP) - Important Accounting Concepts: Proprietary, Entity, Fund, Money Measurement, Accounting Period, Going Concern, Duality, Realization and Accrual; Important Accounting Conventions: Disclosure, Materiality, Consistency, Comparability, Objectivity and Conservatism; Accounting Concept vs. Accounting Convention, Matching Concept, Relation of Accounting Theory with Accounting Practice.

UNIT II: Accounting Process: Journal: Definition, Features, Classification, Journal Entry; ledger: Definition, Classification, Ledger posting; Difference between Journal and Ledger;

UNIT III: Trial Balance: Definition, Importance, Errors, and Preparation of trial balance.

UNIT IV: Cash Book: Definition, Features, Types of Cash Book and Preparation of cash book under Single column method,Double column method,Triple column method and petty Cash Book

UNIT V: Depreciation-Concepts-Features-Causes-Diferent Methods of Depreciation on assets-Practical Problems on Straight line methods, Diminishing balance methods depreciation and Sinking Fund method

UNIT VI: Bad Debt and Provision for bad debt- Concepts-Features-Diference between bad debt and doubtful debt-accounting treatment of bad debt and doubtful debt

UNIT VII: Preparation of Financial Accounts of a profit-making trading Concern with additional information

UNIT VIII: Sectional and Self Balancing Ledgers: Concept of Sectional Balancing, preparation of control accounts. Self-Balancing Ledger: advantages; Recording process; preparation of Adjustment accounts.

References/ Suggested Readings:

1. Accounting Theory, Hendriksen, E.S., Khosla Publishing House, Delhi.
2. Accounting Theory, Lal, J. Himalaya Publishing House, Mumbai.
3. Accounting Theory, Porwal, L.S., Tata McGraw - Hill Publishing Co. Ltd., New Delhi.
4. Accounting Theory and Management Accounting, Sinha, G., Vidyoday Library Pvt. Ltd.
5. Financial Accounting, Goyal, Bhushan Kumar and H.N. Tiwari, Taxmann.
6. Financial Accounting, Kumar, Alok, Singhal Publication.
7. Financial Accounting – Concepts and Applications, Lt Bhupinder, Cengage.
8. Financial Accounting: concept and Applications, Monga, J R, Mayur paper Backs, New Delhi.

MULTIDISCIPLINARY COURSE - 1

Course Name: Information and Media Literacy

Course Code: MDC119

Course Type: **MD (Theoretical)**	Course Details:**MD-1**			L-T-P: **3–0–0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

Course Content:

Theory

UNIT I. Introduction to Information and Media Literacy: Definition and importance of information and media literacy. Interrelationships between data, information, knowledge, and wisdom; Understanding the role of information and media in society. Information source vs. Information resource; Information society; Exploring the impact of misinformation, disinformation and fake news.

UNIT II. Evaluating Information Sources: Concepts of primary, secondary and tertiary information sources; Parametrs for information authenticity andIdentifying credible sources of information. Assessing the reliability and validity of sources. Recognizing bias and evaluating multiple perspectives. Conducting effective research using library resources: library retrieval, use of large-scale textual search engines, electronic databases (bibliographic & full-text), AI-enabled search tools; Developing critical reading and note-taking skills.

UNIT III. Digital Literacy and Online Research: Developing effective search skills – search strategies, search techniques (Boolean, Relational and Positional search operators); Evaluating and selecting appropriate online resources. Citing and referencing sources accurately – use of open source reference management software. Evaluating and integrating information from various sources. Credibility, reliability, and bias in different types of sources (websites, articles, social media, etc.) Fact-checking and verification techniques.

UNIT IV. Privacy, Security, and Digital Citizenship: Understanding online privacy issues and protecting personal information. Recognizing digital threats and practicing safe online behavior. Promoting responsible digital citizenship and ethical online practices. Understanding the relationship between media, democracy, and civic participation. Promoting media literacy as a tool for active citizenship. Concept of research ethics and academic honour code.

UNIT V. Social Media, Information Sharing and Civic Engagement: Analyzing the impact of social media on information dissemination. Understanding the role of algorithms and filter bubbles. Engaging in responsible sharing and combating misinformation, disinformation and fake news.

References/ Suggested Readings:

1. Media Literacy in the Information Age: Current Perspectives" edited by Christina Spurgeon.
2. Media Literacy: A Reader" edited by David Buckingham
3. Information Literacy: Search Strategies, Tools & Resources for High School Students and College Freshmen" by Susanna Caroselli
4. Media Literacy Education in Action: Theoretical and Pedagogical Perspectives" edited by Belinha S. De Abreu and Paul Mihailidis
5. Information Literacy and Information Skills Instruction: Applying Research to Practice in the 21st Century School Library" by Nancy Pickering Thomas
6. Web Literacy for Educators" by Alan November
7. Information and Media Literacy: The Whole-Student Approach" by Dr. Belinha S. De Abreu

SKILL ENHANCEMENT COURSE - 1

Course Name: Office Automation Software Lab

Course Code: BCASE101

Course Type:SEC **(Practical)**	Course Details:**SEC-1**			L-T-P: **0–0–6**	
Credit: 3	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30		**20**	

Course Content:

Practical

UNIT I. Windows Basics: Introduction of windows OS, navigating the Windows 10 user interface, Creating accounts in Windows, Opening apps and programs, working with files, using the Start button and Start menu, Accessing and using the Action Center, Working with apps and programs on the taskbar, Customizing settings in Windows 10, including backgrounds, screensavers, and more, Using the Settings app and the Control Panel.

UNIT II. MS Word and Google Docs: Overview, creating, saving, opening, importing, exporting, and insertingfiles, formatting pages, paragraphs and sections, indents and outdents, creating lists andnumbering. Headings, styles, fonts and font size, editing, positioning, viewing texts,searching and replacing text, inserting page breaks, page numbers, bookmarks, symbols, anddates. Using tabs and tables, header, footer, and printing,

UNIT III. MS Excel and Google Sheets: Worksheet overview, entering information, worksheet creation, openingand saving workbook, formatting numbers and texts, protecting cells, producing charts, andprinting operations. Application of Excel for obtaining statistical parameters, Mean, Median,Mode, average, co-relation, Regression, Data capturing using Google Forms.

UNITIV. MS PowerPoint or Google Slides: Slide creation with PowerPoint, Presenting shows for corporate and commercial using PowerPoint.

UNIT V. Graphics and Image Editing Software: Overview of graphic design and image editing applications (e.g., Adobe Photoshop, GIMP), Understanding basic image editing techniques (e.g., cropping, resizing, retouching), Creating and manipulating graphics for various purposes.

UNIT VI. Web Browsing and Internet Applications: Navigating web browsers and utilizing essential features, Understanding internet protocols and security considerations, Exploring common internet applications (e.g., email clients, cloud storage, online collaboration tools).

UNIT VII. File Compression and Archiving Software: Introduction to file compression formats (e.g., ZIP, RAR), Compressing and decompressing files and folders, Managing archived files and folders.

Internal (CA) Evaluation: Practical Note Book (15 marks), One experiment (10 marks), Viva-voce (5 marks).

ESE Evaluation: One experiment (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. Introduction to Computers with MS-Office, Leon, TMH
2. Learn Microsoft Office 2019, Linda Foulkes, HP.

Semester- II

MAJOR COURSE - 2

Course Name: Data Structures and Algorithms

Course Code: BCAMJ201

<table>
<tr><td>Course Type: Major (Theoretical & Practical)</td><td colspan="2">Course Details:MJC-2</td><td colspan="2">L-T-P: 3–0–4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

UNIT I. Basic concepts- Data, Data Structures, ADT, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis, Linear and Non Linear data structures.

UNIT II. Singly Linked Lists - Operations, Concatenating, Circularly linked lists - Operations for Circularly linked lists, Doubly Linked Lists - Operations. Polynomial and sparse matrix representation using linked list.

UNIT III. Stack- Definition and Operations, Array and Linked Implementations, Applications - Valid Expression Checking (Parenthesis matching), Reversal of string, Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation.

UNIT IV. Queue - Definition and Operations, Array and Linked Implementations, Applications, Circular Queues - Insertion and Deletion Operations, Priority Queue- Definition and Implementation, Dequeue (Double Ended Queue) - Introduction.

UNIT V. Searching Methods – Linear and Binary.

UNIT VI. Sorting Methods – Bubble, Insertion, Selection, Shell, Using Divide-Conquer Approach (Quick and Merge sort), Comparison of Sorting Methods.

UNIT VII. Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Binary Search tree - Creation, Insertion, Deletion and Search, AVL tree- Definition, Examples, Insertion and Rotations, B tree, B+ tree, Heap- Definition, Min heap, Max heap, Insertion and Deletion. Priority Queue using Heap.

UNIT VIII. Graphs, Graph ADT, Graph Representations, Graph Traversals and Searching,

Practical

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable data structures and operations. Some of the problems are indicated below.

1. Write program that uses functions to perform the following:
   a) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
   b) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
   c) To display the elements in forward / reverse order
2. Write recursive programs for Factorial, Fibonacci numbers, Towers of Hanoi etc.
3. Write a program to implement stack (using array and linked list). Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion, postfix evaluation).
4. Write programs to implement queue using array and linked list.
5. Write program that implements linear (using array and linked list) and binary search.
6. Write programs of a) Bubble sort b) Insertion Sort c) Selection Sort d) Quicksort etc.
7. Write a program to create a Binary Search Tree and insertion and deletion of node from the tree. Write recursive and non-recursive routines to traverse a binary tree in preorder, inorder and postorder.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson.
3. Data structures,Lipschutz: Schaum's outline series, Tata McGraw-Hill
4. Data Structure through C in Depth, S.K. Srivastava and DeepaliSrivastava, B.P.B Publication.

MINOR COURSE - 2

Course Name: Cost Accounting

Course Code: BCAMN201

Course Type: **Minor (Theoretical)**	Course Details:**MNC-2**			L-T-P: **4–1–0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Content:

Theory

UNIT I. Introduction Meaning, scope, objectives and advantages of cost accounting; Cost centre and Cost Unit, Difference between financial and cost accounting, Limitation of Cost accounting, Classifications of cost.

UNIT II: Elements of cost and cost sheet.

UNIT III. Materials: Material/inventory control techniques. Accounting and control of purchases, storage and issue of materials. Inventory systems, EOQ, Various levels of stocks, Methods of pricing of materials issues — FIFO, LIFO, Simple Average method, Weighted average method and base stock method.

UNIT IV: Labour: Accounting and Control of labour cost. Time-keeping and time-booking. Concept of idle time, over time, labour turnover and fringe benefits. Methods of wage payment, Time Rate, Piece Rate, and Incentive schemes- Halsey, Rowan, Requisites of Good Wages Incentive Plan;

UNIT-V: Overheads: Classification, allocation, apportionment and absorption of overheads, Under- and over- absorption; Causes and treatment of Under- and over- absorption, Machine Hour Rate.

UNIT VI. Budgetary Control: Definition, features, importance, Classification Zero based Budgeting and Responsibility Accounting, Preparation of Cash Budget and Flexible Budget.

UNIT VII. Marginal Costing-concept of marginal cost and marginal costing; Assumptions, Cost-volume-profit analysis; Break-even analysis-using mathematical and graphical approaches, Profit-volume ratio, angle of incidence, margin of safety.

UNIT VIII: Standard Costing: Standard Costing and Variance Analysis: Meaning of standard cost and standard costing; advantages, limitations and applications; Variance Analysis – Material Variances and Labour Variances.

References/ Suggested Readings:

1. Cost Accounting-principles and practice, Arora, M.N., Vikas Publishing House, New Delhi.
2. Fundamentals of Cost Accounting, Jhamb, H. V., Ane Books Pvt Ltd, New Delhi.
3. Cost Accounting, Lal, Jawahar., and Srivastava, Seema, McGraw Hill Publishing Co., New Delhi.
4. Fundamentals of Cost Accounting, Singh, Surender, KitabMahal, Allahabad/New Delhi.
5. Management and Cost Accounting, Drury, Colin,Thomson Learning.
6. Cost Accounting: A Managerial Emphasis, Horngren, Charles T., George Foster and Srikant M. Dattar. Prentice Hall of India Ltd., New Delhi.
7. Cost Accounting: Principles and Methods, Jain, S.P., and Narang, K.L., Kalyani Publishers, Jalandhar.

SKILL ENHANCEMENT COURSE - 2

Course Name: Web Designing with HTML, CSS

Course Code: BCASE201

<table>
<tr><td>Course Type: SEC
(Practical)</td><td colspan="2">Course Details:SEC-2</td><td colspan="2">L-T-P: 0–0–6</td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks:
50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td></td><td>20</td><td></td></tr>
</table>

Course Content:

Practical

Students are directed to do a minor project based on the contents of the course below (UNIT I to UNIT X) for internal and ESE evaluation.

UNIT I. Introduction to Web Design: Understanding the role and importance of web design, Exploring the components of a web page, Overview of web design principles and best practices.

UNIT II. Introduction to HTM: Understanding the structure and syntax of HTML, Working with HTML tags, attributes, and elements, Creating a basic web page using HTML.

UNIT III. HTML Document Structure: Defining the document type and character encoding, Organizing content with headings, paragraphs, lists, and tables, Incorporating images, links, and multimedia elements.

UNIT IV. HTML Forms and Input Validation: Creating forms for user input, Utilizing different form elements (e.g., text fields, checkboxes, radio buttons), Implementing form validation using HTML attributes.

UNIT V. Introduction to CSS: Understanding the purpose and benefits of CSS, Working with CSS selectors, properties, and values, Applying CSS styles to HTML elements.

UNIT VI. Styling Text and Typography: Formatting text using CSS properties (e.g., font-family, font-size, color), Applying text effects (e.g., bold, italic, underline), Customizing typography using Google Fonts and other resources.

UNIT VII. Box Model and Layouts: Understanding the box model concept, Controlling element dimensions, padding, margins, and borders, Creating different layout structures (e.g., fixed, fluid, responsive).

UNIT VIII. CSS Flexbox and Grid: Introduction to CSS Flexbox for flexible page layouts, Utilizing CSS Grid for advanced grid-based layouts, Creating responsive designs with media queries.

UNIT IX. Styling Links, Navigation, and Menus: Customizing link styles and states, Creating navigation menus using HTML lists and CSS, Implementing dropdown menus and responsive navigation patterns.

UNIT X. CSS Transitions and Animations: Creating smooth transitions between CSS states, Adding animations to elements using key frames and CSS properties, Incorporating CSS animation libraries and frameworks.

Internal (CA) Evaluation: Minor Project Report (15 marks), Demonstration of the minor project (10 marks), Viva-voce (5 marks).

ESE Evaluation: Presentation of the minor project (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. HTML & CSS: design and build websites, John Duckett, John Wiley & Sons, Inc.
2. Beginning Responsive Web Design with HTML5 and CSS3, Jonathan Fielding, Apress.

Semester- III

MAJOR COURSE - 3

Course Name: Object Oriented Programming with C ++

Course Code: BCAMJ301

<table>
<tr><td>Course Type: Major (Theoretical & Practical)</td><td colspan="3">Course Details:MJC-3</td><td colspan="2">L-T-P: 3–0–4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

UNIT I: Principles of Object Oriented Programming (OOP), Software Evaluation, A Look at ProcedureOriented Programming, OOP Paradigm, Basic Concepts of OOP, Benefits of OPP, Application of OOP.

UNIT II: Introduction to C++ What is C++, A simple C++ Program, More C++ statements, Structure of C++ Program. Tokens, Expression and controls Structures Tokens , Keywords, Identifiers and Constants, C++ data types, Variables: Declaration, Dynamic initialization of variables, Reference variables, Operators in C++ : Scope resolution operator, Member deferencing Operators, Memory Management Operators, Manipulators, Type cast operators, Expressions and Control Structures. Functions The main() function, Function Prototyping, Call by reference, Return by reference, Inline function, Function Overloading.

UNIT III: Classes and Objects Introduction, Specifying a Class, Defining member Functions, C++ Program with Class, Nesting of Member functions, Private member functions, Memory Allocation for Objects, Static Data members, Static Member Functions, Arrays within a Class, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects. Pointers Pointers : Declaration and initializing, Manipulation of pointers, pointers Expression and Pointer Arithmetic, Pointer with Arrays, Arrays of Pointers, Pointers to objects, this pointers, Arrays of Pointers to Objects Constructors and Destructors Constructors, Parameterized Constructors, Multiple Constructors in a class, Copy constructor, Destructors. Operator overloading Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Type Conversions.

UNIT IV: Inheritance and Polymorphisms Introduction, Defining Derived Classes, Single inheritance, Multiple inheritance, Hierarchical inheritance, Multilevel inheritance, Hybrid inheritance, Virtual Base Classes, Polymorphism, static and dynamic binding, Constructor in Derived Classes, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT V: I/O Operations and Files C++ Stream Classes, Unformatted I/O Operations, Formatted I/O operations, Classes for File Streams, Opening and Closing a File : open() and close() functions, Manipulators of File Pointers : seekg(), seekp(), tellg(), tellp() functions, Sequential Input and output

Operations : put (), get(), write(), read() functions, Error handling File Operations : eof(), fail(), bad(), good() .

Practical

Students are required to understand the object-oriented concepts using C++. They are required to practice the concepts learnt in the theory. Some of the programs to be implemented are listed as follows:

1. Number of vowels and number of characters in a string.
2. Write a function called zeros maller() that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a main() program to access this function.
3. Demonstration of Class, Constructors, destructors, input and output functions, Objects
4. Demonstration of array of object.
5. Demonstration of friend functions.
6. Demonstration of operator overloading.
7. Demonstration of inheritance.
8. Using this pointer to return a value (return by reference).
9. Demonstration of virtual function.
10. Demonstration of static function.
11. Accessing a particular record in a student's file.
12. Demonstration of exception handling.
13. Demonstration of class template and function template

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks).

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. E.Balagurusamy, Object Oriented Programming through C++, TMH.
2. Lafore Robert, Object Oriented Programming in Turbo C++, Galgotia Publications.
3. Herbert Schildt, C++: The Complete Reference, McGraw Hill.
4. B. Stroutstrup, The C++ Programming Language, 3rd Edition, Pearson Education.
5. Ashok N Kamthane, Programming in C++, Pearson.

MAJOR COURSE - 4

Course Name: Digital Logic and Computer Organization

Course Code: BCAMJ302

<table>
<tr><td>Course Type: Major (Theoretical & Practical)</td><td colspan="2">Course Details:MJC-4</td><td colspan="2">L-T-P: 3–0–4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

Theory

Unit I: Introduction to Computer-Definition of Computer System; Evolution of Computer – a brief history; Classification of computer; Generation of Computers.

Unit II: Computer System Architecture – Definition of Hardware; Basic units of Computer System; CPU – Control Unit, ALU; System Buses, Memory module – Primary Memory, Secondary Memory, Cache Memory, Virtual Memory – definition, classification, features and functions; measuring unit of memory – Bit, Byte, KB, MB, GB; Input Devices – Keyboard, Mouse, Scanner, Output Devices – Monitor, Printer.

Unit III: Introduction to Number System – Positional number systems; Binary, Octal, Hexadecimal and Decimal number systems; conversion of a number in one system to the other; Representation of signed numbers- signed magnitude, one's complement, 2's complement representation techniques, Merits of 2's complement representation scheme; Various binary codes- BCD, excess -3, Gray code; Binary arithmetic- addition, subtraction, multiplication and division of unsigned binary numbers.

Unit IV: Introduction to Software – Definition of Software; Classification of Software; Introduction to Operating System – Definition of OS; Application Softwares, Functions of OS, basic concept of different type of OS- batch processing OS, Multitasking OS, Multi-user OS, Network OS.

Unit V: Logic gates: Basic logic operations- logical sum(or), logical product (AND), complementation (not), Anti coincidence (EX-OR)and coincidence (EX-NOR) operations: Truth tables of Basic gates; Boolean Variables and Expressions; Demorgan's theorem; Universal gates- NAND and NOR; Boolean expressions Simplification- Algebraic technique, Karnaugh map technique, 3 variable and 4 variable Karnaugh map.

Unit VI: Combinational Circuits: Half adder, full adder, binary magnitude comparator, adder/subtractor circuits, multiplexer and demultiplexer circuits, BCD adder/subtractor; ALU; parity generators, code converters, priority encoders, PLAs.

Unit VII: Sequential circuits: flip- flops, - RS, clocked RS, D, JK, T flip-flops,: Race condition, Master Slave JK: Registers, Universal Shift Registers; Counters- Binary, decade; modulo-r divider; Practical IC's; Sequential Machine design.

Unit VIII: Basic Computer Organization and Design: Overview of computer architecture; Von Neumann architecture and its components; CPU, memory, input/output units; Instruction cycle, fetch-decode-execute; Data transfer and control signals

Unit IX: Processor Design and Control Unit: Basic structure of the CPU; Processor design: Control unit, Arithmetic and Logic Unit (ALU); Control unit design: Hardwired vs. Microprogrammed; Instruction set architecture (ISA); RISC vs. CISC processors; Pipelining concepts: Basic, instruction-level parallelism.

Practical

Unit I: Study on the characteristic of AND, OR, NAND, NOR, EX-OR, EX-NOR gates.

Unit II: Design of different combinational circuit such as half adder/subtractor, full adder/subtractor, decoder/encoder, priority encoder, multiplexer, demultiplexer, magnitude comparator etc.

Unit III: Study on the characteristic of different flip-flops-JK, RS, T, D etc.

Unit IV: Design and implementation of different sequential circuit such as shift register, counter-decimal, ripple etc.

CA (Internal) Evaluation: Laboratory Note Book (15 marks), Two Experiments (10 marks) – one from UNIT I-V and another from UNIT VI-IX., Viva-voce (5 marks).

ESE Evaluation: Two Experiments (10 marks) – one from UNIT I-V and another from UNIT VI-IX., Viva-voce (10 marks).

References/ Suggested Readings:

1. M. Morris Mano, Digital Logic, Pearson.
2. D.P. Leach, A.P. Malvino and G. Saha, Digital Principles and Applications, McGraw-Hill.
3. Modern Digital Electronics: R.P. Jain, Tata McGraw Hill.

MINOR COURSE - 3

Course Name: Introduction to Algebra

Course Code: BCAMN301

Course Type: **Minor (Theoretical)**	Course Details:**MNC-3**			L-T-P: **4–1–0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**30**	**-**	**70**

Course Content:

Theory

Unit I. Set: Sets and their representations,Finite and Infinite sets,Empty set. Power set. Equal sets. Subsets.Properties of Complement Sets.Venn diagrams. Difference of sets.Complement of a set.Universal set. Subsets of a set of real numbers especially intervals (with notations).Union and Intersection of sets and Practical Problems based on sets.

Relations and Functions: Defination,Types of relations: reflexive, symmetric, transitive and equivalence relations. Injective,surjective and bijective functions.

Unit II. Complex Number: Conjugate of a complex number, modulus of a complex Number, geometrical representation of complex number, De Moivre's theorem, nth roots of a complex number.

UNIT III. Permutations & Combinations: Fundamental Principle of counting. Factorial n. (n!) Permutations and combinations, derivation of formulae and their connections, simple applications.

UNIT IV. Matrices: Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations on matrices: Addition and multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication. Non-commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

Unit V. Determinants: Determinant of a square matrix (up to 3 x 3 matrices), minors, co-factors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix,Cramer’s rule.

Unit VI. Modern algebra: Introduction to Group, Ring, Field, integral domain with simple examples.
Theory of equations:Polynomials, Division algorithm, Fundamental theorem of classical algebra (Proof not required),Descartes rule of sign and their application, Relation between roots and coefficients; symmetric function of roots, Transformation of polynomial equation, Cardon's solution of cubic equation

Unit VII. Sequence and series: Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), Geometric Mean (G.M,) relation between A.M. & G.M., Arithmetic-Geometric Progression Series (AGP series), infinite G.P. and its sum.

Unit VIII. Vector Algebra: Scalars & vectors, vector addition, linear combination of vectors, condition of colinearity of three points, scalar and vector products, scalar triple product and vector triple product.

Unit IX. Surd and Indices: Basics of Surd and Indices.

Logarithm: Basics of logarithm.

References/ Suggested Readings:

1. Chakravorty and Ghosh, Advanced Higher Algebra, Dhar and Sons. Pvt. Ltd.
2. Chakravorty and Ghosh, Vector Analysis, Dhar and Sons. Pvt. Ltd.

Semester- IV

MAJOR COURSE - 5

Course Name: Operating System

Course Code: BCAMJ401

<table>
<tr><td>Course Type: Major (Theoretical & Practical)</td><td colspan="2">Course Details:MJC-5</td><td colspan="2">L-T-P: 3–0–4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

Theory

UNIT I. (Introduction to Operating System) What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT II. (Operating System Organization and Process Characterization) Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Preemptive Scheduling Algorithms.

UNIT III. Process Management (Deadlock) Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

UNIT IV. (Inter Process Communication and Synchronization) Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT V. (Memory Management) Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory; Page Replacement Algorithms.

UNIT VI. (File and I/O Management, Disk Scheduling, OS security) Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared

Memory, Disk Scheduling (FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK), Security Policy Mechanism, Protection, Authentication and Internal Access Authorization.

UNIT VII. (Introduction to Android Operating System) Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System.

References/ Suggested Readings:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.

Practical

UNIT I. Students are required to write and practically execute programs to solve following problems using C programming language.

1. WRITE A PROGRAM (using fork() and/or exec() commands) where parent and child execute: a) same program, same code. b) same program, different code. c) before terminating, the parent waits for the child to finish its task.
2. WRITE A PROGRAM to report behavior of Linux kernel including kernel version, CPU type and model. (CPU information)
3. WRITE A PROGRAM to report behavior of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
4. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.
5. WRITE A PROGRAM to copy files using system calls.
6. Write programs to implement scheduling algorithms (FCFS, Round Robin, SJF, SRJF)
7. Write program to implement non-preemptive priority based scheduling algorithm.
8. Write program to implement preemptive priority based scheduling algorithm.
9. Write program to calculate sum of n numbers using thread library.
10. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.

UNIT II. UNIX and Shell Scripts

1. External and internal commands of UNIX
2. What is shell and various type of shell, Various editors present in unix/linux
3. Different modes of operation in vi editor
4. What is shell script, Writing and executing the shell script
5. Shell variable (user defined and system variables)
6. System calls, Using system calls
7. Pipes and Filters
8. Decision making in Shell Scripts (If else, switch), Loops in shell
9. Functions
10. Utility programs (cut, paste, join, tr, uniq utilities), Pattern matching utility (grep).

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks) – one from each unit, Viva-voce (5 marks).

ESE Evaluation: Two experiments (10 marks) – one from each unit, Viva-voce (10 marks).

References/ Suggested Readings:

1. Sumitabha, Das, Unix Concepts and Applications, Tata McGraw-Hill Education.
2. Nemeth Synder and Hein, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010.
3. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The sockets Networking API, Vol. 1, 3rd Edition, 2014.
4. Yashavant Kanetkar , UNIX Shell Programming, BPB Publication.
5. Kernighan and Pike, The Unix Programming Environment, Prentice-Hall.

MAJOR COURSE - 6

Course Name: Database Management System

Course Code: BCAMJ402

<table>
<tr><td rowspan="2">Course Type: Major (Theoretical & Practical)</td><td colspan="3" rowspan="2">Course Details:MJC-6</td><td colspan="2">L-T-P: 3–0–4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

Unit I. Introduction: Basic Concept, Drawbacks of File Management; Advantages of DBMS; Layered Architecture of Database, Data Independence; Data Models; Schemas and Instances; Database Languages; Database Users, DBA; Data Dictionary; Functional Components of a DBMS.

Unit II. ER Model: Entity, Attributes and Relationship; Structural Constraints; Keys (candidate, super, foreign, primary); Weak & strong Entity Set; ER Diagram; Specialization and Generalization; Constraints of Specialization and Generalization; Aggregation.

Unit III. Relational Model: Basic Concepts of Relational Model; Relational Algebra, introduction to Tuple Relational Calculus.

Unit IV. SQL: DDL, DCL, DML commands, aggregate functions, create a database table, create relationships between database tables, modify and manage tables, queries, create view.

Unit V. Integrity Constraints: Domain Constraints, Referential Integrity.

Unit VI. Relational Database Design: Problems of Un-Normalized Database; Functional Dependencies, Derivation Rules, Closure of FD Set, Membership of a Dependency, Canonical Cover; Decomposition to 1NF, 2NF, 3NF or BCNF Using FDs; Lossless Join Decomposition & Dependency Preservation.

Unit VII. Transaction Processing: ACID properties, concurrency control

Practical

Students are required to practice the concepts learnt in the theory by designing and querying a database for a chosen organization (Like Library, Transport etc). The teacher may devise appropriate weekly lab assignments to help students practice the designing , querying a database in the context of example database. Some indicative list of experiments is given below.

Experiment 1: E-R Model Analyze the organization and identify the entities , attributes and relationships in it. . Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Experiment 2: Concept design with E-R Model Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).

Experiment 3: Relational Model Represent all the entities (Strong, Weak) in tabular fashion. Represent relation ships in a tabular fashion.

Experiment 4: Normalization Apply the First, Second and Third Normalization levels on the database designed for the organization

Experiment 5: Practicing DDL commands,Creating databases, How to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.

Experiment 6: Practicing DML commands on the Database created for the example organization DML commands are used to for managing data within schema objects. Some examples: ● SELECT - retrieve data from the a database ● INSERT - insert data into a table ● UPDATE - updates existing data within a table ● DELETE - deletes all records from a table, the space for the records remain

Experiment 7: Querying practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Experiment 8: Querying (continued…) Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education,2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.
5. Ullman, Principles of Database Systems, Galgotia Publications.

MINOR COURSE - 4

Course Name: Introduction to Calculus and Differential Equation

Course Code: BCAMN401

Course Type: **Minor (Theoretical)**	Course Details:**MNC-4**			L-T-P: **4–1–0**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Course Content:

Theory

Unit I. Differential Calculus:

Limit of a function and continuity. Fundamental properties of continuous functions (proofs not required).

Derivative: Differentiation of powers of x, Differentiation of exp and log x, differentiation of trigonometric functions, Rules for finding derivatives, Different types of differentiation, logarithmic differentiation, differentiation by substitution, differentiation of implicit functions, differentiation from parametric equation. Differentiation from first principles.Second order derivatives.

Successive differentiation. Leibnitz's theorem.

Rolle's theorem, Mean-Value theorems—Lagrange's and Cauchy's.

Partial Derivatives.Euler's theorem on homogeneous functions of two variables.

Application of derivatives:Maxima-Minima, Determining Increasing and Decreasing Functions.

Unit II. Integral Calculus:

Integration of standard Functions, rules of Integration, More formulas in integration, Definite integrals and their elementary properties. Area of a simple curves using definite integral.

Unit III. Differential equations

First order differential equations, practical approach to Differential equations, first order and first degree differential equations, separation of variable, homogeneous equations. Linear

equations, Bernoulli's equation, Exact Differential Equations, Integrating factors. Oblique and orthogonal trajectories, equations of first order but not first degree, Clairaut's form, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, method of variation of parameters.

References/ Suggested Readings:

1. Chakravorty and Ghosh, Differential Equations, Dhar and Sons. Pvt. Ltd.

SKILL ENHANCEMENT COURSE - 3

Course Name: Reasoning and Aptitude

Course Code: BCASE401

<table>
<tr><td>Course Type: SEC
(Theoretical)</td><td colspan="2">Course Details:SEC-3</td><td colspan="2">L-T-P: 3–0–0</td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks:
50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td></td><td>15</td><td></td><td>35</td></tr>
</table>

Course Content:

Theory

UNIT I. Quantitative Ability (Basic Mathematics): Number Systems, LCM and HCF, Decimal Fractions, Simplification, Square Roots and Cube Roots, Average, Problems on Ages, Surds & Indices, Percentages, Problems on Numbers.

UNIT II. Quantitative Ability (Applied & Engineering Mathematics), Logarithm, Permutation and Combinations, Probability, Profit and Loss, Simple and Compound Interest, Time, Speed and Distance, Time & Work, Ratio and Proportion, Area, Mixtures and Allegation.

UNIT III. Data Interpretation, Data Interpretation, Tables, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Venn Diagrams.

UNIT IV. Logical Reasoning (Deductive Reasoning), Analogy, Blood Relation, Directional Sense, Number and Letter Series, Coding – Decoding, Calendars, Clocks, Venn Diagrams, Seating Arrangement, Syllogism, Mathematical Operations.

References/ Suggested Readings:

1. R S Agarwal, A Modern Approach To Verbal & Non Verbal Reasoning, S Chand Publishing.
2. R S Agarwal, Quantitative aptitude for Competitive examination, S Chand Publishing.
3. Abhijit Guha, Quantitative Aptitude by Competitive Examinations. McGraw Hill Education.
4. B.S. Sijwalii and Indu Sijwali, A New Approach to REASONING Verbal & Non-Verbal, Arihant Publications.

Internal (CA) Evaluation: To be decided by the college/institution.

ESE Evaluation: 35 MCQs to be answered from 40 MCQs given.

NEP SYLLABUS COMPUTER SCIENCE

National Curriculum and Credit Framework (NCCF)

Syllabus

for

Computer Science

w.e.f. Academic Session 2023-24

Kazi Nazrul University

Asansol, Paschim Bardhaman

West Bengal 713340

Semester- I

MAJOR COURSE - 1

Course Name: Introduction to Programming using C

Course Code: BSCCOSMJ101

<table>
<tr><td rowspan="2">Course Type: Major (Theoretical & Practical)</td><td colspan="3" rowspan="2">Course Details: MJC-1</td><td colspan="2">L-T-P: 3 – 0 – 4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

UNIT I. Introduction to computers, Evolution, Generation of Computers, Computers Hierarchy, Different components of computer (CPU, ALU, different types of memory etc.), Number System – Binary, Hexa, Octal, BCD System, Introduction to operating environment.

UNIT II. Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Flowcharts, Types of Programming Methodologies, Introduction to C Programming - Basic Program Structure in C, Variables and Assignments, Input and Output, Selection and Repetition Statements.

UNIT III. Top-Down Design, Predefined Functions, Programmer-defined Function, Local Variable, Recursion - Developing Recursive Definition of Simple Problems and their implementation.

UNIT IV. Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays.Arrays in Functions, Multi-Dimensional Arrays, Searching in Array.

UNIT V. Pointers - Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Call-By-Value and Call-By-Reference Parameters.

UNIT VI. Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions.

UNIT VII. Strings - Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions.

UNIT VIII. File Handling – File opening modes, use of files for data input and output. merging and copy files.

Practical

UNIT I. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:

a) To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.

b) Learn how to use functions and parameter passing in functions, writing recursive programs.

UNIT II. Students should be given assignments on following:

a) Write Programs to learn the use of strings and string handling operations.

b) Problems which can effectively demonstrate use of Arrays. Structures and Union.

c) Write programs using pointers and functions.

d) Write programs to use files for data input and output.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks) – one from each unit, Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks) – one from each unit, Viva-voce (10 marks)

References/ Suggested Readings:

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson.
2. C Programming, Karnighan & Ritchie, PHI
3. Programming through C, Richard Johnsonbaugh and Martin Kalin, Pearson Education
4. Programming in C, B.S. Gottfried, Sahaum Series.
5. Programming in ANSI C, E. Balaguruswami, TMH

MINOR COURSE - 1

Course Name: Introduction to Programming using C

Course Code: BSCCOSMN101

Course Type: **Minor (Theoretical & Practical)**	Course Details: **MNC-1**			L-T-P: **3 – 0 – 4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Content:

Theory

UNIT I. Introduction to computers, Evolution, Generation of Computers, Computers Hierarchy, Different components of computer (CPU, ALU, different types of memory etc.), Number System – Binary, Hexa, Octal, BCD System, Introduction to operating environment.

UNIT II. Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Flowcharts, Types of Programming Methodologies, Introduction to C Programming - Basic Program Structure in C, Variables and Assignments, Input and Output, Selection and Repetition Statements.

UNIT III. Top-Down Design, Predefined Functions, Programmer-defined Function, Local Variable, Recursion - Developing Recursive Definition of Simple Problems and their implementation.

UNIT IV. Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays.Arrays in Functions, Multi-Dimensional Arrays, Searching in Array.

UNIT V. Pointers - Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Call-By-Value and Call-By-Reference Parameters.

UNIT VI. Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions.

UNIT VII. Strings - Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions.

UNIT VIII. File Handling – File opening modes, use of files for data input and output. merging and copy files.

Practical

UNIT I. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:

a) To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.

b) Learn how to use functions and parameter passing in functions, writing recursive programs.

UNIT II. Students should be given assignments on following:

a) Write Programs to learn the use of strings and string handling operations.

b) Problems which can effectively demonstrate use of Arrays. Structures and Union.

c) Write programs using pointers and functions.

d) Write programs to use files for data input and output.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks) – one from each unit, Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks) – one from each unit, Viva-voce (10 marks)

References/ Suggested Readings:

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson.
2. C Programming, Karnighan & Ritchie, PHI
3. Programming through C, Richard Johnsonbaugh and Martin Kalin, Pearson Education
4. Programming in C, B.S. Gottfried, Sahaum Series.
5. Programming in ANSI C, E. Balaguruswami, TMH

MULTIDISCIPLINARY COURSE - 1

Course Name: Information and Communication Technology

Course Code: MDC117

Course Type: **MD (Theoretical)**	Course Details:**MD-1**			L-T-P: **3–0–0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	**15**	**---**	**35**

Course Content:

Theory

UNIT I. Introduction to ICT: Definition of ICT and its significance in today's world, Historical evolution of ICT and major milestones,ICT's role in Education, ICT's role in various industries and societal impacts.

UNIT II. Computer Systems and Architecture: Overview of computer hardware components, CPU, memory, storage devices, and peripherals, Basics of computer architecture and operating systems.

UNIT III. Software and Programming Fundamentals: Introduction to software types: system software, application software, and programming languages, Basics of algorithm design and problem-solving techniques.

UNIT IV. Data Communication and Networks: Understanding data transmission and communication protocols, Introduction to network topologies and architectures, Local Area Networks (LANs), Wide Area Networks (WANs), and the Internet.

UNIT V. Basics of Email: Traditional mail vs Email, Understanding of email addresses, setting up your own email account, Email providers,E-mail protocols, Format of an E- mail message, Description of E-mail Headers, E- mail contents and encoding, E-mail clients.

UNIT VI. Emerging Technologies: The importance of information security in ICT, Cloud Computing and Virtualization: Understanding cloud computing models (SaaS, PaaS, IaaS), Virtualization technologies and their role in cloud infrastructure, Evolution of mobile technologies and their impact on ICT, Exploration of cutting-edge technologies (e.g., Internet of Things, Artificial Intelligence, Virtual Reality).

UNIT VII. Ethical and Social Implications of ICT: Ethical considerations in the use of ICT and data privacy, ICT's impact on society, economy, and the environment.

References/ Suggested Readings:

1. P S Kawatra, Fundamentals of Information and Communication Technology (ICT), B.R. Publishing Corporation.
2. C. Thatchinamoorthy, Fundamentals of Information Communication Technology, Notion Press.

SKILL ENHANCEMENT COURSE - 1

Course Name: Office Automation Software Lab

Course Code: BSCCOSSE101

<table>
<tr><td rowspan="2">Course Type: SEC
(Practical)</td><td colspan="2" rowspan="2">Course Details: SEC-1</td><td colspan="2">L-T-P: 0 – 0 – 6</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks:
50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>---</td><td>20</td><td>---</td></tr>
</table>

Course Content:

Practical

UNIT I. Windows Basics: Introduction of windows OS, navigating the Windows 10 user interface, Creating accounts in Windows, Opening apps and programs, working with files, using the Start button and Start menu, Accessing and using the Action Center, Working with apps and programs on the taskbar, Customizing settings in Windows 10, including backgrounds, screensavers, and more, Using the Settings app and the Control Panel.

UNIT II. MS Word and Google Docs: Overview, creating, saving, opening, importing, exporting, and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. Headings, styles, fonts and font size, editing, positioning, viewing texts, searching and replacing text, inserting page breaks, page numbers, bookmarks, symbols, and dates. Using tabs and tables, header, footer, and printing,

UNIT III. MS Excel and Google Sheets: Worksheet overview, entering information, worksheet creation, opening and saving workbook, formatting numbers and texts, protecting cells, producing charts, and printing operations. Application of Excel for obtaining statistical parameters, Mean, Median, Mode, average, co-relation, Regression, Data capturing using Google Forms.

UNIT IV. MS PowerPoint or Google Slides: Slide creation with PowerPoint, Presenting shows for corporate and commercial using PowerPoint.

UNIT V. Graphics and Image Editing Software: Overview of graphic design and image editing applications (e.g., Adobe Photoshop, GIMP), Understanding basic image editing techniques (e.g., cropping, resizing, retouching), Creating and manipulating graphics for various purposes.

UNIT VI. Web Browsing and Internet Applications: Navigating web browsers and utilizing essential features, Understanding internet protocols and security considerations, Exploring common internet applications (e.g., email clients, cloud storage, online collaboration tools).

UNIT VII. File Compression and Archiving Software: Introduction to file compression formats (e.g., ZIP, RAR), Compressing and decompressing files and folders, Managing archived files and folders.

Internal (CA) Evaluation: Practical Note Book (15 marks), One experiment (10 marks), Viva-voce (5 marks).

ESE Evaluation: One experiment (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. Introduction to Computers with MS-Office, Leon, TMH.
2. Learn Microsoft Office 2019, Linda Foulkes, HP.

Semester- II

MAJOR COURSE - 2

Course Name: Data Structures and Algorithms

Course Code: BSCCOSMJ201

Course Type: **Major (Theoretical & Practical)**	Course Details: **MJC-2**			L-T-P: **3 – 0 – 4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Content:

Theory

UNIT I. Basic concepts- Data, Data Structures, ADT, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis, Linear and Non Linear data structures.

UNIT II. Singly Linked Lists - Operations, Concatenating, Circularly linked lists - Operations for Circularly linked lists, Doubly Linked Lists - Operations. Polynomial and sparse matrix representation using linked list.

UNIT III. Stack- Definition and Operations, Array and Linked Implementations, Applications - Valid Expression Checking (Parenthesis matching), Reversal of string, Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation.

UNIT IV. Queue - Definition and Operations, Array and Linked Implementations, Applications, Circular Queues - Insertion and Deletion Operations, Priority Queue-Definition and Implementation, Dequeue (Double Ended Queue) - Introduction.

UNIT V. Searching Methods – Linear and Binary.

UNIT VI. Sorting Methods – Bubble, Insertion, Selection, Shell, Using Divide-Conquer Approach (Quick and Merge sort), Comparison of Sorting Methods.

UNIT VII. Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Binary Search tree - Creation, Insertion, Deletion and Search, AVL tree-Definition, Examples, Insertion and Rotations, B tree, B+ tree, Heap- Definition, Min heap, Max heap, Insertion and Deletion. Priority Queue using Heap.

UNIT VIII. Graphs, Graph ADT, Graph Representations, Graph Traversals and Searching,

Practical

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable data structures and operations. Some of the problems are indicated below.

1. Write program that uses functions to perform the following:
   a) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
   b) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
   c) To display the elements in forward / reverse order
2. Write recursive programs for Factorial, Fibonacci numbers, Towers of Hanoi etc.
3. Write a program to implement stack (using array and linked list). Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion, postfix evaluation).
4. Write programs to implement queue using array and linked list.
5. Write program that implements linear (using array and linked list) and binary search.
6. Write programs of a) Bubble sort b) Insertion Sort c) Selection Sort d) Quicksort etc.
7. Write a program to create a Binary Search Tree and insertion and deletion of node from the tree. Write recursive and non-recursive routines to traverse a binary tree in preorder, inorder and postorder.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson.
3. Data structures, Lipschutz: Schaum's outline series, Tata McGraw-Hill
4. Data Structure through C in Depth, S.K. Srivastava and Deepali Srivastava, B.P.B Publication.

MINOR COURSE - 2

Course Name: Data Structures and Algorithms

Course Code: BSCCOSMN201

<table>
<tr><td colspan="2">Course Type: Minor (Theoretical & Practical)</td><td colspan="3">Course Details: MNC-2</td><td colspan="2">L-T-P: 3 – 0 – 4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

UNIT I. Basic concepts- Data, Data Structures, ADT, Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis, Linear and Non Linear data structures.

UNIT II. Singly Linked Lists - Operations, Concatenating, Circularly linked lists - Operations for Circularly linked lists, Doubly Linked Lists - Operations. Polynomial and sparse matrix representation using linked list.

UNIT III. Stack- Definition and Operations, Array and Linked Implementations, Applications - Valid Expression Checking (Parenthesis matching), Reversal of string, Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation.

UNIT IV. Queue - Definition and Operations, Array and Linked Implementations, Applications, Circular Queues - Insertion and Deletion Operations, Priority Queue-Definition and Implementation, Dequeue (Double Ended Queue) - Introduction.

UNIT V. Searching Methods – Linear and Binary.

UNIT VI. Sorting Methods – Bubble, Insertion, Selection, Shell, Using Divide-Conquer Approach (Quick and Merge sort), Comparison of Sorting Methods.

UNIT VII. Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Binary Search tree - Creation, Insertion, Deletion and Search, AVL tree-Definition, Examples, Insertion and Rotations, B tree, B+ tree, Heap- Definition, Min heap, Max heap, Insertion and Deletion. Priority Queue using Heap.

UNIT VIII. Graphs, Graph ADT, Graph Representations, Graph Traversals and Searching,

Practical

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable data structures and operations. Some of the problems are indicated below.

8. Write program that uses functions to perform the following:
   a) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
   b) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
   c) To display the elements in forward / reverse order
9. Write recursive programs for Factorial, Fibonacci numbers, Towers of Hanoi etc.
10. Write a program to implement stack (using array and linked list). Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion, postfix evaluation).
11. Write programs to implement queue using array and linked list.
12. Write program that implements linear (using array and linked list) and binary search.
13. Write programs of a) Bubble sort b) Insertion Sort c) Selection Sort d) Quicksort etc.
14. Write a program to create a Binary Search Tree and insertion and deletion of node from the tree. Write recursive and non-recursive routines to traverse a binary tree in preorder, inorder and postorder.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson.
3. Data structures, Lipschutz: Schaum's outline series, Tata McGraw-Hill
4. Data Structure through C in Depth, S.K. Srivastava and Deepali Srivastava, B.P.B Publication.

MULTIDISCIPLINARY COURSE - 2

Course Name: Social Media and Cyber Awareness

Course Code: MDC209

Course Type: **MD (Theoretical)**	Course Details:**MD-2**			L-T-P: **3–0–0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	**15**	**---**	**35**

Course Content:

Theory

UNIT I. Introduction to Social Media: Overview of major social media platforms and their features, History and evolution of social media, Pros and cons of social media usage.

UNIT II. Understanding Digital Footprints and Privacy: What is a digital footprint?, The importance of protecting personal information online, Privacy settings on social media platforms.

UNIT III. Responsible Social Media Usage and Digital Citizenship: Building a positive online presence, Ethical considerations in social media communication, Understanding online reputation management.

UNIT IV. Social Media and Mental Health: The relationship between social media usage and mental well-being, Strategies for promoting a healthy balance between online and offline life, Dealing with social media addiction.

UNIT V. Cyber Security Fundamentals: Introduction to cyber security concepts, Common cyber threats and attacks, Password best practices and multi-factor authentication.

UNIT VI. Cyber bullying and Online Harassment: Defining cyber bullying and its impact on individuals, Strategies for preventing and dealing with cyber bullying, Supporting victims and fostering a respectful online environment.

UNIT VII. Identifying and Avoiding Online Scams: Recognizing common online scams and phishing attempts, Techniques used by scammers and how to stay vigilant, Reporting and dealing with online fraud.

UNIT VIII. Creating Your Online Safety Plan: Developing a personal cyber security and social media responsibility plan, Resources for staying informed about online safety.

References/ Suggested Readings:

1. P. W. Singer and Allan Friedman, Cyber Security and Cyber War, Oxford University Press.
2. Raef Meeuwisse, Cybersecurity For Beginners, Lulu Publishing Services.

SKILL ENHANCEMENT COURSE - 2

Course Name: Basics of Python

Course Code: BSCCOSSE201

<table>
<tr><td rowspan="2">Course Type: SEC
(Practical)</td><td colspan="2" rowspan="2">Course Details: SEC-2</td><td colspan="2">L-T-P: 0 – 0 – 6</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks:
50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>---</td><td>20</td><td>---</td></tr>
</table>

Course Content:

Practical

UNIT I. Introduction to Python, Python, Features of Python, Execution of a Python, Program, Writing Our First Python Program, Data types in Python. Python Interpreter and Interactive Mode; Values and Types: int, float, boolean, string, and list; Variables, Expressions, Statements, Tuple Assignment, Precedence of Operators, Comments; Modules and Functions, Function Definition and use, Flow of Execution, Parameters and Arguments

UNIT II. Operators in Python, Input and Output, Control Statements. Boolean Values and operators, Conditional (if), Alternative (if-else), Chained Conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful Functions: Return Values, Parameters, Local and Global Scope, Function Composition, Recursion

UNIT III. Arrays in Python, Strings and Characters. Strings: String Slices, Immutability, String Functions and Methods, String Module; Lists as Arrays. Illustrative Programs: Square Root, gcd, Exponentiation, Sum an Array of Numbers, Linear Search, Binary Search.

UNIT IV. Functions, Lists and Tuples. List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters; Tuples: Tuple Assignment, Tuple as Return Value; Dictionaries: Operations and Methods; Advanced List Processing - List Comprehension; Illustrative Programs: Selection Sort, Insertion Sort, Merge sort, Histogram.

UNIT V. Files and Exception: Text Files, Reading and Writing Files, Format Operator; Command Line Arguments, Errors and Exceptions, Handling Exceptions, Modules, Packages; Illustrative Programs: Word Count, Copy File.

The students are required to verify their ability to use core programming basics and program design with functions using Python programming language. The teacher shall programs to strengthen the practical expertise of the students. The following is an indicative list of programs that can be practised.

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

4. Write a python script to print the current date in the following format “Sat Oct 11 02:26:23 IST 2020”
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to construct the different pattern, using a nested for loop, Like

```
*
* *
* * *
* *
 *
```

10. Write a Python script that prints prime numbers less than 20.
11. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
12. Write a python program to define a module and import a specific function in that module to another program.
13. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
14. Write a Python class to convert an integer to a roman numeral.
15. Write a Python class to reverse a string word by word.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks).

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. Alex Martelli, Python in a Nutshell, Oreilly Publication.
2. Allen Downey, Think Python, Green Tea Press.
3. Wesley J. Chun, Core Python Programming, Pearson Education.
4. Mark Lutz, Learning Python, Oreilly Publication.
5. Kenneth A. Lambert, Fundamentals of Python: First Programs, Course Technology Inc.

Semester- III

MAJOR COURSE - 3

Course Name: Discrete Mathematics

Course Code: BSCCOSMJ301

Course Type: **Major (Theoretical)**	Course Details: **MJC-3**			L-T-P: 4 – 1 – 0	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	**30**	**---**	**70**

Course Content:

Theory

UNIT I. Sets: Finite and Infinite Sets, Uncountable Infinite Sets, problems based on set theory.

Functions: Domain, Co-domain, Range, Injective, surjective and bijective functions Equal function, Exponential function, Logarithmic function, Square function, Cube function, Relations: Reflexive, Symmetric, Anti-symmetric, Properties of Binary Relations, Closure, Partial Ordering Relations; Counting - Pigeonhole Principle, - Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Permutation and Combination: Introduction to Permutation and Combination, Permutation of thing not all different, Multiplication Principle, Addition Principle, Basics of probability Random Experiment, sample space, event, types, definition, simple problems.

Mathematical Induction, Principle of Inclusion and Exclusion.

UNIT II. Growth of Functions: Asymptotic Notations, Summation Formulas and Properties, Bounding Summations, Approximation by Integrals.

UNIT III. Recurrences: Recurrence Relations, Generating Functions, Linear Recurrence Relations with Constant Coefficients and their Solution, Substitution Method, Recurrence Trees, Master Theorem.

UNIT IV. Graph Theory: Basic Terminology, Models and Types, Multigraphs and Weighted Graphs, Directed Graph, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and Properties of Trees, Introduction to Spanning Trees.

UNIT V. Propositional Logic: Proposition Or Statements, Truth table, Logical Connectives, Well-formed Formulas, Tautologies, Contradiction, Equivalences, Inference Theory, Conjunctive Normal Form, Disjunctive Normal Form.

References/ Suggested Readings:

1. C.L. Liu & Mahopatra, Elements of Discrete mathematics, 2nd Sub Edition 1985, Tata McGraw Hill.

2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition, McGraw Hill 2006

3. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms 1988 John wiley Publication.

MAJOR COURSE - 4

Course Name: Digital Logic and Computer Organization

Course Code: BSCCOSMJ302

Course Type: **Major (Theoretical & Practical)**	Course Details: **MJC-4**			L-T-P: **3 – 0 – 4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Content:

Theory

Unit I: Introduction to Computer-Definition of Computer System; Evolution of Computer – a brief history; Classification of computer; Generation of Computers.

Unit II: Computer System Architecture – Definition of Hardware; Basic units of Computer System; CPU – Control Unit, ALU; System Buses, Memory module – Primary Memory, Secondary Memory, Cache Memory, Virtual Memory – definition, classification, features and functions; measuring unit of memory – Bit, Byte, KB, MB, GB; Input Devices – Keyboard, Mouse, Scanner, Output Devices – Monitor, Printer.

Unit III: Introduction to Number System – Positional number systems; Binary, Octal, Hexadecimal and Decimal number systems; conversion of a number in one system to the other; Representation of signed numbers- signed magnitude, one's complement, 2's complement representation techniques, Merits of 2's complement representation scheme; Various binary codes- BCD, excess -3, Gray code; Binary arithmetic- addition, subtraction, multiplication and division of unsigned binary numbers.

Unit IV: Introduction to Software – Definition of Software; Classification of Software; Introduction to Operating System – Definition of OS; Application Softwares, Functions of OS, basic concept of different type of OS- batch processing OS, Multitasking OS, Multi-user OS, Network OS.

Unit V: Logic gates: Basic logic operations- logical sum(or), logical product (AND), complementation (not), Anti coincidence (EX-OR)and coincidence (EX-NOR) operations: Truth tables of Basic gates; Boolean Variables and Expressions; Demorgan's theorem; Universal gates- NAND and NOR; Boolean expressions Simplification- Algebraic technique, Karnaugh map technique, 3 variable and 4 variable Karnaugh map.

Unit VI: Combinational Circuits: Half adder, full adder, binary magnitude comparator, adder/subtractor circuits, multiplexer and demultiplexer circuits, BCD adder/subtractor; ALU; parity generators, code converters, priority encoders, PLAs.

Unit VII: Sequential circuits: flip- flops, - RS, clocked RS, D, JK, T flip-flops,: Race condition, Master Slave JK: Registers, Universal Shift Registers; Counters- Binary, decade; modulo-r divider; Practical IC's; Sequential Machine design.

Unit VIII: Basic Computer Organization and Design: Overview of computer architecture; Von Neumann architecture and its components; CPU, memory, input/output units; Instruction cycle, fetch-decode-execute; Data transfer and control signals

Unit IX: Processor Design and Control Unit: Basic structure of the CPU; Processor design: Control unit, Arithmetic and Logic Unit (ALU); Control unit design: Hardwired vs. Microprogrammed; Instruction set architecture (ISA); RISC vs. CISC processors; Pipelining concepts: Basic, instruction-level parallelism.

Practical

Unit I: Study on the characteristic of AND, OR, NAND, NOR, EX-OR, EX-NOR gates.

Unit II: Design of different combinational circuit such as half adder/subtractor, full adder/subtractor, decoder/encoder, priority encoder, multiplexer, demultiplexer, magnitude comparator etc.

Unit III: Study on the characteristic of different flip-flops-JK, RS, T, D etc.

Unit IV: Design and implementation of different sequential circuit such as shift register, counter-decimal, ripple etc.

CA (Internal) Evaluation: Laboratory Note Book (15 marks), One Experiment (10 marks), Viva-voce (5 marks).

ESE Evaluation: One Experiment (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. M. Morris Mano, Digital Logic, Pearson.
2. D.P. Leach, A.P. Malvino and G. Saha, Digital Principles and Applications, McGraw-Hill.
3. Modern Digital Electronics: R.P. Jain, Tata McGraw Hill.

MINOR COURSE - 3

Course Name: Digital Logic and Computer Organization

Course Code: BSCCOSMN301

<table>
<tr><td rowspan="2">Course Type: Minor (Theoretical & Practical)</td><td colspan="3" rowspan="2">Course Details: MNC-3</td><td colspan="2">L-T-P: 3 – 0 – 4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

Unit I: Introduction to Computer-Definition of Computer System; Evolution of Computer – a brief history; Classification of computer; Generation of Computers.

Unit II: Computer System Architecture – Definition of Hardware; Basic units of Computer System; CPU – Control Unit, ALU; System Buses, Memory module – Primary Memory, Secondary Memory, Cache Memory, Virtual Memory – definition, classification, features and functions; measuring unit of memory – Bit, Byte, KB, MB, GB; Input Devices – Keyboard, Mouse, Scanner, Output Devices – Monitor, Printer.

Unit III: Introduction to Number System – Positional number systems; Binary, Octal, Hexadecimal and Decimal number systems; conversion of a number in one system to the other; Representation of signed numbers- signed magnitude, one's complement, 2's complement representation techniques, Merits of 2's complement representation scheme; Various binary codes- BCD, excess -3, Gray code; Binary arithmetic- addition, subtraction, multiplication and division of unsigned binary numbers.

Unit IV: Introduction to Software – Definition of Software; Classification of Software; Introduction to Operating System – Definition of OS; Application Softwares, Functions of OS, basic concept of different type of OS- batch processing OS, Multitasking OS, Multi-user OS, Network OS.

Unit V: Logic gates: Basic logic operations- logical sum(or), logical product (AND), complementation (not), Anti coincidence (EX-OR)and coincidence (EX-NOR) operations: Truth tables of Basic gates; Boolean Variables and Expressions; Demorgan's theorem; Universal gates- NAND and NOR; Boolean expressions Simplification- Algebraic technique, Karnaugh map technique, 3 variable and 4 variable Karnaugh map.

Unit VI: Combinational Circuits: Half adder, full adder, binary magnitude comparator, adder/subtractor circuits, multiplexer and demultiplexer circuits, BCD adder/subtractor; ALU; parity generators, code converters, priority encoders, PLAs.

Unit VII: Sequential circuits: flip- flops, - RS, clocked RS, D, JK, T flip-flops,: Race condition, Master Slave JK: Registers, Universal Shift Registers; Counters- Binary, decade; modulo-r divider; Practical IC's; Sequential Machine design.

Unit VIII: Basic Computer Organization and Design: Overview of computer architecture; Von Neumann architecture and its components; CPU, memory, input/output units; Instruction cycle, fetch-decode-execute; Data transfer and control signals

Unit IX: Processor Design and Control Unit: Basic structure of the CPU; Processor design: Control unit, Arithmetic and Logic Unit (ALU); Control unit design: Hardwired vs. Microprogrammed; Instruction set architecture (ISA); RISC vs. CISC processors; Pipelining concepts: Basic, instruction-level parallelism.

Practical

Unit I: Study on the characteristic of AND, OR, NAND, NOR, EX-OR, EX-NOR gates.

Unit II: Design of different combinational circuit such as half adder/subtractor, full adder/subtractor, decoder/encoder, priority encoder, multiplexer, demultiplexer, magnitude comparator etc.

Unit III: Study on the characteristic of different flip-flops-JK, RS, T, D etc.

Unit IV: Design and implementation of different sequential circuit such as shift register, counter-decimal, ripple etc.

CA (Internal) Evaluation: Laboratory Note Book (15 marks), One Experiment (10 marks), Viva-voce (5 marks).

ESE Evaluation: One Experiment (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. M. Morris Mano, Digital Logic, Pearson.
2. D.P. Leach, A.P. Malvino and G. Saha, Digital Principles and Applications, McGraw-Hill.
3. Modern Digital Electronics: R.P. Jain, Tata McGraw Hill.

MULTIDISCIPLINARY COURSE - 3

Course Name: Impact of Artificial Intelligence in Education

Course Code: MDC313

Course Type: **MD (Theoretical)**	Course Details:**MD-3**			L-T-P: **3–0–0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		---	**15**	**---**	**35**

Course Content:

Theory

Unit I. Introduction: Overview of Artificial intelligence (AI) - Problems of AI, AI techniques, Agents & environment, nature of environment, Overview of the history of AI in Education, PEAS (Performance measure, Environment, Actuators, Sensors) Representation, Examples of PEAS with Educational Contexts. Overview of machine learning techniques commonly used in education applications.

Unit II. AI in Modern Education System: Why AI in Education?, Transforming Teaching Patterns: Personalized Learning, Smart Content Creation, Automated Administrative Operations, AI in Classroom for Adaptable Access, Curriculum Planning and Development, Self Directed Learning, Closing the skill gap. Examples of AI-based tools currently used in education to illustrate these transformations (e.g., adaptive learning platforms, AI teaching assistants), Intelligent Tutoring System, Assessment Automation, adaptive assessments and their role in personalized learning, teacher–student collaboration, Role of AI in teacher professional development and skill-building, AI-based analytics for tracking student performance.

Unit III. Applications: AI is natural language processing (NLP), Scope of NLP applications (e.g., essay grading, language translation for global classrooms), ChatGPT and other conversational AI's role in providing 24/7 student support and assistance.

Unit IV. EMIS and LMS: Data analytics in Education Management Information Systems (EMIS) and the evolution to Learning Management Systems (LMS), Case studies of colleges/universities using EMIS and LMS with AI integration for data-driven decision-making, AI-powered LMS that provide real-time insights and automation.

Unit V. Benefits: Global Access to Education, Enhanced Learning Outcomes, Time and Cost Efficiency, Scalability of AI-driven education for remote areas and underserved populations.

Unit VI. Challenges and Ethical Considerations: Data Privacy and Security, Bias and Discrimination, Plagiarism and Academic Integrity, Legal implications and data protection regulations (e.g., GDPR compliance in educational AI systems), AI transparency and explain ability to ensure ethical usage in educational systems.

Unit VII. Future Directions and Opportunities: Augmented and Virtual Reality, Lifelong Learning and Skill Development, AI Literacy and Ethics Education, Emerging trends like AI-driven micro-credentials and competency-based education, Role of AI in shaping future education policies

References/ Suggested Readings:

1. Miao, F.; Holmes, W.; Huang, R.; Zhang, H. *AI and Education: A Guidance for Policymakers*; UNESCO Publishing: Paris, France, 2021.
2. Luckin, R., Holmes, W., Griffiths, M. & Forcier, L.B. Intelligence Unleashed: an argument for Al in Education. London: Pearson, 2016
3. Montebello, M. (2017). AI injected e-learning: the future of Online Education. Berlín, Germany: Springer.
4. Dr. R. D. Padmavathy, Dr. Raju Talreja AI IN EDUCATION: TRANSFORMING LEARNING AND TEACHING, Redshine Publication, 2024.
5. Sadiku Matthew N O, Artificial Intelligence in Education, iUniverse.

Semester- IV

MAJOR COURSE - 5

Course Name: Operating System

Course Code: BSCCOSMJ401

Course Type: **Major (Theoretical & Practical)**	Course Details:**MJC-5**			L-T-P: **3–0–4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Content:

Theory

UNIT I. Introduction to Operating System: What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT II. Operating System Organization and Process Characterization: Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Preemptive Scheduling Algorithms.

UNIT III. Process Management: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

UNIT IV. Inter Process Communication and Synchronization: Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT V. Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory; Page Replacement Algorithms.

UNIT VI. File and I/O Management, Disk Scheduling, OS security: Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Disk Scheduling (FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK), Security Policy Mechanism, Protection, Authentication and Internal Access Authorization.

UNIT VII. Android Operating System: Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System.

Practical

UNIT I. Students are required to write and practically execute programs to solve following problems using C programming language.

1. WRITE A PROGRAM (using fork() and/or exec() commands) where parent and child execute: a) same program, same code. b) same program, different code. c) before terminating, the parent waits for the child to finish its task.
2. WRITE A PROGRAM to report behavior of Linux kernel including kernel version, CPU type and model. (CPU information)
3. WRITE A PROGRAM to report behavior of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
4. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.
5. WRITE A PROGRAM to copy files using system calls.
6. Write programs to implement scheduling algorithms (FCFS, Round Robin, SJF, SRJF)
7. Write program to implement non-preemptive priority based scheduling algorithm.
8. Write program to implement preemptive priority based scheduling algorithm.
9. Write program to calculate sum of n numbers using thread library.
10. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.

UNIT II. UNIX and Shell Scripts

1. External and internal commands of UNIX
2. What is shell and various type of shell, Various editors present in unix/linux
3. Different modes of operation in vi editor
4. What is shell script, Writing and executing the shell script
5. Shell variable (user defined and system variables)
6. System calls, Using system calls
7. Pipes and Filters
8. Decision making in Shell Scripts (If else, switch), Loops in shell
9. Functions
10. Utility programs (cut, paste, join, tr, uniq utilities), Pattern matching utility (grep).

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks) – one from each unit, Viva-voce (5 marks).

ESE Evaluation: Two experiments (10 marks) – one from each unit, Viva-voce (10 marks).

References/ Suggested Readings:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. Sumitabha, Das, Unix Concepts and Applications, Tata McGraw-Hill Education.

4. Nemeth Synder and Hein, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010.
5. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The sockets Networking API, Vol. 1, 3rd Edition, 2014.
6. Yashavant Kanetkar , UNIX Shell Programming, BPB Publication.
7. Kernighan and Pike, The Unix Programming Environment, Prentice-Hall.

MAJOR COURSE - 6

Course Name: Object Oriented Design and Programming

Course Code: BSCCOSMJ402

Course Type: **Major (Theoretical & Practical)**	Course Details:**MJC-6**			L-T-P: **3–0–4**	
Credit: **5**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

Course Content:

Theory

UNIT I: Principles of Object Oriented Programming (OOP), Software Evaluation, A Look at ProcedureOriented Programming, OOP Paradigm, Basic Concepts of OOP, Benefits of OPP, Application of OOP.

UNIT II: Introduction to C++ What is C++, A simple C++ Program, More C++ statements, Structure of C++ Program. Tokens, Expression and controls Structures Tokens , Keywords, Identifiers and Constants, C++ data types, Variables: Declaration, Dynamic initialization of variables, Reference variables, Operators in C++ : Scope resolution operator, Member deferencing Operators, Memory Management Operators, Manipulators, Type cast operators, Expressions and Control Structures. Functions The main() function, Function Prototyping, Call by reference, Return by reference, Inline function, Function Overloading.

UNIT III: Classes and Objects Introduction, Specifying a Class, Defining member Functions, C++ Program with Class, Nesting of Member functions, Private member functions, Memory Allocation for Objects, Static Data members, Static Member Functions, Arrays within a Class, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects. Pointers Pointers : Declaration and initializing, Manipulation of pointers, pointers Expression and Pointer Arithmetic, Pointer with Arrays, Arrays of Pointers, Pointers to objects, this pointers, Arrays of Pointers to Objects Constructors and Destructors Constructors, Parameterized Constructors, Multiple Constructors in a class, Copy constructor, Destructors. Operator overloading Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Type Conversions.

UNIT IV: Inheritance and Polymorphisms Introduction, Defining Derived Classes, Single inheritance, Multiple inheritance, Hierarchical inheritance, Multilevel inheritance, Hybrid inheritance, Virtual Base Classes, Polymorphism, static and dynamic binding, Constructor in Derived Classes, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.

UNIT V: I/O Operations and Files C++ Stream Classes, Unformatted I/O Operations, Formatted I/O operations, Classes for File Streams, Opening and Closing a File : open() and close() functions, Manipulators of File Pointers : seekg(), seekp(), tellg(), tellp() functions, Sequential Input and output

Operations : put (), get(), write(), read() functions, Error handling File Operations : eof(), fail(), bad(), good() .

Practical

Students are required to understand the object-oriented concepts using C++. They are required to practice the concepts learnt in the theory. Some of the programs to be implemented are listed as follows:

1. Number of vowels and number of characters in a string.
2. Write a function called zeros maller() that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a main() program to access this function.
3. Demonstration of Class, Constructors, destructors, input and output functions, Objects
4. Demonstration of array of object.
5. Demonstration of friend functions.
6. Demonstration of operator overloading.
7. Demonstration of inheritance.
8. Using this pointer to return a value (return by reference).
9. Demonstration of virtual function.
10. Demonstration of static function.
11. Accessing a particular record in a student's file.
12. Demonstration of exception handling.
13. Demonstration of class template and function template

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks).

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. E.Balagurusamy, Object Oriented Programming through C++, TMH.
2. Lafore Robert, Object Oriented Programming in Turbo C++, Galgotia Publications.
3. Herbert Schildt, C++: The Complete Reference, McGraw Hill.
4. B. Stroutstrup, The C++ Programming Language, 3rd Edition, Pearson Education.
5. Ashok N Kamthane, Programming in C++, Pearson.

MINOR COURSE - 4

Course Name: Database Management System

Course Code: BSCCOSMN401

<table>
<tr><td rowspan="2">Course Type: Minor (Theoretical & Practical)</td><td colspan="3" rowspan="2">Course Details: MNC-3</td><td colspan="2">L-T-P: 3 – 0 – 4</td></tr>
<tr></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Course Content:

Theory

Unit I. Introduction: Basic Concept, Drawbacks of File Management; Advantages of DBMS; Layered Architecture of Database, Data Independence; Data Models; Schemas and Instances; Database Languages; Database Users, DBA; Data Dictionary; Functional Components of a DBMS.

Unit II. ER Model: Entity, Attributes and Relationship; Structural Constraints; Keys (candidate, super, foreign, primary); Weak & strong Entity Set; ER Diagram; Specialization and Generalization; Constraints of Specialization and Generalization; Aggregation.

Unit III. Relational Model: Basic Concepts of Relational Model; Relational Algebra, introduction to Tuple Relational Calculus.

Unit IV. SQL: Overview of Structured Query Language (SQL), DDL, DCL, DML commands, aggregate functions, create a database table, create relationships between database tables, modify and manage tables, queries, create view.

Unit V. Integrity Constraints: Domain Constraints, Referential Integrity.

Unit VI. Relational Database Design: Problems of Un-Normalized Database; Functional Dependencies, Derivation Rules, Closure of FD Set, Membership of a Dependency, Canonical Cover; Decomposition to 1NF, 2NF, 3NF or BCNF Using FDs; Lossless Join Decomposition & Dependency Preservation.

Unit VII. Transaction Processing: ACID properties, concurrency control.

Practical

Students are required to practice the concepts learnt in the theory by designing and querying a database for a chosen organization (Like Library, Transport etc). The teacher may devise appropriate weekly lab assignments to help students practice the designing, querying a database in the context of example database. Some indicative list of experiments is given below.

Experiment 1: E-R Model Analyze the organization and identify the entities , attributes and relationships in it. . Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Experiment 2: Concept design with E-R Model Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).

Experiment 3: Relational Model Represent all the entities (Strong, Weak) in tabular fashion. Represent relation ships in a tabular fashion.

Experiment 4: Normalization Apply the First, Second and Third Normalization levels on the database designed for the organization

Experiment 5: Practicing DDL commands, Creating databases, How to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.

Experiment 6: Practicing DML commands on the Database created for the example organization DML commands are used to for managing data within schema objects. Some examples: ● SELECT - retrieve data from the a database ● INSERT - insert data into a table ● UPDATE - updates existing data within a table ● DELETE - deletes all records from a table, the space for the records remain

Experiment 7: Querying practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Experiment 8: Querying (continued…) Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Internal (CA) Evaluation: Practical Note Book (15 marks), Two experiments (10 marks), Viva-voce (5 marks)

ESE Evaluation: Two experiments (10 marks), Viva-voce (10 marks)

References/ Suggested Readings:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education,2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.
5. Ullman, Principles of Database Systems, Galgotia Publications.

SKILL ENHANCEMENT COURSE - 3

Course Name: Web Programming

Course Code: BSCCOSSE401

Course Type: SEC **(Practical)**	Course Details: **SEC-3**			L-T-P: **0 – 0 – 6**	
Credit: 3	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**--**	**20**	**--**

Course Content:

Practical

Students are directed to do a minor project based on the contents of the course below (UNIT I to UNIT VI) for internal and ESE evaluation.

UNIT I. Introduction to World Wide Web: Internet Standards, Introduction to WWW and WWW Architecture, Internet Protocols, Overview of HTTP, HTTP request – response, Generations of dynamic web pages.

UNIT II. User Interface Design: Introduction to HTML and HTML5, TML Tags, Formatting and Fonts, Commenting Code, Anchors, Backgrounds, Images, Hyperlinks, Lists, Tables, Frames, HTML Forms. The need for CSS, Introduction to CSS, Basic syntax and structure, Inline Styles, Embedding Style Sheets, Linking External Style, Backgrounds, Manipulating Text, Margins and Padding, Positioning using CSS.

UNIT III. Java Programming: Java Script, Introduction, Core features, Data types and Variables, Operators, Expressions, Functions, Objects, Array, Date and Math related Objects. JAVA Networking classes, TCP/IP Protocol Suite, File Transfer Protocol (FTP), Java Environment, Setup for Web Applications, JavaBean, Application Builder Tool, Bean Developer Kit (BDK), The Java Beans API, Introduction to EJB

UNIT IV. Database: Database basics, SQL, MySQL, PostgreSQL, JDBC API, Driver Types, Two-tier and Three-tier Models, Connection Overview, Transactions, Driver Manager Overview, Statement Overview, Result Set Overview, Types of Result Sets, Concurrency Types, Prepared Statement Overview

UNIT V. Java Applet and JSP: Java Web Programs and Applets, Web Application, Servlet, Servlet Life Cycle, Servlet Programming, Introduction to JSP, Life Cycle of a JSP Page, Translation and Compilation, Creating Static Content, Response and Page Encoding, Creating Dynamic Content, Using Objects within JSP Pages, JSP Programming

UNIT VI. Dot Net Framework: Introduction to Dot Net, Dot Net framework and its architecture, CLR, Assembly, Components of Assembly, DLL hell and Assembly Versioning, Overview to C#, Introduction to ASP.net, Asp.net Programming.

Internal (CA) Evaluation: Minor Project Report (15 marks), Demonstration of the minor project (10 marks), Viva-voce (5 marks).

ESE Evaluation: Presentation of the minor project (10 marks), Viva-voce (10 marks).

References/ Suggested Readings:

1. James Keogh, J2EE: The complete Reference.
2. John Brock, Arun Gupta, Geertjan Wielenga, Java EE and HTML5 Enterprise Application Development (Oracle Press)
3. James Holmes, Struts: The Complete Reference, 2nd Edition
4. Stephen Walther, Kevin Scott Hoffman, Nate Dudek, ASP.NET Unleashed
5. John Sharp, Microsoft Visual C# 2013 Step by Step.
6. A. Majumdar and P. Bhattacharyya, Database Management Systems, McGraw Hill Education.

VALUE ADDED COURSE - 2

Course Name: Digital and Technological Solutions

Course Code: VAC403

Course Type: **VA (Theoretical)**	Course Details:**VAC-2**			L-T-P: 4–**0**–**0**	
Credit: 4	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		--	**15**	--	**35**

Course Content:

Theory

UNIT I: Introduction & Evolution of Digital Systems: Role & Significance of Digital Technology. Information & Communication Technology & Tools. Computer System & its working, Software and its types. Operating Systems: Types and Functions. Problem Solving: Algorithms and Flowcharts. Communication Systems: Principles, Model & Transmission Media. Computer Networks & Internet: Concepts & Applications, WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking. Computer Based Information System: Significance & Types. E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.

UNIT II: Digital India & e-Governance: Initiatives, Infrastructure, Services and Empowerment. Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit / Debit Cards, e-Wallets, Internet Banking, NEFT/RTGS and IMPS, Online Bill Payments and PoS. Cyber Security: Threats, Significance, Challenges, Precautions, Safety Measures, & Tools, legal and ethical perspectives. Emerging Technologies & their applications: Overview of Cloud Computing, Big Data, Internet of Things, Virtual Reality, Blockchain & Cryptocurrency, Robotics, Machine Learning & Artificial Intelligence, 3-D Printing. Digital Signatures.

References/ Suggested Readings:

1. V. Rajaraman, Introduction to Information Technology, 3rd Edition, PHI;
2. E Balagurusamy, Fundamentals of Computers, Tata Mc GrawHill;
3. Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill;
4. Pramod Kumar, Anuradha Tomar, R. Sharmila, Emerging Technologies in Computing Theory, Practice, and Advances, Edition 2021, Chapman and Hall/CRC Imprint;
5. Buvya, Broberg, and Gosciniski, Cloud Computing- Principals and Paradigms, Wiley
6. Russel and Norving, Artificial Intelligence- A Modern Approach, Pearson Education;
7. Samuel Greengard, Internet of Things, MIT Press;
8. C.S.V. Murthy, E-commerce Concepts, Models, Strategies;
9. Hurwith, Nugent Halper, Kaufman, Big Data for dummies, Wiley & Sons - Wiley.

NEP SYLLABUS
POLITICAL SCIENCE

B.A. in Political Science Syllabus under NCCF 2020
3 Year UG Degree in Political Science
4 Year UG Degree (Honours) in Political Science
4 Year UG Degree (Honours with Research) in Political Science

Semester- I
Course Name: Political Theory-1
Course Code: BAPLSMJ101

Course Type: MAJOR	**Course Details: MJC-1**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To gather in-depth knowledge on different approaches to Political theory.
2. To understand the nature of the state through theories.
3. To understand democracy.
4. To understand some concepts.

Course Content: Unit-wise course content distribution -

Unit -1: What is Politics-Approaches to the study of politics: Normative and Empirical, Behavioral & post-Behavioral.
Unit-2: Concept of State: Social contract Theory. (Hobbes, Locke, Rousseau)
Unit-3: Nature of State: Idealist, Liberal and Neo-liberal Theories.
Unit-4: Sovereignty: Monistic and Pluralistic Theories.
Unit-5: Democracy: Basic Concepts and Classifications.
Unit-6: Liberty, Equality, and Rights: Concepts and its interrelations.
Unit-7: Justice: Theory of Rawls and Robert Nozick.

Course Learning Outcomes:

1. Students will be able to learn key concept sand various approaches to understand politics.

2. They will come to know about the nature of various types of states and theories.

3. Students will come to know how liberal tradition looks at and understand politics.

4. They will earn the concept of state Sovereignty and learn also various theories of sovereignty, theory of justice etc.

Suggested Readings

1. R. Bharagava and A.Acharyaeds. *Political Theory*(Delhi:Longman,2008).

2. O.P.Guaba .*Introduction toPolitical Theory*.(New Delhi:Macmillan,2011).

3. J.C.Johari. *Contemporary Political Theory*.(New Delhi:AdventBooks).

4. S.Ramaswamy. *Political Theory:Ideasa nd Concept.(*NewDelhi:Macmillan).

5. A.Roy and M.Bhattacharya. *PoliticalTheory: Ideas and Institutions*.(Kolkata: WorldPress.

6. S.P.Verma. *Modern Political Theory*.(NewDelhi: Vikash).

7. D.C.Bhattacharyya. *Political Theory*.(Kolkata:VijoyaPublishingHouse).

8. David Held, Models of Democracy (Stanford University Press, 1996).

9. G. Sabine, History of Political Theory

10. Amal Kr. Mukhopadhyay, *Western Political Thought* (Kolkata: K.P. Bagchi and Company, 1980). (in Bengali and English)

Semester-I
Course Name: Political Theory-1
Course Code: BAPLSMN101

Course Type: MINOR	**Course Details: MNC-1**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To gathering-depth knowledge on different approaches to Political theory.
2. To understand the nature of the state through theories.
3. To understand democracy.
4. To understand some concepts.

Course Content: Unit-wise course content distribution -

Unit -1: What is Politics-Approaches to the study of politics: Normative and Empirical, Behavioral & post-Behavioral.

Unit-2: Concept of State: Social contract Theory. (Hobbes, Lock, Rousseau)
Unit-3: Nature of State: Idealist, Liberal and Neo-liberal Theories.
Unit-4: Sovereignty: Monistic and Pluralistic Theories.
Unit-5: Democracy: Basic Concepts and Classifications.
Unit-6: Liberty, Equality, and Rights: Concepts and their interrelations.
Unit-7: Justice: Theory of Rawls and Robert Nozick.

Course Learning Outcomes:

1. Students will be able to learn key concepts and various approaches to understand politics.

2. They will come to know about the nature of various type of state sand theories.

3. Students will come to know how liberal tradition looks at and understand politics.

4. They will learn the concept of States Sovereignty and learn also various theories of sovereignty, theory of justice etc.

Suggested Readings

1. R.Bharagava and A.Acharyaeds .*Political Theory*(Delhi:Longman,2008).

2. O.P.Guaba. *Introduction toPolitical Theory*.(New Delhi:Macmillan,2011).

3. J.C.Johari. *Contemporary Political Theory*.(New Delhi:AdventBooks).

4. S.Ramaswamy.*Political Theory:IdeasandConcept.(*NewDelhi:Macmillan).

5. A.RoyandM.Bhattacharya.*Political Theory: Ideas and Institutions*.(Kolkata: WorldPress.

6. S.P.Verma.*Modern Political Theory*.(NewDelhi: Vikash).

7. D.C.Bhattacharyya. *Political Theory*.(Kolkata:VijoyaPublishingHouse).

8. David Held, Models of Democracy (Stanford University Press, 1996).

9. G. Sabine, History of Political Theory

10. Amal Kr. Mukhopadhyay, *Western Political Thought* (Kolkata: K.P. Bagchi and Company, 1980). (in Bengali and English)

Semester-I
Course Name: Human Rights
Course Code: MDC-103

Course Type: MD	Course Details: MDC-1			L-T-P: 2 - 1- 0	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. The aim of the course is to prepare the students aware of the different strands in the debates on human rights and its evolution through historical and contemporary times. The course aims at providing students with conceptual tools to understand what the different generations of rights are; and the new concerns that have emerged in the recent past.

2. It will make students aware of the institutionalization of the human rights and will provide knowledge on the constitutional frameworks of human rights in India. It further intends to develop the analytical skills of students to reflect on the issues of Terrorism, Counter terrorism and human rights in developing countries.

3. The objective is to enable students to gain knowledge about state responses to the issues withspecial reference to the National Human Rights Commission and give them an idea about the Human Rights and its role in the countering the Terrorism

Course Content: Unit-wise course content distribution -

Unit1: Concepts of Human Rights, Meaning, Nature and Scope-Evolution of human rights.
Unit 2: Indian Constitution and protection of human rights.
Unit 3: National Human Rights Commission-Composition, functions, and role.
Unit4: Human Rights – Terrorism and Counter–terrorism

Course Learning Outcomes

1. The course will equip students with an understanding of debates on human rights through a study of human rights concerns in India.

2. Keeping India as a common case study in all thematic analyses will familiarize students with the historical evolution of human rights and the theoretical frameworks and core themes that inform the debates on human rights.

3. The course will enhance the student's understanding of state response to issues and human rights questions pertaining to structural violence, such as terrorism and counter-terrorism, and rights of Adibasi from the human rights perspective.

Suggested Readings

1. Baxi,Upendra, *The Future of Human Rights*(New Delhi: Oxford)

2. Donnely, Jack, Universal Human Rights in Theory and Practice (Cornel University Press).

3. Clapham, Andrew, *Human Rights: A very short introduction* (Oxford University Press)

4. Narayan,S,*Human Rights Dynamics in India* (Kalpaz Publications).

5. Nickel, James, W.,*Making Sense of Human Rights***,** Wiley Blackwell**.**

6. Das, Jayanta Kumar, *Human Rights Law and Practice,* PHI Learning, New Delhi

Semester-I
Course Name: Democratic Awareness with Legal Literacy
Course Code: BAPLSSE101

Course Type: SE	**Course Details: SEC-1**			**L-T-P: 2 - 1 - 0**	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. To understand the fundamental rights and duties and other constitutional rights of citizens of India.
2. To understand anti-terrorist laws, the dowry system , sexual harassment and violence against women.
3. To understand the role of the judiciary in the protection of women.

Course Content: Unit-wise course content distribution -

Unit 1: Constitution - Fundamental Rights, Fundamental Duties, Other Constitutional Rights.
Unit 2: Laws relating to dowry, sexual harassment and violence against women–National Commission for women.
Unit 3: Laws relating to consumer rights and Consumers' Protection Act 1986 and Cyber crimes.
Unit 4: Right to Information Act, 2005 & Right to Free and Compulsory Education Act 2009.

Learning Outcomes

1. This course will be helpful to understand the fundamental rights and duties and other constitutional rights of citizens of India.
2. This course will be helpful to understand anti-terrorist laws, dowry system, sexual harassment and violence against women.
3. The students will be able to understand the role of the judiciary in protection of women.

Suggested Readings

1. Basu, D. D, *Introduction to the Constitution of India* (Nagpur: Lexis Nexis)

2. Kashyap, S. *Our Constitution* (New Delhi: National Book Trust)

3. Gender Study Group, (1996*) Sexual Harassment in Delhi University*, A Report, Delhi: University of Delhi.

4. C. Kumar and K. Chockalingam (eds) *Human Rights, Justice, and Constitutional Empowerment*, Delhi: Oxford University Press.

5. J. Kothari,(2005)'Criminal Law on Domestic Violence',*Economic and Political Weekly*, Vol.40(46),pp.4843-4849.

SEMESTER-II
Course Name: Political Theory-II
Course Code: BAPLSMJ201

Course Type: MAJOR	**Course Details: MJC-2**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives
1. To understand the theoretical base of Marxism.
2. To understand various concepts of Marxism.
3. To understand some important debates of Marxism.

Course Content: Unit wise course content distribution -
Unit-1: Marxist approach to the study of Politics: Dialectical Materialism, Historical Materialism and, Class and Class Struggle.
Unit-2: The question of relative autonomy of the State -Ralph Miliband and Nicos Poulantzas
Unit-3: Gramsci's concept of hegemony.
Unit-4: Theory of Revolution: Lenin and Mao.
Unit-5: Marxian theory of Party: Lenin's contribution; Lenin-Rosa Luxemburg Debate on Party.

Course Learning Outcomes
1. Comprehending one of the major developments of the nineteenth and twentieth century period, when the Socialist tradition, known to the wider world as Marxism, appeared as one of the prominent alternative discourses opposed to the Liberal school of thought.

2. Assessing the importance of the progress of mankind from the historical perspective of class phenomenon and its related notion of economic progression.

3. Grasping the key concepts of Marxism such as dialectic, labour, theory of surplus-value, alienation, revolution, the working class, the idea of party and communism.

Suggested Readings

1. David McLellan, *Marxism After Marx*,4th Edition(Palgrave Macmillan).

2. PaulLe Blanc, *From Marx to Gramsci:A Reader in revolutionary MarxistPolitics*(Haymet Books).

3. T.Bottomore, *A Dictionary of Marxist Thought* (Oxford: Blackwell).

4. O.P.Gauba, *Introduction to Political Theory* (New Delhi: Macmillan,2011).

5. J.C.Johari, *Contemporary Political Theory* (New Delhi: Advent Books).

6. S.Ramaswamy, *Political Theory: Ideas and Concept* (New Delhi: Macmillan).

7. B.D.Mahajan, *Political Theory: Principles of Political Science*(New Delhi: S. Chand).

8. H. Abbas andR. Kumar, *Political Theory*(Delhi: Pearson).

9. Hoffman, J andGraham, P., *Introduction to Political Ideologies* (Noida: Pearson).

10. Ralph Miliband, *Marxism and Politics* (OUP, 1977)

11. Nicos Poulantzas, *Political Power and Social Classes* (Verso, 1978).

12. John James Pipoly, *Western Marxism- A Critical Reader* (Canada: Knopf Doubleday Publishing Group)

SEMESTER-II
Course Name: Political Theory-II
Course Code: BAPLSMN201

Course Type: MINOR	**Course Details: MNC-2**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–	30	–	70

Course Objectives

4. To understand the theoretical base of Marxism.

5. To understand various concepts of Marxism.

6. To understand some important debates of Marxism.

Course Content: Unit-wise course content distribution -

Unit-1: Marxist approach to the study of Politics: Dialectical Materialism, Historical Materialism, and Class and Class Struggle.

Unit-2: The question of the relative autonomy of the State -Ralph Miliband and Nicos Poulantzas

Unit-3: Gramsci's concept of hegemony.

Unit-4: Theory of Revolution: Lenin and Mao.

Unit-5: Marxian theory of Party: Lenin's contribution; Lenin-Rosa Luxemburg Debate on Party.

Course Learning Outcomes

4. Comprehending one of the major developments of the nineteenth and twentieth century period, when the Socialist tradition, known to the wider world as Marxism, appeared as one of the prominent alternative discourses opposed to the Liberal school of thought.

5. Assessing the importance of the progress of mankind from the historical perspective of class phenomenon and its related notion of economic progression.

6. Grasping the key concepts of Marxism such as dialectic, labour, theory of surplus-value, alienation, revolution, the working class, the idea of party and communism

Suggested Readings

1. David McLellan, *Marxism After Marx*,4th Edition (Palgrave Macmillan).

2. Paul Le Blanc, *From Marx to Gramsci:A Reader in revolutionary Marxist Politics*(Haymet Books).

3. T. Bottomore, *A Dictionary of Marxist Thought* (Oxford: Blackwell).

4. O. P. Gauba, *Introduction to Political Theory* (New Delhi: Macmillan,2011).

5. J. C. Johari, *Contemporary Political Theory* (New Delhi: Advent Books).

6. S. Ramaswamy, *Political Theory: Ideas and Concept* (NewDelhi: Macmillan).

7. B.D. Mahajan ,*Political Theory: Principles of Political Science* (New Delhi: S. Chand).

8. H. Abbas and R. Kumar, Political *Theory*(Delhi: Pearson).

9. Hoffman, J and Graham, P.,*Introduction to Political Ideologies* (Noida:Pearson).

10. Ralph Miliband, *Marxism and Politics* (OUP, 1977)

11. Nicos Poulantzas, *Political Power and Social Classes* (Verso, 1978).

12. John James Pipoly, *Western Marxism- A Critical Reader* (Canada: Knopf Doubleday Publishing Group

Semester – II
Course Name: Women Empowerment in India: Issues and Dimensions
Course Code: MDC219

Course Type: MD	**Course Details: MDC-2**			**L-T-P: 2 - 1- 0**	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. This course engages with contemporary representations of women feminities, gender-parity and power. The course aims to help students to develop a robust understanding of how discourses of gender underlie and shape our very lives, experiences, emotions and choices. The course exposes students to a broad range of political, historical periods and contexts, so that they are able to examine the socially-constructed nature of gendered and gendering process.
2. To understand women's rights in India.
3. To understand the Gender-based participation in politics.

Content: Unit wise course content distribution

Theory

Unit – 1: Conceptual Definition: Women and Women empowerment - Sex and Gender – Patriarchy

Unit – 2: Women and caste, religion, Women and environment, development; Women and access to resources: employment, health, education - Public sphere participation of women in politics

Unit – 3: The women's questions in pre-Independence era - sati-reform, widow remarriage; post-Independence campaign against sexual harassment, dowry, violence; debates around the Uniform Civil Code,

Unit – 4: Women, the Law and the State: Constitutional remedies and rights against gender-based violence; The history of constitutional protections for women (Hindu Code Bill, right to property, personal laws).

Learning Outcomes

The course will help students

1. Read, understand and examine closely narratives that seek to represent women, femininities and, by extension, gendering itself;
2. Understand how gender norms intersect with other norms, such as those of caste, race, religion and community to create further specific forms of privilege and oppression;
3. Identify how gendered practices influence and shape knowledge production and circulation of such knowledges, including legal, sociological, and scientific discourses;
4. Students will be able to understand the Gender-based participation in politics by this course.
5. They will be able to understand conceptual differences between women and trans gender.
6. This course will be beneficial for the students to understand Gender identity.
7. Student will also learn how patriarchy operates as a power structure in our society.

Suggested Readings:

1. Baby Kamble, 'Our Wretched Lives', Women Writing in India: 600 BC to the early twentieth century, eds Susie Tharu and K Lalitha (Delhi: OUP, 1997) pp. 307-11.
2. Rassundari Devi, From Amar Jiban, in Women Writing in India: 600 BC to the early twentieth century, eds Susie Tharu and K Lalitha (Delhi: OUP, 1997) pp. 190-202.
3. V Geetha, Patriarchy, Theorizing Gender Series (Kolkata: Stree, 2007) pp. 3-61.
4. Mary John, 'Feminism Poverty and the Emergent Social Order', in Handbook of Gender, ed. Raka Ray (Delhi: Oxford University Press, 2012).
5. Leela Kasturi, 'Report of the Sub-Committee Women's Role in Planned Economy National Planning Committee (1947), in Feminism in India, ed. Maitrayee Chaudhuri (Delhi: Zed, 2005) pp. 136-55.
6. Vandana Shiva, Staying Alive: Women Ecology and Development, Chapters 2&4
7. Kumkum Sangari, 'Politics of Diversity: Religious Communities and Multiple Patriarchies, Economic and Political Weekly 3052 (1995).
8. Urmila Pawar and Meenakshi Moon, We also made history: Women in the Ambedkarite Movement, (Delhi: Zubaan, 2008).
9. Janaki Nair, 'The Foundations of Modern Legal Structures in India', in Handbook of Gender, ed Raka Ray (Delhi: OUP, 2012).

Semester- II
Course Name: Indian Constitutional Development
Course Code: BAPLSSE201

Course Type: SEC	Course Details: SEC-2			L-T-P: 2 - 1- 0	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. To understand the constitutional development from the British period
2. To understand how the different Acts were incorporated and played a key role in the making of our Constitution.

Course Content: Unit-wise course content distribution -

Unit1: Brief history of Indian Constitutional Development since 1858-1909.
Unit2: Government of India Act 1919 or Montague Chelmsford Reforms 1919: Main Provisions (in details) and Dyarchy.
Unit 3: Simon Commission.
Unit4: Nehru Report.
Unit5: Government of India Act of 1935: Main Provisions (in detail), Provisional Autonomy and Federal System.
Unit6: Cripp's Mission Plan.
Unit 7: Cabinet Mission Plan
Unit 8: Indian Independence Act of 1947: Main Provisions.

Learning Outcomes

1. Students will be able to understand the brief history regarding our constitutional development.
2. This course will be helpful to understand how the British period broadened the path for our Constitutional Development.

Suggested Readings

1. Sharma, L.P, *Indian National Movement and Constitutional Development* (Agra: Lakshmi Narain Agarwal,1996)
2. Agarwal, R.C. and M. Bhatnagar, *Constitutional Development and National Movement of India* (New Delhi : S. Chand and Company Ltd, 2005)
3. Singh,K.D, *Modern Indian History and Constitutional Development.* (K.D Sikhsha Sansthaan Pvt. Ltd., 2019).
4. Gupta, D.C, *Indian National Movement and Constitutional Development.* (Delhi: Vikas Publishing House Pvt.Ltd, 1973).
5. Bhagwan and Vishnoo, *Constitutional History of India and National Movement* (The University of California : Atma Ram ,1973).

Semester- III

Course Name: Western Political Thought – I

Course Code: BAPLSMJ301

Course Type: MAJOR	**Course Details: MJC-3**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. The purpose of this module is to introduce to the students some classical political thinkers from the West who shaped the ideas and key concepts of political Science in the Anglo-American tradition.
2. Developing a 'just society' and a 'just state' has been a perennial question for all civilizations. But the answers are not alike. They are different across civilizations and times.
3. This course examines the ideas of some of the prominent classical political thinkers beginning from Plato, whose response to political questions vividly influenced political thinking. The seeds of the conceptual themes which seem to be so enriched today also found expressions in older times with different accentuation and nodes.
4. The course seeks to the trace that ideas and tradition and examine them critically.

Course Content: Unit-wise course content distribution

Theory

Unit – 1: Background of Western Political Thought: A brief outline with special emphasis on Stoics and Sophists.

Unit – 2: Greek Political Thoughts:

A] Plato: Theory of Ideal State and Justice

B] Aristotle: concepts of state and constitution.

Unit – 3: Roman Political Thought: Law and Jurisprudence Medieval Political Thought in Europe: Features.

Unit – 4: Post Medieval Political Thought in Europe: Niccole Machiavelli – Secularization of politics and statecraft.

Unit – 5: Jean Badin: Theories of state and sovereignty.

Learning Outcomes

1. The students will know the key ideas of all the political philosophers given in the course.

2. They will be able to explain what was the justice according to Plato

3. They will be able to answer how Aristotle explain the concept of state and constitution.

4. They will be able to answer how and why Machiavelli gave an overriding priority to pragmatism above ethics and values in operation of statecraft.

5. They will be able to answer how Bodin define state.

Semester-III

Course Name: Comparative Politics

Course Code: BAPLSMJ302

Course Type: MAJOR	**Course Details: MJC-4**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Objectives of the Course

1. To understand the difference between the Comparative Politics and Comparative Government.
2. To understand nature, scope, and approaches of Comparative Politics.
3. To understand relevant theories of Comparative Politics.
4. To understand Comparative Political System.

Content: Unit wise course content distribution

Theory

Unit – 1: Distinction between Comparative Politics and Comparative Government-Development of Comparative Politics.

Unit – 2: Scope, Purpose and method of Comparison-Approaches to the study of Comparative Politics.

Unit – 3: Theories of Political System. Easton, Almond and Powell.

Unit – 4: Theories of Political Modernization and Political Development: Pye and Huntington.

Unit – 5: Dependency Theory: Andre Gunder Frank.

Unit – 6: Constitutionalism: Evolution of the Idea of Constitutionalism, Post-colonial Constitutionalism and Rule of Law

Unit – 7: Electoral System: Definition and procedures: Types of electoral systems (First Past the Post, Proportional Representation, Mixed Representation

Course Learning Outcomes:

1. Students will be able to Learn key concepts of Comparative politics and Comparative Governments, distinction between them and development of Comparative politics.
2. They will come to know the purpose, Scope and methods of comparison and different approaches to the study of Comparative politics.
3. Students will come to know different theories of Political System.
4. They will learn the concept of Political Modernization and Political Development.
5. They will come to understand Dependency Theory.
6. Students will understand the different types of electoral system.

Suggested Readings

1. Almond, G and others Eds. *Comparative Politics Today: A World View (New Delhi :Pierson).*

2. Rakhahari Chatterjee. *Introduction to Comparative Political analysis. (*Kolkata:Sarat).

3. S.P.Verma. *Modern Political Theory.* (New Delhi: Vikash).

4. S.N.Roy. *Modern Comparative Politics*. (Delhi: PHI Learning).

5. S.Mukherjee and S. Ramaswamy.*Theoretical Foundations of Comparative Politics*.(Hyderabad: Orient Black Swan).

6. A. Heywood (2002) 'Representation, Electoral and Voting', in *Politics*. New York: Palgrave Macmillan, pp. 223-245.

7. Downs, W. M. (2011) 'Electoral Systems in Comparative Perspectives', in Ishiyama, J. T. and Breuning, M. (eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 159-167.

8. A. Evans (2009) 'Elections Systems', in J. Bara and M. Pennington (eds.) *Comparative politics*, New Delhi: Sage, pp. 93-119.
9. C. Mcllwain (1940 [2007]), *Constitutionalism: Ancient and Modern*, Cornell University Press.
10. U. Baxi (2000) 'Postcolonial Legality', in Henry and Sangeeta Ray eds., *A Companion to Postcolonial Studies*, Blackwell, pp.540-555.

Semester-III

Course Name: Comparative Government and Politics

Course Code: BAPLSMN301

Course Type: MINOR	**Course Details: MNC-3**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the development of Comparative Politics.
2. To understand scope and purposes of Comparative Politics.
3. To understand typologies of Comparative Politics.
4. To understand comparative analysis of legislature, executive, and judiciary.
5. To understand the manner in which power exists in society
6. Analytical capacity to engage with contemporary debates on welfare, populism, and authoritarianism.

Content: Unit wise course content distribution

Theory

Unit - 1: Distinction between Comparative Politics and Comparative Government: Development of Comparative Politics.
Unit - 2: Comparative Politics: Nature, Scope, Purposes, and Methods of Comparison.
Unit - 3: Theories of Political Systems: Easton, Almond and Powell.
Unit - 4: Typology of Constitutional Systems: Unitary and Federal, Parliamentary and Presidential
Unit - 5: Executive, Legislature and Judiciary: UK, USA and PRC.
Unit - 6: Political Parties and Pressure Groups: UK and USA.

Learning Outcome

1. Students will be able to understand the development of Comparative Politics.
2. They will understand scope and purposes of Comparative Politics.
3. Students will gather typologies of Comparative Politics.

4. Students will acquire knowledge on comparative analysis of legislature, executive, and judiciary.
5. Analytical capacity to engage with contemporary debates on welfare, populism, and authoritarianism.

Suggested Readings

1. Almond, G and Others(eds.), *Comparative Politics Today: A World View* (New Delhi: Pearson).
2. Rakhahari Chatterjee, *Introduction to Comparative Political Analysis* (Sarat Book House: Kolkata).
3. S.N. Ray, *Modern Comparative Politics* (Delhi: PHI Learning).
4. Rod Hague, Martin Harrop and Shaun Breslin, *Comparative Government and Politics: An Introduction* (London: Macmillan).
5. S. Mukherjee and S. Ramaswamy, *Theoretical Foundations of Comparative Politics* (Hyderabad: Black Swan).
6. J.C. Johari, *Comparative Politics* (New Delhi: Sterling).
7. J.C. Johari, *Major Modern Political Systems* (New Delhi: Sterling).
8. A.K Kapur and K.K. Mishra, *Select Constitutions* (New Delhi: S. Chand).
9. Lindstaedt N. (2020) Authoritarian Regimes, in D. Caramani (ed.), Comparative Politics, Oxford University Press, Ch 6. Pp.103-115
10. Busch, Andreas (2015), The Changing Architecture of the National Security State', in Stephan Leibfried, Evelyn Huber, Mattew Large, Jonah D. Levy and John D. Stephens (eds.), *The Oxford Handbook of Transformations of State*, Oxford, Oxford University Press.
11. Webb, E. (2011) 'Totalitarianism and Authoritarianism', in Ishiyama, J. T. and Breuning, M.(eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 249-257.
12. Mudde Cas and Kaltwasser Cristóbal Rovira (2017), What is Populism (Ch 1), Populism around the world (Ch 2) in *Populism: A Very Short Introduction*, OUP
13. Garland, David (2016) Ch 1, Ch 6, Ch 7, in *The Welfare State: A Very Short Introduction*, OUP.

Semester - III
Course Name: Indian Polity and Economy
Course Code: MDC307

Course Type: MD	**Course Details: MDC-3**			**L-T-P: 2 - 1 - 0**	
Credit: 3	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	15	_	35

Course Objectives

1. This course introduces to the students the significant linkages that exist between politics and economics in the domain of Indian economy and polity by apprising them about the meaning, nature and conceptual foundations of the field of Indian Political Economy.
2. Students will learn about the traditional as well as critical theoretical frameworks employed to examine the nature and functioning of Indian political economy. These theories include economic nationalism, liberalism and structuralism.

Unit – 1: Introduction: Understanding the intersectionality between politics and economy; The nature of state in India

Unit – 2: Theoretical Perspectives. Economic Nationalism, Liberalism and Structuralism

Unit – 3: Planning and Economic Development: Nehruvian and Gandhian perspectives; Role of planning and public sector; Green Revolution, land reforms and agrarian relations;

Unit – 4: Liberalization and economic reforms, Political and social constraints on Indian development.

Learning Outcomes

1. Develop a basic understanding of the structural functional linkages that connect the realms of politics and economics.

2. Learn to use the conceptual tools and theoretical frameworks for understanding the nature and basic functioning of the Indian political economy.
3. Understand the structural drivers that determine the contours of Indian political economy.
4. Students will expose to land reforms and agrarian relations.
5. Students will expose to the nature of state in India i.e. developmental, welfare and regulatory.

Semester- IV

Course Name: Western Political Thought - II

Course Code: BAPLSMJ401

<table>
<tr><td>Course Type: MAJOR</td><td colspan="2">Course Details: MJC-5</td><td colspan="2">L-T-P: 4 - 1 - 0</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>–</td><td>30</td><td>–</td><td>70</td></tr>
</table>

Course Objectives

1. The main objective of this course is to introduce to the students some modern political thinkers from the West who shaped the ideas and key concepts of Political Science in Anglo American tradition.

2. This course examines the ideas of some of the prominent modern thinkers beginning from Thomas Hobbes to Karl Marx whose response to political questions vividly influenced political thinking. The course seeks to the trace that ideas and tradition and examine them critically.

Content: Unit wise course content distribution

Theory

Unit 1: Thomas Hobbes: Materialism, Human nature, State of nature and State & Sovereignty.
Unit 2: John Locke: Natural rights, and Property; & J.J. Rousseau: Concept of General Will.
Unit 3: Hegel: Dialectics and State.
Unit 4: Karl Marx and Frederick Engels: Dialectical, Historical Materialism and Revolution.
Unit 5: Jeremy Bentham: Utilitarianism; & J.S. Mill: Utilitarianism and Liberalism.

Course Learning Outcomes

1. The students will know the ideas of all the political philosophers given in the course.

2. Students will be able to make a distinction among Hobbes, Locke and Rousseau on the stat of nature, law of nature, nature and from of contract and emergence of state from the contract.

3. Students will be able to understand the theory of dialectical and historical materialism of Marx and Engels.

4. Students will be able to understand the meaning of utilitarianism and how Bentham and Mill differ from each other.

Suggested Readings

1. G.H. Sabine, *A History of Political Theory* , (USA: Wadsworth Publishing Co. Inc,)

2. S. Mukherjee and S. Ramaswamy, *A History of Political Thought* (New Delhi: PHI)

3. Shefali Jha, *Western Political Thought* (Delhi: Pearson)

4. C.B. Macpherson, *Political Theory of progressive individualism: from Hobbes to Locke,* (Canada: Oxford)

5. Amal Kr. Mukhopadhyay, *Western Political Thought* [in Bengali]

6. Shobhanlal Dattagupta, *Marxist Thought* [in Bengali]

Semester – IV
Course Name: Indian Government and Politics
Course Code: BAPLSMJ402

Course Type: MAJOR	**Course Details: MJC-6**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. The main purpose of the course is to familiarize the student with the key elements of Indian constitution and enable them to critically access the working of government institutions in the broader framework of constitutionally and factors and forces which attempts to influence them.

2. The course has been designed to cover the journey of the map of India that emerge from partition to subsequent integration of princely states and how the decision on the key significant symbols such as national flag, national anthem, national song, etc. of the Constitution was arrived at through comprehensive debate in the Constituent Assembly.

3. Students also understand the fundamental rights and duties of the citizens, directive principles of State policy, nature of Indian federalism and other institution as described by the Constitution of India.

Content: Unit wise course content distribution

Theory

Unit - 1: Framing of the Indian Constitution: Role of the Constituent Assembly; Features of Indian Constitution; the Preamble

Unit - 2: Fundamental rights and duties; Directive principles of State policy.

Unit - 3: Nature of Indian Federalism: Constitutional provisions; changing nature of center-state relations.

Unit - 4: Union executive: President and vice President- election power and position. Prime Minister- power and position; Council of Ministers; Relationship of President and Prime Minister.

Unit - 5: Union legislature: Rajya Sabha and Lok Sabha: composition and functions: Speaker.

Unit - 6: The judiciary: Supreme Court and high courts- compositions and functions.

Unit - 7: Constitutional amendment: Procedures; Religion and politics: debates on secularism and communalism in India

Learning Outcomes

1. Students will be able to know the importance of the preamble in the constitutional design of India.

2. Students will be able to know the fundamental rights and duties of the Indian citizens.

3. Students also know about the nature of the Indian federalism and all about the the union state relationship in India.

4. Student will be able to know the legislative process of India.

5. Students also able to answer the questions about the functions and role of the President, Prime Minister and Parliament

Suggested Readings

1. D.D. Basu, *Introduction to the Constitution of India*, (Nagpur: Lexis Nexis).
2. S.C. Kashyap, *Our Constitution*, (New Delhi: National Book Trust).
3. S.C. Kashyap, *Our Political System*, (New Delhi: National Book Trust).
4. G.C. Hiregowder, et al., *The Indian Constitution: An Introduction*, (New Delhi: Orient Black Swan).
5. J.C. Johari, *Indian Government and Politics, Vol. I & II* (New Delhi: Vikash Publication).
6. Madhab Khosla, *The Indian Constitution*, (New Delhi: Oxford).
7. T. Pantham (2004) 'Understanding Indian Secularism: Learning from its Recent Critics', in R. Vora and S. Palshikar (eds.) *Indian Democracy: Meanings and Practices*, New Delhi: Sage, pp. 235-256.
8. N. Chandhoke (2010) 'Secularism', in P. Mehta and N. Jayal (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp. 333-346.
9. R Bhargava (ed.) (2006) *Secularism and its Critics*, Oxford India Paperback

Semester – IV
Course Name: Politics of Globalization
Course Code: BAPLSMN401

<table>
<tr><td colspan="2">Course Type: MINOR</td><td colspan="2">Course Details: MNC-4</td><td colspan="2">L-T-P: 4 - 1 - 0</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>_</td><td>30</td><td>_</td><td>70</td></tr>
</table>

Course Objectives

1. To understand meaning and debates of globalization.
2. To understand impact of globalization on economy.
3. To understand the impact of globalization on international order.

Content: Unit wise course content distribution

Theory

Unit - 1: Globalization: Meaning, Historical Perspective and debates of globalization.
Unit - 2: Globalization to de-globalization, and post-globalization
Unit - 3: Sovereign State in a Globalised World: Political Dimensions; Shift from State to Market?
Unit - 4: Globalization and new international order.
Unit- 5: Globalization and Localization: Dimensions of cultural change; Globalization and Terrorism.

Learning Outcome

1. The students will be able to understand meaning and debates of globalization.
2. The students will be able understand impact of globalization on economy.
3. They will understand the impact of globalization on international order.
4. Understand the nature, significance, and principal debates in the literature on globalisation and the concept of globalization as both a historical process and, a socio-cultural phenomenon.

Suggested Readings:

1. Baylis, J. And S. Smith (eds.), *The Globalization of World Politics: An Introduction.*

2. Nayyar, Deepak (ed.), *Governing Globalisation: Issues and Institutions*, Oxford University Press.

3. Keohane, Rebert and Nye, Joseph S., *Globalisation: What is new, what is not.*

4. O'Meara, Patrick and others, *Globalization and the Challenges of a New Century: A Reader*, Indiana University Press.

5. Susan Strange, "The Declining Authority of States," in in Frank J. Lechner and John Boli (eds.), *The Globalization Reader*, Oxford: Blackwell, 2004: pp. 219-224.

Semester – IV

Course Name: Political Communication and Leadership

Course Code: BAPLSSE401

Course Type: SE	Course Details: SEC-3			L-T-P: 2 - 0 - 1	
Credit: 3	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		15		_	35

Learning Objectives

1. The Learning Objectives of this course are as follows:
2. To understand the cross-cutting multi-disciplinary linkage of the subject.
3. To gain a basic understanding of specific concepts and critical review of political communication and election campaign studies.
4. To be able to construct a linkage between political communication and leadership.
5. To learn conceptual frameworks and qualitative research skills for the analysis of modes and techniques of political communication and leadership

Content: Unit wise course content distribution

Theory

Unit- 1: Explaining Political Communication: Meaning, Nature and Scope; Evolution and Transformation

Unit- 2: Exploring Leadership: Themes, Theories and Typologies; Participation and Performance

Unit- 3: Expanding Political Communication and Leadership: Orientation and Action: Developing Communication and Leadership through Research; Strengthening Techniques of Communication and Leadership

Unit- 4: Extending Political Communication and Leadership: Research Issues and Challenges: Researching Communication and Leadership through Survey: Opinion Poll, Exit Poll; Examining Contemporary Issues and Challenges in Communication and Leadership, Exploring Career Options.

Learning outcomes

The Learning Outcome of this course is as follows:

After studying this course, students will be able to have a professional/career-oriented insight by facilitating their journey as Media managers, policy makers, political analysts, Journalists, Public relations officers in government agencies, political parties and higher education.

Guidelines for Practical: The assessment for the course may include Class participation, Assignments, Projects, Field Work, Presentations, amongst others as decided by the faculty. Special emphasis will be given on **field work/educational tour/excursion** for 4th semester students.

Suggested Readings:

1 Pole (2009). Blogging the Political: Politics and Participation in a networked Society. New York: Routledge.
2 D. A. Graber (2005). 'Political Communication Faces the 21st Century', Journal of Communication, September: 479-507.
3 Frank Esser and Barbara Pfetsh (eds.). (2004). Comparing Political CommunicationTheories, Cases and Challenges. Cambridge: Cambridge University Press.
4 G. Gerbner, L. Gross, M. Morgan and N. Signorielli (1982). 'Charting the Mainstream: Television's Contribution to Political Orientations', Journal of Communication, 32(2): 100-27.
5 H. A. Semetko and M. Scammell (eds.) (2012). The SAGE Handbook of Political Communication. London: Sage.
6 John C Maxwell (2008). Developing the Leader Within You. New Delhi: Harper Collins.
7 Kiran Prasad (ed.) (2003). Political Communication: The Indian Experience. New Delhi: B.R. Publishers.
8 Max Depree (2004). Leadership is an Art. RHUS Publications.
9 Yogesh Atal (2014). 'Matdataoin Ka Sansar', Pratiman, Vol.2, No.1.
10 Yogesh Atal (2018). 'Chunav Shastra Aur Rajniti', Pratiman, No.11.

Semester – IV
Course Name: Basics of Indian Constitution
Course Code: VAC407

Course Type: VA	**Course Details: VAC-2**			**L-T-P: 4 - 0 - 0**	
Credit: 4	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–		–	

Course Objectives

1. The main purpose of the course is to familiarize the student with the key elements of Indian constitution.
2. The course has been designed to cover the journey of the map of India that emerge from partition to subsequent integration of princely states and how the decision on the key significant symbols such as national flag, national anthem, national song, etc. of the Constitution was arrived at through comprehensive debate in the Constituent Assembly.

3. Students also understand the fundamental rights and duties of the citizens, directive principles of State policy, nature of Indian federalism and other institution as described by the Constitution of India.

Content: Unit wise course content distribution
Theory
Unit - 1: Framing of the Indian Constitution: Role of the Constituent Assembly; Features of Indian Constitution; the Preamble
Unit - 2: Fundamental rights and duties; Directive principles of State policy.
Unit - 3: Nature of Indian Federalism: Constitutional provisions; changing nature of center-state relations.
Unit - 4: Organs of Constitutional Governance- Legislature (Lok Sabha & Rajya Sabha), Executive (The President, Prime Minister and Vice President) and Judiciary (Supreme Court) in India: Composition, procedure, powers & functions.
Unit - 5: Constitutional amendment: Procedures; Election Commission of India.

Learning Outcomes
1. Students will be able to know the importance of the preamble in the constitutional design of India.

2. Students will be able to know the fundamental rights and duties of the Indian citizens.

3. Students also know about the nature of the Indian federalism and all about the union state relationship in India.

4. Student will be able to know the legislative process of India.

5. Students also able to answer the questions about the functions and role of the President, Prime Minister and Parliament

Suggested Readings
1. D.D. Basu, *Introduction to the Constitution of India*, (Nagpur: Lexis Nexis).
2. S.C. Kashyap, *Our Constitution*, (New Delhi: National Book Trust).
3. S.C. Kashyap, *Our Political System*, (New Delhi: National Book Trust).
4. G.C. Hiregowder, et al., *The Indian Constitution: An Introduction*, (New Delhi: Orient Black Swan).
5. J.C. Johari, *Indian Government and Politics, Vol. I & II* (New Delhi: Vikash Publication).
6. Madhab Khosla, *The Indian Constitution*, (New Delhi: Oxford).

Semester – V

Course Name: Basis Theories of International Relations
Course Code: BAPLSMJ501

Course Type: MAJOR	Course Details: MJC-7			L-T-P: 4 - 1 - 0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the theories to the study of International Relations.

2. To understand the basic concepts of International Relations.

3. To Understand the major approaches to the study of International Relations.

Content: Unit wise course content distribution

Theory

Unit – 1: International Relations as a discipline: Emergence and evolution.

Unit – 2: Basic concepts of International Relations: (a) National power, (b) Balance of power, (c) Collective security, (d) Bipolarity, (e) Unipolarity, (f) Multipolarity, (g) National interest, (h) Globalization and (i) deterrence

Unit – 3: Approaches to the Study of International Relations: Realist, Liberalism, Functionalist and World System Theory.

Unit – 4: Techniques of implementation of Foreign Policy: Diplomacy, Propaganda and Foreign Aid.

Unit – 5: United Nations: Envisaged role and actual record; Specialized UN agency – WHO - aims and functioning; the need for UN reforms.

Learning Outcomes

1. This course will be helpful to understand the theories to the study of International Relations.
2. The students will be able to understand the basic concepts of International Relations.
3. They will understand the major approaches to the study of International Relations.

Suggested Readings

1. Burchill, S. et al. (eds.), *Theories of International Relations*, Palgrave Macmillan, 2001.

2. Bandyopadhyaya, Jayantanuja, *A General Theory of International Relations.*

3. Reus-Smit, Christian and Duncan Snidal (eds.), *The Oxford Handbook of International Relations.*

4. Sterling-Folker, Jennings (ed.), *Making sense of International Relations Theory.*

5. Waltz, Kenneth, *Theory of International Politics*

6. Wendt, Alexander, *Social Theory of International Politics.*

7. Chris Brown, Understanding International Relations, St. Martin Press, New York, 1997.

8. Jennifer Sterling Folker (ed.) Making Sense of International Relations Theory, Lynne Rienner Publisher, London, 2006.

9. Robert Jackson and Georg Sorensen, *Introduction to International Relations: Theories and Approaches*, Oxford University Press, 1999.

10. Tim Dunne, Milja Kurki and Steve Smith (ed.) *International Relations Theories: Discipline and Diversity*, Oxford University Press, 2007.

Semester – V
Course Name: Political Sociology
Course Code: BAPLSMJ502

Course Type: MAJOR	**Course Details: MJC-8**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the difference between Sociology of Politics and Politics of Sociology.
2. To understand the concepts of Political Sociology and their applicability.

Content: Unit wise course content distribution

Theory

Unit1: Nature and Scope of Political Sociology: Sociology of Politics and Political Sociology.
Unit2: Political Culture: key aspects and classifications.
Unit 3: Social Stratification: Caste and Class.
Unit4: Power, Legitimacy and Authority- Max Weber.
Unit5: Political Socialization: Meaning and Agencies.

Unit6: Elite theories- Moska, Michels & Pareto.

Learning Outcomes

1. Students will be able to understand the difference between Sociology of Politics and Political Sociology.
2. This course will be helpful to understand the concepts of Political Sociology and their applicability.
3. Students will be able to analyse socio-political events and issues in the framework of interaction between society and politics as a two way process.

Suggested Readings

1. Bottomore,Tom,*Political Sociology*(NewDelhi:B.I.Publication).
2. Chakraborty,Satyabrata(ed.),*PoliticalSociology*(NewDelhi:Trinity).
3. Ashraf,AliandSharma,L.N.,*Political Sociology:A New Grammar of Politics*(Hyderabad: University Press).
4. Mukhopadhyay,AmalKumar, *Political Sociology*(Kolkata:K.P.Bagchi).
5. Bhattachariya,D.C.,*Political Sociology*(Kolkata: VijoyaPublishingHouse).
6. Dasgupta,Samir,*Political Sociology*(NewDelhi:Pearson).
7. Gupta,Dipankar,*Political Sociology in India*(Delhi:OrentLongman).
8. Weber Max, *Politics as vocation* (USA: Hackett Publishing Company,2004)
9. Gerth & Mills (eds.) *From Max Weber: Essays in Sociology* (Routledge,1948)

Semester – V
Course Name: Basic Theories of Public Administration
Course Code: BAPLSMJ503

Course Type: MAJOR	**Course Details: MJC-9**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand evolution of Public Administration.
2. To understand nature and scope of Public Administration.
3. To understand various models of Public Administration.

Content: Unit wise course content distribution

Theory

Unit -1: Nature, Scope and Evolution of Public Administration- Private and Public Administration.

Unit - 2: Theories of Public Administration:
A. Classical Theories – i) Scientific Management (F.W. Taylor) ii) Administrative Management (Fayol)
B. Neo-Classical Theories – i) Human Relations Theory (Elton Mayo), ii) Rational Decision-Making (Herbert Simon)
C. Contemporary Theories – i) Ecological Approach (Fred Riggs)

Unit - 3: Major concepts of Organization: a) Hierarchy, b) Unity of Command, c) Span of Control, d) Authority, e) Centralization, Decentralization and Delegation, f) Line and Staff.

Unit - 4: Weber's bureaucratic model its critique.
Unit - 5: Development Administration: Fred W. Riggs.

Unit - 6: Public Policy: Concept, scope and relevance.

Learning Outcomes

1. Studying Public administration students will develop the leadership and management skills.
2. Students will be taught how to manage people efficiently
3. The student will be introduced to the evolution of the discipline, its changing contours through a study of the different theories, ranging from the classical, neo-classical and contemporary theories.

Suggested Reading

1. Mohit Bhattacharya , *New Horizons of Public Administration*(New Delhi : Jawahar Publishers).

2. S.R . Maheswari, *Administrative Theory: An Introduction* (Delhi : Macmillan).

3. S. R . Maheshwari, *A Dictionary of Public Administration* (New Delhi : Orient Blackswan).

4. Rumki Basu , *Public Administration: Concepts and Theories* (New Delhi: Sterling).

5. Bidyut Chakraborty and Prakash Chand, *Public Administration in a Globalizing World: Theories and Practices* (New Delhi: Sage).

6. Alka Dhameja and Sweta Mishra (eds.), *Public Administration : Approaches and Applications* (Noida: Pearson).

7. Rajashri Basu, *Public Administration* [in Bengali] (Calcutta: Paschim Banga Rajya Pustak Parshad)

Semester – V
Course Name: Indian Political Thought
Course Code: BAPLSMN501

Course Type: MINOR	**Course Details: MNC-5**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. This course intends to acquaint students with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.

2. In India, academic sages and philosophers produced huge treasures of wisdom on politics, kingship, the functioning of government including the monarchy and bureaucracy, and their relationship with the people.

3. This course module will make them understand the ideas of some prominent ancient political thinkers of India.

4. This course has been designed to familiarize the students with key ideas of some of political thinkers of the modern India whose writings and ideas have impacted the society and polity significantly

Content: Unit wise course content distribution

Theory

Unit - 1: Kautilya's Political Thought: Saptanga and Dandaniti.
Unit - 2: Medieval Political Thought in India: A broad outline.
Unit - 3: Raja Rammohan Roy: Rule of Law and Freedom of thought.
Unit- 4: Bankim Chandra, Rabindranath Tagore, Swami Vivekananda, Sri Aurobindo: Nationalism.
Unit - 5: Gandhi: Swaraj and trusteeship.
Unit - 6: Ambedkar: Social justice.

Learning Outcomes

1. The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government.

2. They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual thinkers.

3. Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.

4. Students will be able to explain the key ideas of Raja Rammohan Roy.

5. They will come to understand how Bankim Chandra Chattopadhyay,

Suggested Readings

1. Ambedkar, B. R. (1946). Prospects of Democracy in India. *In Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Dept.,* Government of Maharashtra, Mumbai, pp. 519-523.

2. *Basu, S. (2002). Religious Revivalism as Nationalist Discourse: Swami Vivekananda and New Hinduism in Nineteenth-Century Bengal.* London: Oxford University Press.

3. Chatterji, B. C. (2006). *In Roy, B. K. (translated) Anandamath.* New Delhi: Orient Paperbacks.

4. Chakraborty, B and Pandey R.K , *Modern Indian Political Thought,* New Delhi, Sage.

5. Das, R., & Das, R. (2012), *The Nation and the Community: Hindus and Muslims in the Novels of Bankim Chandra Chatterjee. Proceedings of the Indian History Congress,* 73, pp. 578-587

6. Dhar, S. (1981). *Kautilya and the Arthashastra*. New Delhi: Marwah publication.

7. Dutt, M. N. (2003), *Manusmriti.* New Delhi. Vedic Books.

8. Haldar, M. K. (1977). *Renaissance and Reaction in Nineteenth Century Bengal: Bankim Chandra Chattopadhyay (Translation of Bengali Essay).* Calcutta: Minerva Associates.

9. Jolly, J. (1923). *Kautiliyam Arthashastram- Arthashastra of Kautilya. New Delhi: Motilal Banarasi Dass.*

11. Parekh, B. (1997). *The Critique of Modernity. In: Gandhi: A Brief Insight. Delhi: Sterling Publishing Company, pp. 63-74.*

12. Parel, A. J. (Ed.). (2002). *Introduction. In: Gandhi, freedom and Self Rule. Delhi: Vistaar Publication.*

Semester – VI
Course Name: India's Foreign Policy in a Globalizing World
Course Code: BAPLSMJ601

Course Type: MAJOR	Course Details: MJC-10			L-T-P: 4 - 1 - 0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand the changing dynamics of India's foreign policy in the globalized world.

2. To understand the major issues of India's foreign policy in the globalized world.

3. To gather knowledge, the relational dynamics between India and the USA and UK.

4. To understand India's economic engagements with various economic forum.

Content: Unit wise course content distribution

Theory

Unit - 1: India's Foreign Policy in the era of Globalization: Emerging Issues (a) India's global trade and market economy, (b) Environmental issue in India's foreign policy, (c) Terrorism, (d) National Security, and (e) Nuclear issue – Pokhran Issue.

Unit - 2: India's Foreign Policy towards Selected Neighbours: China, Myanmar, Sri Lanka, Pakistan, and Bhutan.

Unit - 3: The Changing Contours of Indo-U.S. relations in the Era of Globalization.

Unit - 4: India and U.K: The Changing Dimensions of Relations in a Globalized World.

Unit - 5: India's Foreign Policy: From Non-Alignment to Strategic Engagements in a Multipolar World; BRICS and G-20.

Unit - 6: Recent developments in Indian Foreign Policy: India's Position on the Recent Crises in Afghanistan and Myanmar, Growing Relations with US and Israel; India's Vision of a New World Order.

Learning Outcome

1. The students will be able understand the changing dynamics of India's foreign policy in the globalized world.

2. They will gather the major issues of India's foreign policy in the globalized world.

3. This course will be beneficial for the students to assume the relational dynamics between India and the USA and UK.

4. This course will be helpful to understand India's economic engagements with various economic forum.

Suggested Readings

1. Ganguly, Sumit, *Indian Foreign Policy*, Oxford University Press, New Delhi.

2. Kothari, Raj Kumar, *India in the New World Order: The Changing Contours of Her Foreign Policy Under Narendra Modi*, Atlantic, New Delhi.

3. Dubey, M, *India's, Foreign Policy*, Orient Black Swan.

4. Dutt, Sagarika, *India in a Globalized World*, Manchester University Press.

5. Chakrabory, Biswanath, and Nandy, Debasish (eds.) *An Outline of India's Foreign Policy and Relations*, Mitram, Kolkata.

6. Nandy, Debasish, *Revisiting India's Post-Cold War Foreign Policy since 1991 to Present Day*, Avenel Press, Kolkata.

Semester – VI
Course Name: Comparative Constitutional Systems
Course Code: BAPLSMJ602

Course Type: MAJOR	**Course Details: MJC-11**			**L-T-P: 4 - 1 - 0**
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. To understand conceptual base of comparative constitutionalism.
2. To understand the role of legislature, executive, and judiciary of major countries.
3. To understand the different types of state and regimes.

Content: Unit wise course content distribution

Theory

Unit - 1: Typology of Constitutional Systems: Unitary and Federal, Parliamentary and Presidential

Unit - 2: Comparing State and Regime Types: Capitalist, Welfare, Populist and Security State.
Unit - 3: Legislature in UK and PRC: composition and functions – role of second chambers in UK and USA – role of speakers in parliamentary and presidential systems (UK and USA);
Unit - 4: Executive in UK, USA and PRC – Prime Minister in UK, President in USA and State Council in PRC.
Unit - 5: Relation between executive and legislature in UK, USA and PRC.
Unit - 6: Judiciary in UK, USA and PRC (with special reference to the procuratorate).

Course Learning Outcomes

1. Understand the importance of comparative analysis required for a proper assessment of the different constitutional systems;
2. Comprehend the various historical, political, social, cultural, economic and diplomatic aspects of UK, USA and PRC;
3. Assess the relation between the political systems of UK, USA and PRC and to understand the importance of their relative position in the world order.
4. Analytical capacity to engage with contemporary debates on welfare, populism, and authoritarianism.

Suggested Readings

1. Rod Hague, Martin Harrop and Shaun Breslin, *Comparative Government and Politics – An Introduction* (London: Macmillan).
2. J.C. Johari, *Major Modern Political Systems* (New Delhi: Sterling).
3. J.C. Johari, *Comparative Politics* (New Delhi: Sterling).
4. Rakhahari Chatterjee, *Introduction to Comparative Political Analysis* (Kolkata: Sarat Book House)
5. K.K. Ghai, *Major Governments* (New Delhi: Kalyani Publication)
6. S.N. Ray, *Modern Comparative Politics: Approaches, Methods and Issues* (Delhi: PHI)
7. A.C. Kapur and K.K. Mishra,
8. *Select Constitutions* (New Delhi: S. Chand)
9. Lindstaedt N. (2020) Authoritarian Regimes, in D. Caramani (ed.), Comparative Politics, Oxford University Press, Ch 6. Pp.103-115
10. Busch, Andreas (2015), The Changing Architecture of the National Security State', in Stephan Leibfried, Evelyn Huber, Mattew Large, Jonah D. Levy and John D. Stephens (eds.), *The Oxford Handbook of Transformations of State*, Oxford, Oxford University Press.
11. Webb, E. (2011) 'Totalitarianism and Authoritarianism', in Ishiyama, J. T. and Breuning, M.(eds.) *21st Century Political Science: A Reference Book*. Los Angeles: Sage, pp. 249-257.
12. Mudde Cas and Kaltwasser Cristóbal Rovira (2017), What is Populism (Ch 1), Populism around the world (Ch 2) in *Populism: A Very Short Introduction*, OUP
13. Garland, David (2016) Ch 1, Ch 6, Ch 7, in *The Welfare State: A Very Short Introduction*, OUP.

Semester-VI

Course Name: Issues in Indian Administration and Governance
Course Code: BAPLSMJ603

Course Type: MAJOR	**Course Details: MJC-12**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand Indian Administration.

2 To understand key issues in India Administration.

3 To understand aspects of governance.

Content: Unit wise course content distribution
Theory Unit 1: Salient features and value premises of Indian administration. Constitutionalism. Political and administrative culture. Bureaucracy and democracy.

Unit 2: Major issues in Indian Administration: a) Ethics in Administration: Integrity vs. Corruption b) Accountability: RTI, Lokpal, Citizens' Charter c) Relationship between Political Executive and Permanent Executive d) Generalists and Specialists

Unit 3: Social Welfare Policies a) Education: Right to Education b) Health: National Health Mission c) Food: Right to Food Security d) Employment: MGNREGA

Unit 4: Citizen and administration. Pressure groups and interest groups. Self- help groups.

Unit 5: Governance and reforms-Meaning and concepts. Good governance. Innovation in Administration and Governance.

Unit 6: E-Governance- Critical Issues: Digital India & Digital Divide in India, Cyber security.

Learning Outcomes

1 This course will be helpful to the students to understand the administration from an Indian perspective.

2 The students will be able to understand the contemporary issues related to governance and administration.

3 The students will be able to understand the functions and importance of Administration and governance in the present scenario.

Suggested Readings

1. Hoshiar Singh and Mohinder Singh: Public Administration in India: Theory & Practice. New Delhi, Sterling Pub., Reprint, 1990.
2. Hoshiar Singh and D.P. Singh : Indian Administration Current Issues and Problems, Jaipur, Aalekh Publishers, 1990.
3. Pilani, G.P. and Singh, Hoshiar: Administration and Social Changes, Jaipur; Printwell Pub., 1985.
4. Avasthi: Central Administrative, Tata McGraw Hill Pub. Co. Pvt. Ltd., New Delhi, 1988.
5. Jain, R.B.: Contemporary Issues in Indian Administration, Delhi; Vishal Pub., 1976.
6. Maheshwari, S.R.: Indian Administration, Delhi; Orient Longman, 1989.
7. Bhambri, C.P.: Public Administration in India, Delhi, Vikas, 1973.
8. Sarkar Siuli, Public Administration in India, PHI, New Delhi,2010.
9. Arora and Goyal, Indian Public Administration, New age International, Delhi. 2014
10. E Governance Initiatives in India http://www.arc.gov.in/11threp/ARC_11thReport_Ch4.pdf
11. National e Governance Plan, http://www.arc.gov.in/11threp/ARC_11thReport_Ch4.pdf
12. Vandana Gupta and Ajay Sharma, *E Governance in India: Problems, Challenges and Prospects*, Research Journal of Economic and Business Studies, Vol.1 No.9, 2012 http://www.theinternationaljournal.org/ojs/index.php?journal=rjebs&page=article&op=view&p ath%5B%5D=1110

13. B. Muthukumaran, Information Technology for Management, Oxford University Press, New Delhi, 2010

14. Misra and Puri (2010), *Indian Economy*, New Delhi: Himalaya Publishing House

15. Ministry of Finance, Government of India (2014) Economic Survey

16. Economic and Political Weekly, Special articles on Indian Economy

17. Frankel, Francine (2009) India's Political Economy: The Gradual Revolution, New Delhi, OxfordUniversity Press

Semester – VI
Course Name: Political Process in India
Course Code: BAPLSMJ604

Course Type: MAJOR	**Course Details: MJC-13**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Learning Objectives

1. This course aims at familiarising the students with the processes through which politics makes itself manifest in India. It involves looking at the different modes through which power is exercised and dispersed in society along the axes of caste, class, religion, ethnicity and gender.
2. It seeks insights from political sociology to understand how political process is mediated through and structured by various forms of social power.
3. It enables students to comprehend the relationship between caste, religion and politics, the constitutional recognition and institutional arrangements for self-government, autonomy and development in the context of tribal communities as reflected in the Fifth and Sixth Schedules, and the various constitutional and legal provisions that enable the state to empower the marginalised and vulnerable in society.
4. The course enables the students to understand the party system in India, its changing form in response to democratic churnings and electoral competition, and the role played by them in the articulation of political power. It draws attention to the constitutional, statutory and institutional

arrangements for regulating electoral competition through the study of electoral reforms and the Election Commission of India.

Content: Unit wise course content distribution

Theory

Unit 1: Political Parties and the Party System: National and State Parties; Trends in the Party System: One party dominant system (the Congress System), fragmented and regionalized multi-party system, binodal system to ascendancy of Bhartiya Janata Party

Unit 2: Elections and Electoral Processes: Electoral Process, Representation and social determinants of voting behaviour in India; Election Commission and Electoral Reforms in India.

Unit 3: Religion and Politics: Debates on Secularism and Communalism since Independence

Unit 4: Caste and Politics: Caste in Politics and the Politicization of Caste; Intersectionality of Caste and Class, reservation and affirmative action policies

Unit 5: Tribes and Politics: Policies and Challenges: Fifth and Sixth Schedules; Forest Rights Act.

Learning outcomes

On successful completion of the course, the students will demonstrate:

1. Understanding of political process in India and its interaction with social cleavages of caste, class, gender, ethnicity and religion
2. Familiarity with the ways in which the state in India responds to social groups and vulnerable sections
3. Knowledge of political parties and the party system in India
4. Awareness of the manner in which representation and electoral competition play out in Indian politics.

Suggested Readings:

1. R. Kothari (2002) 'The Congress System', in Z. Hasan (ed.) Parties and Party Politics in India, New Delhi: Oxford University Press, pp 39-55.
2. Pradeep Chibber and Rahul Verma (2019) 'The Rise of the Second Dominant Party System in India: BJPs New Social Coalition in 2019' in Studies in Politics, Vol. 7, No.2, Pp.131-148.
3. N. G. Jayal (2006) Representing India: Ethnic Diversity and the Governance of Public Institutions, Palgrave Macmillan, London. Yogendra Yadav (2010), 'Representation', in Niraja Gopal Jayal and Pratap Bhanu Mehta (eds), The Oxford Companion to Politics in India, New Delhi: Oxford University Press, 347- 360.
4. T. Pantham (2004) 'Understanding Indian Secularism: Learning from its Recent Critics', in R. Vora and S. Palshikar (eds.) Indian Democracy: Meanings and Practices, New Delhi: Sage, pp. 235-256.
5. N. Chandhoke (2010) 'Secularism', in P. Mehta and N. Jayal (eds.) The Oxford Companion to Politics in India, New Delhi: Oxford University Press, pp. 333-346.

6. R. Kothari (1970) 'Introduction', in Caste in Indian Politics, Delhi: Orient Longman, pp.3- 25.
7. M. Weiner (2001) 'The Struggle for Equality: Caste in Indian Politics', in Atul Kohli (ed.) The Success of India's Democracy, New Delhi: Cambridge University Press, pp. 193-225.
8. G. Omvedt (2002) 'Ambedkar and After: The Dalit Movement in India', in G. Shah (ed.) Social Movements and the State, New Delhi: Sage Publications, pp. 293-309
9. B. Sharma (2010), 'The 1990s: Great Expectations'; 'The 2000s: Disillusionment Unfathomable', in Unbroken History of Broken Promises: Indian State and Tribal People, Delhi: Freedom Press and SahyogPustakKuteer, pp. 64-91.
10. V. Xaxa (2019) 'Isolation, Inclusion and Exclusion: the case of Adivasis in India', in V.S.Rao, Adivasi Rights and Exclusion in India, Oxon and New York: Routledge, pp.27-40

Semester – VI
Course Name: Summer Internship
Course Code: SI601
(To be prepared later on as per the directions of the University)

4 Year UG Degree (Honours) in Political Science
Semester – VII
Name of the Course: Understanding South Asia
Course Code: BAPLSMJ701

Course Type: MAJOR	**Course Details: MJC-14**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the strategic importance of South Asian region.

2 To understand the major border disputes in South Asia.

3 To explore the reasons of civil wars and conflicts in South Asian region.

4 To understand democratic systems of South Asia and regional integration process.

Content: Unit wise course content distribution
Theory

Unit 1: South Asia: As a region and its strategic importance.

Unit 2: Border Disputes: (a) India-Pakistan and (b) India-China.

Unit 3: Civil Wars and Ethnic Conflicts in South Asia: (a) Sinhala-Tamil conflict in Sri Lanka, and Baluchistan movement in Pakistan.

Unit 4: Democracy and state system in South Asia: Case study of Pakistan, Bangladesh, Maldives, Sri Lanka, Nepal, and Bhutan.

Unit 5: Regional Integration in South Asia: SAARC; ASEAN

Suggested Readings

1. Farmer, B.H., *An Introduction to South Asia*, Rutledge, London.
2. Baxter et, al.(ed.), *Government and Politics in South Asia*, West view, Boulder.
3. Mitra, Debashis and Nandy, Debasish(eds.), *South Asia and Democracy: Contextualizing Issues and Institutions*, Kunal Books, New Delhi.
4. Nandy, Debasish, *Understanding Pakistan*, Kunal Books, New Delhi.
5. Nandy, Debasish (ed.) *Mapping South Asia: State, Society and Security Dilemmas*, Blue Roan Publishers, Ahmedabad.
6. Phandis, Urmila and Ganguly Rajat, *Ethnicity, and Nation Building in South Asia*, Sage, New Delhi.

Semester – VII
Name of the Course: Politics of Developing Societies

Course Code: BAPLSMJ702

Course Type: MAJOR	**Course Details: MJC-15**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical

	100	_	30	_	70

Course Objectives:

1 The course offers a conceptual understanding of the political processes in the ThirdWorld.
2 It hastens the knowledge organism to familiarize with different cause-effect imprint inthe developing world.

Content: Unit wise course content distribution
Theory

Unit 1: Approaches to the study of developing societies in the post-Cold war era changingdimensions of such societies.
Unit 2: Economic Dimension – Globalization and Liberalization: Their Impacts – Inequality as an issue.
Unit 3: The State in developing societies – state formation, state building, and state transition.

Unit 4: Political Dimension – from authoritarianism to democratization.
Unit 5: Civil Society – Role of Intellectual
Unit 6: Religion and Politics in developing societies.

Learning Outcome:

1. The students will be able to cultivate an acquaintance of different concepts and issues of theThird World.

Suggested Readings:

1. Burnell, Peter and Vicky Randell eds. – Politics in the Developing World
2. Clapham, Christopher – Third World Politics: An Introduction
3. Fawcett, Louise, and Yezid Sayigh eds. – The Third World Beyond the Cold War: Continuity andChange
4. Gonzales, Alfonso and Jim Norwine eds. – The New Third World
5. Huntington, Samuel – The Third Wave: Democratization in the Late Twentieth Century
6. Keane, J – Global Civil Society
7. Ravenhill, John – Global Political Economy.

Semester – VII
Course Name: Indian Political Thought
Course Code: BAPLSMJ703

Course Type: MAJOR	**Course Details: MJC-16**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. This course intends to acquaint students with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.

2. In India, academic sages and philosophers produced huge treasures of wisdom on politics, kingship, the functioning of government including the monarchy and bureaucracy, and their relationship with the people.

3. This course module will make them understand the ideas of some prominent ancient political thinkers of India.

4. This course has been designed to familiarize the students with key ideas of some of political thinkers of the modern India whose writings and ideas have impacted the society and polity significantly

Content: Unit wise course content distribution

Theory

Unit - 1: Kautilya's Political Thought: Saptanga and Dandaniti.
Unit - 2: Medieval Political Thought in India: A broad outline.
Unit - 3: Raja Rammohan Roy: Rule of Law and Freedom of thought.
Unit- 4: Bankim Chandra, Rabindranath Tagore, Sri Aurobindo, Swami Vivekananda: Nationalism.
Unit - 5: Gandhi: Swaraj and trusteeship.
Unit - 6: Ambedkar: Social justice.

Learning Outcomes

1. The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government.

2. They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual thinkers.

3. Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.

4. Students will be able to explain the key ideas of Raja Rammohan Roy.

5. They will come to understand how Bankim Chandra Chattopadhyay,

Suggested Readings

1. Ambedkar, B. R. (1946). Prospects of Democracy in India. *In Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Dept.,* Government of Maharashtra, Mumbai, pp. 519-523.

2. *Basu, S. (2002). Religious Revivalism as Nationalist Discourse: Swami Vivekananda and New Hinduism in Nineteenth-Century Bengal.* London: Oxford University Press.

3. Chatterji, B. C. (2006). *In Roy, B. K. (translated) Anandamath.* New Delhi: Orient Paperbacks.

4. Chakraborty, B and Pandey R.K , *Modern Indian Political Thought,* New Delhi, Sage.

5. Das, R., & Das, R. (2012), *The Nation and the Community: Hindus and Muslims in the Novels of Bankim Chandra Chatterjee. Proceedings of the Indian History Congress,* 73, pp. 578-587

6. Dhar, S. (1981). *Kautilya and the Arthashastra*. New Delhi: Marwah publication.

7. Dutt, M. N. (2003), *Manusmriti.* New Delhi. Vedic Books.

8. Haldar, M. K. (1977). *Renaissance and Reaction in Nineteenth Century Bengal: Bankim Chandra Chattopadhyay (Translation of Bengali Essay).* Calcutta: Minerva Associates.

9. Jolly, J. (1923). *Kautiliyam Arthashastram- Arthashastra of Kautilya. New Delhi: Motilal Banarasi Dass.*

11. Parekh, B. (1997). *The Critique of Modernity. In: Gandhi: A Brief Insight. Delhi: Sterling Publishing Company, pp. 63-74.*

12. Parel, A. J. (Ed.). (2002). *Introduction. In: Gandhi, freedom and Self Rule. Delhi: Vistaar Publication.*

Semester – VII
Course Name: Politics in West Bengal
Course Code: BAPLSMJ704

Course Type: MAJOR	Course Details: MJC-17			L-T-P: 4 - 1 - 0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the dynamics of West Bengal Politics.
2 To understand the role of leadership in West Bengal Politics.
3 To assess the role of civil society in West Bengal.

Content: Unit wise course content distribution
Theory
Unit 1: Dynamics of politics in West Bengal: An overview.

Unit 2: Leadership role: Caste and class and elite.

Unit 3: Politics of Ethnicity: Gorkhaland Movement and Kamtapur Movement.

Unit 4: Civil Society in West Bengal – nature and role.

Unit 5: Role of Bhadralok in Bengal Politics.

Learning Outcomes

1 This course will help to understand the dynamics of West Bengal Politics.
2 This course will be helpful to understand the role of leadership in West Bengal Politics.
3 This course will be helpful to assess the role of civil society in West Bengal.

Suggested Readings

1. Franda, Marcus F., *Radical politics in West Bengal* (MIT Press).
2. Chatterjee, Partha, *State and Politics in India* (Delhi: Oxford).
3. Kaviraj, Sudipta and Khilnani, Sunil (eds.), *Civil Society: History and Possibilities* (Delhi: Cambridge).
4. Bagchi, Romit, Gorkhaland: *Crisis of Statehood* (Delhi: Sage).
5. Rakhahari Chatterjee and Partha Pratim Basu(eds.) *West Bengal*

Under the Left 1977- 2011. Sarat Books, Kolkata.

6. *The Kamtapur Movement* Ch. 8 (Ph.D. thesis of Ramesh Dural), Available at: http://shodhganga.inflibnet.ac.in/bitstream/10603/137574/8/08_chapter_04.pdf

Semester: VII
Course Name: Nation Building and National Integration in India
Course Code: BAPLSMN701

Course Type: MINOR	**Course Details: MNC-6**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:
Students will understand the followings:
1. To understand various aspects of effective nation building.
2. Difference between nation and state.
3. Various ingredients of Nation Building.
3. About India and its Nationhood.
4. Hindrances on the way of Nation Building in India.

Content: Unit wise course content distribution
Theory
Unit – 1: Nation-Building in India, theoretical, historical and cultural perspective
Unit – 2: Challenges to National Integration: Communalism, Regionalism, Linguism, Castism, Separatism and Globalization.
Unit – 3: Role of Planning and Bureaucracy in nation building.
Unit – 4: National Movement
Unit – 5: Nation building in India: Problems and prospects.

Learning Outcomes:
Students will understand the followings:
1. Various aspects of effective nation building.
2. Difference between nation and state.

3. Various ingredients of Nation Building.
4. About India and its Nationhood.
5. Hindrances on the way of Nation Building in India.

Suggested Readings:

1. Mohanty, Susama, *Political Development & Ethinic Identity in Africa*, Radiant Publishers, New Delhi, 1992
2. Ramakant & Upreti, B.C. (ed.), *Nation-Building in South Asia (Vol.2):* South –Asian Publishers, New Delhi, 1991
3. Brass, P.R., *Ethnicity and Nationalism – Theory and Comparison*, Sage Publication, New Delhi, 1991
4. Shah, Ghanshyam, *Minorities and Nation-Building – A Case of Muslim and Scheduled Tribes in India.*
5. W. Andersen and S. Damle, *The Brotherhood in Saffron: The Rashtriya Swayamsevak Sangh and Hindu Revivalism*, New Delhi, Vistaar/Sage Publications. 1987
6. A. Basu, *Two Faces of Protest: Contrasting Modes of Women's Activism, Berkeley,* University of California Press, 1992
6. D.D. Basu, *An Introduction to the Constitution of India*, New Delhi, Prentice Hall, 1994.
7. U. Baxi, *The Indian Supreme Court and Politics*, Delhi, Eastern Book Company, 1980
8. U. Baxi and B. Parekh (ed.), *Crisis and Change in Contemporary India*, New Delhi, Sage 1994
9. P.R. Brass, *Language, Religion and Politics in North India*, London, Cambridge University Press, 1974,
10. P. Chatterjee, *The Nation and its Fragments: Colonian and Postcolonial Histories*, Princeton NJ, Princeton University Press, 1993
11. S. Cobridge and J. Harriss, *Reiventing India: Liberalization, Hindu Nationalism and Popular Democracy*, Delhi, Oxford University Press, 2001
12. F.R. Frankel and et.al., *(eds.), Transforming India: Social and Political Dynamics of Democracy*, New Delhi, Oxford University Press, 2000
13. S. Harrison, *India: The Most Dangerous Decades*, Princeton NJ, Princeton University Press, 1960
14. P. Karat, *Language and Nationality Politics in India*, Bombay, Orient Longman, 1973
15. S. Khilnani, *The Idea of India*, London, Hamish Hamilton, 1997
16. A. Kumar (ed.), *Nation-Building in India: Culture, Power and Society*, New Delhi, Radiant Publishers, 1999
17. R. Kothari, *State Against Democracy: In Search for Humane Governance*, Delhi, Ajanta, 1988
18. R. Kothari, *Caste and Politics in India*, New Delhi, Orient Longman, 1970
19. R. Kothari, *Politics in India*, New Delhi, Orient Longman, 1970
20. R. Kothari, *Party System and Election Studies*, Bombay, Asia Publishing House, 1967
21. N.C. Sahni, (ed.), *Coalition Politics in India*, Jullunder, New Academic Publishing Company, 1971

Semester- VIII
Course Name: Theory as Discourse
Course Code: BAPLSMJ801

Course Type: MAJOR	**Course Details: MJC-18**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. The paper will familiarize the students with the concepts that are central to the study of political science.
2. It will be helpful to explore, evaluate, justify, and interrogate public life and institutions.
3. This course will enable the students to acquire knowledge about the debates and discourse around the issues in the changing social and political context.

Content: Unit wise course content distribution
Theory

Unit 1: Political Theory: Concepts and Critique- Liberty, Equality, Rights, Justice, Democracy, Citizenship and Power.

Unit 2: Critique of Liberalism- Communitarianism, Multiculturalism, Deliberative Democracy.

Unit 3: Interrogating Enlightenment: Post-Modernism, Post-Colonialism, Feminism.

Unit 4: Contemporary theories – Nationalism, Globalization and Environmentalism

Learning Outcomes

1 This course will help to understand the dynamics of Political Theory.

2 This course will help to understand Key concepts in Political Theory.

3 This course will be helpful in assessing the role of contemporary ideas in Political Theory like

globalization and environmentalism.

Suggested Readings

1. Andrew Heywood: *Political Ideologies : An Introduction*

2. Rajiv Bhargava, Ashok , Acharya: *Political Theory : An Introduction*

3. Peri Robert and Peter Sutch : *An Introduction to Political Thought: A Conceptual Toolkit*

4. Isaiah Berlin : *Four Essays on Liberty*

5. Ronald Dworkin : Taking Rights Seriously

6. Will Kymlicka: *Contemporary Political Philosophy*

7. J. Rawls : *A Theory of Justice*

8. R. Noick: *Anarchy, State and Utopia*

9. R. Dworkin: *Sovereignty Virtue: The Theory and Practice of Equality*

10. J.Waldrone(ed): *Theories of Rights*

11. Andrew Vincent(ed) *Political Theory: Tradition and Diversity*

12. C.B Macpherson: *Democratic Theory: Essays in Retrieval*

13. Daphne Halikiopoulou, Sofia Vasilopoulou (ed) : *Nationalism and Globalization: Conflicting or Complementary?*

14. James Goodman and Paul James (Ed): *Nationalism and Global Solidarities*

15. Paul Hawken: *Blessed Unrest: How the Largest Movement in the World Came into Being and Why No One Saw It Coming*

16. Javier Auyero and Débora Swistun: *Flammable: Environmental Suffering in an Argentine Shantytown*

17. Terry L. Anderson, Donald R. Leal: *Free Market Environmentalism*

18. Charles T. Rubin: *The Green Crusade*

19. James Gustave Speth: *Red Sky at Morning: America and the Crisis of the Global Environment*

Semester-VIII
Course Name: Social Movements in Contemporary India
Course Code: BAPLSMJ802

Course Type: MAJOR	**Course Details: MJC-19**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Learning Objectives

1. The basic objective of the course is to build a theoretical as well as a practical understanding of the concept of social movement and develop awareness about the impact of such people-based movements with special reference to India.
2. To understand the currents of Social Movements in India.

Content: Unit wise course content distribution

Theory

Unit - 1: Meaning and features of Social Movements.
Unit - 2: Social Movement and New Social Movement.
Unit - 3: Peasant Movement – Telengana and Singur.
Unit - 4: Tribal Movements – POSCO and Niyamgiri.
Unit - 5: Environmental Movement – Chipko, Narmada Bachao and Silent Valley.
Unit - 6: Women's movement - POCSO, Anti-caste movements – Savitri Bai Phule and BAMCEF.

Course Learning Outcomes

1. To develop an understanding about the concept of social movements-its origin, development and impact on all aspects of human life.
2. To critically examine the concept of social change which can be ushered in through the process of combined and collective efforts.
3. To theoretically reflect on the significance of social movement by studying the nature of various types of movements including peasants, tribal and environmental, women's, caste and civil liberties movements.

Suggested Readings

1. Shah, Ghanshyam, Social Movements in India: A Review of Literature (New Delhi: Sage)
2. Shah, Ghanshyam, Social Movements and the State (New Delhi: Sage)
3. Ray, Raka and Katzenstain, Mary Fainsod, Social Movements in India: Poverty, Power, and Politics, (Rowman and Littlefield Publishers)

4. Singh, A. P., Development Process and Social Movements in Contemporary India (Pinnacle Learning) 5. Kumar, Bijendra, Social Movement in Modern India (DPS Publishing House)
6. Joshi, Sarat. C., Contemporary Social Mobility and Social Movements: Views and Reviews (Akansha Publication)
7. Banerjee, Parthasarathi, "Land Acquisition and Peasant Resistance at Singur", Economic and Political Weekly November 18, 2006. Available at: http://sanhati.com/wp-content/uploads/2007/03/acquisitionsingur.pdf
8. Ghatak, Maitreesh and et al., Land Acquisition and Compensation in Singur: What Really Happened?, March 29, 2012. Available at: http://ibread.org/bread/system/files/bread_ppapers/p035.pdf
9. Singh, Samal Jayaram, Displacement and Resistance: A Case Study of Posco Project, Odisha (LAP Lambert)
10. Jena, Manipadma, 'Voices from Niyamgiri', Economic and Political Weekly (Online). Available at: http://www.epw.in/node/128306/pdf

11. G. Shah, (2004) *Social Movements in India: A Review of Literature*, New Delhi: Sage Publications.
12. A. Roy (2010) 'The Women's Movement', in N.Jayal and P. Mehta (eds.) *The Oxford Companion to Politics in India*, New Delhi: Oxford University Press, pp.409-422
13. A.R. Desai, (ed.), (1986) *Agrarian Struggles in India After Independence*, Delhi: Oxford University Press, pp. xi-xxxvi
14. D.N. Dhanagare (2017), Understanding the Farmers' Movement in Maharashtra: Towards an Analytical Framework, in *Populism and Power Farmers' movement in western India, 1980—2014*, Routledge
15. S. Shyam (2003) 'Organizing the Unorganized', in *Seminar*, [Footloose Labour: A Symposium on Livelihood Struggles of the Informal Workforce, 531] pp. 47-53.
16. G. Omvedt (2012) 'The Anti-caste Movement and the Discourse of Power', in N. Jayal (ed.) *Democracy in India*, New Delhi: Oxford India Paperbacks, sixth ed., pp.481-508.
17. R. Guha, *Environmentalism: A Global History*, Longman Publishers, 1999

Semester – VIII
Course Name: Themes in Political Thought
Course Code: BAPLSMJ803

Course Type: MAJOR	**Course Details: MJC-20**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–	30	–	70

Course Objectives

1. To learn about core concepts of thought through eminent thinkers.

2. To understand comparative thoughts of Western and Indian thinkers.

Content: Unit wise course content distribution
Theory
Unit 1: Distinctive features of Indian and Western Political Thought
Unit 2: Western Thought: Thinkers and Themes
a) Aristotle on Citizenship

b) Locke on Rights

c) Rousseau on Inequality

d) J.S. Mill on Liberty and Democracy

Unit 3: Indian Thought: Thinkers and Themes
a) Kautilya on State

b) Tilak and Gandhi on Swaraj

c) Ambedkar on Social Justice

d) Nehru and Jayprakash Narayan on Democracy

Course Learning Outcomes
1. Students will get aware from different major western political thoughts. By this course student will understand the political enquiry of Aristotle, Locke, Rousseau and J.S. Mill.
2. Further, students will also get aware from different major Indian political thoughts. By this course student will understand the views of Kautilya, Tilak, BR Ambedkar, Nehru and Jayprakash Narayan.

Suggested Readings
1. G. H. Sabine, *A History of Political Theory* (USA: Wadsworth Publishing Co Inc,).
2. S. Mukherjee and S. Ramaswamy, *A History of Political Thought* (New Delhi: PHI).
Shefali Jha, Western Political Thought (Delhi: Pearson).
3. Altekar, A.S., *State and Government in Ancient India* (Delhi: Motilal Banarsidass).

4. Varma, V. P., *Modern Indian Political Thought* (Agra: Lakshmi Narayan Agarwal).

5. Pantham, T and Deutsch, K. L., *Political Thought in Modern India* (ed.), (New Delhi: Sage Publications).

6. Chakraborty, B and Pandey, R. K., *Modern Indian Political Thought*, (New Delhi: Sage)

7. Singh, M. P. and Roy, H, *Indian Political Thought: Themes and Thinkers*, (New Delhi: Pearson).

Semester – VIII
Course Name: State Politics in India
Course Code: BAPLSMJ804

Course Type: MAJOR	**Course Details: MJC-21**			**L-T-P: 4 - I - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:
1. To explain how subject of state politics has evolved in India.
2. Stress on different paradigms of Indian states.
3. This course emphasizes on electoral and voting pattern in Indian states.
4. This course aims to analyze the regional and identity politics in Indian states.

Content: Unit wise course content distribution
Theory
Unit – I: State Politics in India: Approaches to the Study State Politics: Liberal and Marxist
Unit – II: Region and Regionalism: Autonomy and Separatism: Tamil Nadu and Punjab; Ethno-Nationalism: North East India; Sub-Sate Regionalism: Gorkhaland and Bodoland.
Unit – III: Dynamics of Party Politics and Electoral Politics in Indian States: Regionalization of Party System: One Party Dominant System to Coalition Party System, Pattern of coalition politics; Language and State Politics: Andhra Pradesh and Maharashtra; Caste in State Politics: Uttar Pradesh and Bihar; Religion in State Politics: Gujarat and West Bengal
Unit – IV: Development and State Politics: State Development Models of West Bengal, Gujarat and Maharashtra; Green Revolution: Punjab and Rajasthan.

Unit – V: Marxist politics and governments: West Bengal and Kerala.

Unit – VI: Identity Politics in Indian States: SCs, STs, OBCs and Women: West Bengal, Uttar Pradesh and Bihar

Learning Outcomes
1. Student will understand the asymmetries in Indian polity.

2. Students will know the nature of autonomy and separatist movements in India.
3. Students will know the patterns of ethnicity in northeast region.
4. Student will understand the regionalization & fragmentation in Indian polity and dynamics of party system in Indian states.
5. Student will understand the background of demands of statehood, new states and special status of states.

Suggested Readings:

1. Brass, Paul R. (2002). "India, Myron Weiner and the Political Science of Development". Economic and Political Weekly 37 (29), July 20-26: 3026-3040.
2. Narain, Iqbal (1970). "Democratic Politics and Political Development in India". Asian Survey 10 (2), February: 88-9
3. Pai, Sudha (1989). "Towards A Theoretical Framework For The Study Of State Politics In India: Some Observations". The Indian Journal of Political Science 50 (1): 94-1
4. Singh, Mahendra Prasad (2012). "State Politics in India". Dialogue 14 (1), July-September. Available at https://www.asthabharati.org/Dia_Jul%20012/m.p.%20singh.htm
5. Kothari, Rajni (1970) *Politics in India*. India: Orient Black Swan, New Delhi
6. Francine R. Frankel and M.S.A. Rao (eds.) (1989), *Dominance and State Power in Modern India: Decline of Social Order* Vol. I, Oxford University Press, Delh
7. Narain, Iqbal (1976), *State Politics in India*, Meenakshi Prakashan, Meerut
8. Weiner, Myron (eds.) (1968) *State Politics in India*, Princeton University Press.
9. Bhambhri, C.P., (1989) "The Indian State: Conflicts and Contradiction", in Zoya Hasan, S.N. Jha and Rasheeduddin Khan (eds.), *The State, Political Processes and Identity: Reflections on Modern India*, Sage Publications, New Delhi.
10. Chatterjee, Partha, State Politics in India.
11. Pai, Sudha, Handbook of Politics in Indian States.
12. T.J. Nossiter, *Marxist State Governments in India*

Semester- VIII
Course Name: Gender and Politics in India
Course Code: BAPLSMN801

Course Type: MINOR	**Course Details: MNC-7**			**L-T-P: 4 - I - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the Gender-based participation in politics.

2 To understand conceptual differences between women and trans gender.

3 To understand Gender identity.

Content: Unit wise course content distribution

Theory

Unit 1: Conceptualizing Gender in Politics: Political Participation, policy making and development.

Unit 2: Security concern for Women and Third Gender/Transgender.

Unit 3: Effective participation of Women in Decision making structures: Issue of Reservation Impact.

Unit 4: Gender Identity: Women in riot and War.

Learning Outcome

1 Students will be able to understand the Gender-based participation in politics by this course.

2 They will be able to understand conceptual differences between women and trans gender.

3 This course will be beneficial for the students to understand Gender identity.

Suggested Readings

1. Geetha, V. *Gender*. (Calcutta: Stree).
2. Geetha, V. *Patriarchy*. (Calcutta: Stree).
3. Menon, Nivedita, *Gender and Politics in India*, Oxford India Paperbacks.
4. Saigol, Rubina, *Feminism in India*, (Women Unlimited Publication).
5. John, Mary E., *Women Studies in India: A reader* (ed.), (Penguin India Publication).

4 Year UG Degree (Honours with Research) in Political Science

Semester – VII
Name of the Course: Understanding South Asia
Course Code: BAPLSMJ701

Course Type: MAJOR	**Course Details: MJC-14**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the strategic importance of South Asian region.

2 To understand the major border disputes in South Asia.

3 To explore the reasons of civil wars and conflicts in South Asian region.

4 To understand democratic systems of South Asia and regional integration process.

Content: Unit wise course content distribution
Theory

Unit 1: South Asia: As a region and its strategic importance.

Unit 2: Border Disputes: (a) India-Pakistan and (b) India-China.

Unit 3: Civil Wars and Ethnic Conflicts in South Asia: (a) Sinhala-Tamil conflict in Sri Lanka, and Baluchistan movement in Pakistan.

Unit 4: Democracy and state system in South Asia: Case study of Pakistan, Bangladesh, Maldives, Sri Lanka, Nepal, and Bhutan.

Unit 5: Regional Integration in South Asia: SAARC; ASEAN

Suggested Readings

7. Farmer, B.H., *An Introduction to South Asia*, Rutledge, London.
8. Baxter et, al.(ed.), *Government and Politics in South Asia*, West view, Boulder.

9. Mitra, Debashis and Nandy, Debasish(eds.), *South Asia and Democracy: Contextualizing Issues and Institutions*, Kunal Books, New Delhi.

10. Nandy, Debasish, *Understanding Pakistan*, Kunal Books, New Delhi.

11. Nandy, Debasish (ed.) *Mapping South Asia: State, Society and Security Dilemmas*, Blue Roan Publishers, Ahmedabad.

12. Phandis, Urmila and Ganguly Rajat, *Ethnicity, and Nation Building in South Asia*, Sage, New Delhi.

Semester – VII
Name of the Course: Politics of Developing Societies

Course Code: BAPLSMJ702

Course Type: MAJOR	**Course Details: MJC-15**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:

1 The course offers a conceptual understanding of the political processes in the ThirdWorld.
2 It hastens the knowledge organism to familiarize with different cause-effect imprint inthe developing world.

Content: Unit wise course content distribution
Theory

Unit 1: Approaches to the study of developing societies in the post-Cold war era changingdimensions of such societies.
Unit 2: Economic Dimension – Globalization and Liberalization: Their Impacts – Inequality as an issue.
Unit 3: The State in developing societies – state formation, state building, and state transition.

Unit 4: Political Dimension – from authoritarianism to democratization.
Unit 5: Civil Society – Role of Intellectual
Unit 6: Religion and Politics in developing societies.

Learning Outcome:

The students will be able to cultivate an acquaintance of different concepts and issues of theThird World.

Suggested Readings:

8. Burnell, Peter and Vicky Randell eds. – Politics in the Developing World
9. Clapham, Christopher – Third World Politics: An Introduction
10. Fawcett, Louise, and Yezid Sayigh eds. – The Third World Beyond the Cold War: Continuity andChange
11. Gonzales, Alfonso and Jim Norwine eds. – The New Third World
12. Huntington, Samuel – The Third Wave: Democratization in the Late Twentieth Century
13. Keane, J – Global Civil Society
14. Ravenhill, John – Global Political Economy.

Semester – VII
Course Name: Indian Political Thought
Course Code: BAPLSMJ703

Course Type: MAJOR	**Course Details: MJC-16**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1. This course intends to acquaint students with the vast repository of ideas and institutions produced by ancient Indian philosophers on politics and management of statecraft.

2. In India, academic sages and philosophers produced huge treasures of wisdom on politics, kingship, the functioning of government including the monarchy and bureaucracy, and their relationship with the people.

3. This course module will make them understand the ideas of some prominent ancient political thinkers of India.

4. This course has been designed to familiarize the students with key ideas of some of political thinkers of the modern India whose writings and ideas have impacted the society and polity significantly

Content: Unit wise course content distribution
Theory
Unit - 1: Kautilya's Political Thought: Saptanga and Dandaniti.
Unit - 2: Medieval Political Thought in India: A broad outline.
Unit - 3: Raja Rammohan Roy: Rule of Law and Freedom of thought.
Unit- 4: Bankim Chandra, Rabindranath Tagore, Sri Aurobindo, Swami Vivekananda: Nationalism.
Unit - 5: Gandhi: Swaraj and trusteeship.
Unit - 6: Ambedkar: Social justice.

Learning Outcomes
1. The student will come to know about the ideas of individual sages and philosophers on politics and functioning of government.

2. They will be able to interlink the themes on the functioning of the Monarchy and its relationship with the people taking the cue from the ideas of individual thinkers.

3. Students will be able to explain the trajectory of ideas on key political questions and institutions of ancient India.

4. Students will be able to explain the key ideas of Raja Rammohan Roy.

5. They will come to understand how Bankim Chandra Chattopadhyay,

Suggested Readings
1. Ambedkar, B. R. (1946). Prospects of Democracy in India. *In Dr. Babasaheb Ambedkar Writings and Speeches, Vol. 17-III, Education Dept.,* Government of Maharashtra, Mumbai, pp. 519-523.

2. *Basu, S. (2002). Religious Revivalism as Nationalist Discourse: Swami Vivekananda and New Hinduism in Nineteenth-Century Bengal.* London: Oxford University Press.

3. Chatterji, B. C. (2006). *In Roy, B. K. (translated) Anandamath.* New Delhi: Orient Paperbacks.

4. Chakraborty, B and Pandey R.K , *Modern Indian Political Thought,* New Delhi, Sage.

5. Das, R., & Das, R. (2012), *The Nation and the Community: Hindus and Muslims in the Novels of Bankim Chandra Chatterjee. Proceedings of the Indian History Congress,* 73, pp. 578-587

6. Dhar, S. (1981). *Kautilya and the Arthashastra*. New Delhi: Marwah publication.

7. Dutt, M. N. (2003), *Manusmriti.* New Delhi. Vedic Books.

8. Haldar, M. K. (1977). *Renaissance and Reaction in Nineteenth Century Bengal: Bankim Chandra Chattopadhyay (Translation of Bengali Essay).* Calcutta: Minerva Associates.

9. Jolly, J. (1923). *Kautiliyam Arthashastram- Arthashastra of Kautilya. New Delhi: Motilal Banarasi Dass.*

11. Parekh, B. (1997). *The Critique of Modernity. In: Gandhi: A Brief Insight. Delhi: Sterling Publishing Company, pp. 63-74.*

12. Parel, A. J. (Ed.). (2002). *Introduction. In: Gandhi, freedom and Self Rule. Delhi: Vistaar Publication.*

Semester – VII
Course Name: Politics in West Bengal
Course Code: BAPLSMJ704

Course Type: MAJOR	**Course Details: MJC-17**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the dynamics of West Bengal Politics.
2 To understand the role of leadership in West Bengal Politics.
3 To assess the role of civil society in West Bengal.

Content Theory

Unit 1: Dynamics of politics in West Bengal: An overview.

Unit 2: Leadership role: Caste and class and elite.

Unit 3: Politics of Ethnicity: Gorkhaland Movement and Kamtapur Movement.

Unit 4: Civil Society in West Bengal – nature and role.

Unit 5: Role of Bhadralok in Bengal Politics.

Learning Outcomes

1 This course will help to understand the dynamics of West Bengal Politics.
2 This course will be helpful to understand the role of leadership in West Bengal Politics.
3 This course will be helpful to assess the role of civil society in West Bengal.

Suggested Readings

7. Franda, Marcus F., *Radical politics in West Bengal* (MIT Press).
8. Chatterjee, Partha, *State and Politics in India* (Delhi: Oxford).
9. Kaviraj, Sudipta and Khilnani, Sunil (eds.), *Civil Society: History and Possibilities* (Delhi: Cambridge).
10. Bagchi, Romit, Gorkhaland: *Crisis of Statehood* (Delhi: Sage).
11. Rakhahari Chatterjee and Partha Pratim Basu(eds.) *West Bengal Under the Left 1977- 2011.* Sarat Books, Kolkata.
12. *The Kamtapur Movement* Ch. 8 (Ph.D. thesis of Ramesh Dural), Available at: http://shodhganga.inflibnet.ac.in/bitstream/10603/137574/8/08_chapter_04.pdf

Semester: VII
Course Name: Nation Building and National Integration in India
Course Code: BAPLSMN701

Course Type: MINOR	**Course Details: MNC-6**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives:
Students will understand the followings:
1. To understand various aspects of effective nation building.
2. Difference between nation and state.
3. Various ingredients of Nation Building.
3. About India and its Nationhood.
4. Hindrances on the way of Nation Building in India.

Content: Unit wise course content distribution

Theory

Unit – 1: Nation-Building in India, theoretical, historical and cultural perspective

Unit – 2: Challenges to National Integration: Communalism, Regionalism, Linguism, Castism, Separatism and Globalization.

Unit – 3: Role of Planning and Bureaucracy in nation building.

Unit – 4: National Movement

Unit – 5: Nation building in India: Problems and prospects.

Learning Outcomes:

Students will understand the followings:

1. Various aspects of effective nation building.
2. Difference between nation and state.
3. Various ingredients of Nation Building.
4. About India and its Nationhood.
5. Hindrances on the way of Nation Building in India.

Suggested Readings:

1. Mohanty, Susama, *Political Development & Ethinic Identity in Africa*, Radiant Publishers, New Delhi, 1992
2. Ramakant & Upreti, B.C. (ed.), *Nation-Building in South Asia (Vol.2):* South –Asian Publishers, New Delhi, 1991
3. Brass, P.R., *Ethnicity and Nationalism – Theory and Comparison,* Sage Publication, New Delhi, 1991
4. Shah, Ghanshyam, *Minorities and Nation-Building – A Case of Muslim and Scheduled Tribes in India.*
5. W. Andersen and S. Damle, *The Brotherhood in Saffron: The Rashtriya Swayamsevak Sangh and Hindu Revivalism,* New Delhi, Vistaar/Sage Publications. 1987
6. A. Basu, *Two Faces of Protest: Contrasting Modes of Women's Activism, Berkeley,* University of California Press, 1992

6.D.D. Basu, *An Introduction to the Constitution of India*, New Delhi, Prentice Hall, 1994.

7. U. Baxi, *The Indian Supreme Court and Politics,* Delhi, Eastern Book Company, 1980
8. U. Baxi and B. Parekh (ed.), *Crisis and Change in Contemporary India*, New Delhi, Sage 1994
9. P.R. Brass, *Language, Religion and Politics in North India*, London, Cambridge University Press, 1974,
10. P. Chatterjee, *The Nation and its Fragments: Colonian and Postcolonial Histories*, Princeton NJ, Princeton University Press, 1993
11. S. Cobridge and J. Harriss, *Reiventing India: Liberalization, Hindu Nationalism and Popular Democracy,* Delhi, Oxford University Press, 2001
12. F.R. Frankel and et.al., *(eds.), Transforming India: Social and Political Dynamics of Democracy,* New Delhi, Oxford University Press, 2000

13. S. Harrison, *India: The Most Dangerous Decades*, Princeton NJ, Princeton University Press, 1960
14. P. Karat, *Language and Nationality Politics in India*, Bombay, Orient Longman, 1973
15. S. Khilnani, *The Idea of India*, London, Hamish Hamilton, 1997
16. A. Kumar (ed.), *Nation-Building in India: Culture, Power and Society*, New Delhi, Radiant Publishers, 1999
17. R. Kothari, *State Against Democracy: In Search for Humane Governance*, Delhi, Ajanta, 1988
18. R. Kothari, *Caste and Politics in India*, New Delhi, Orient Longman, 1970
19. R. Kothari, *Politics in India*, New Delhi, Orient Longman, 1970
20. R. Kothari, *Party System and Election Studies*, Bombay, Asia Publishing House, 1967
21. N.C. Sahni, (ed.), *Coalition Politics in India*, Jullunder, New Academic Publishing Company, 1971

Semester- VIII
Course Name: Theory as Discourse
Course Code: BAPLSMJ801

Course Type: MAJOR	**Course Details: MJC-18**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–	30	–	70

Course Objectives

1. The paper will familiarize the students with the concepts that are central to the study of political science.
2. It will be helpful to explore, evaluate, justify, and interrogate public life and institutions.
3. This course will enable the students to acquire knowledge about the debates and discourse around the issues in the changing social and political context.

Content: Unit wise course content distribution
Theory
Unit 1: Political Theory: Concepts and Critique- Liberty, Equality, Rights, Justice, Democracy,

Citizenship and Power.

Unit 2: Critique of Liberalism- Communitarianism, Multiculturalism, Deliberative Democracy.

Unit 3: Interrogating Enlightenment: Post-Modernism, Post-Colonialism, Feminism.

Unit 4: Contemporary theories – Nationalism, Globalization and Environmentalism

Learning Outcomes

1 This course will help to understand the dynamics of Political Theory.

2 This course will help to understand Key concepts in Political Theory.

3 This course will be helpful in assessing the role of contemporary ideas in Political Theory like globalization and environmentalism.

Suggested Readings

1. Andrew Heywood: *Political Ideologies : An Introduction*

2. Rajiv Bhargava, Ashok , Acharya: *Political Theory : An Introduction*

3. Peri Robert and Peter Sutch : *An Introduction to Political Thought: A Conceptual Toolkit*

4. Isaiah Berlin : *Four Essays on Liberty*

5. Ronald Dworkin : Taking Rights Seriously

6. Will Kymlicka: *Contemporary Political Philosophy*

7. J. Rawls : *A Theory of Justice*

8. R. Noick: *Anarchy, State and Utopia*

9. R. Dworkin: *Sovereignty Virtue: The Theory and Practice of Equality*

10. J.Waldrone(ed): *Theories of Rights*

11. Andrew Vincent(ed) *Political Theory: Tradition and Diversity*

12. C.B Macpherson: *Democratic Theory: Essays in Retrieval*

13. Daphne Halikiopoulou, Sofia Vasilopoulou (ed) : *Nationalism and Globalization: Conflicting or Complementary?*

14. James Goodman and Paul James (Ed): *Nationalism and Global Solidarities*

15. Paul Hawken: *Blessed Unrest: How the Largest Movement in the World Came*

into Being and Why No One Saw It Coming

16. Javier Auyero and Débora Swistun: *Flammable: Environmental Suffering in an Argentine Shantytown*

17. Terry L. Anderson, Donald R. Leal: *Free Market Environmentalism*

18. James Gustave Speth: *Red Sky at Morning: America and the Crisis of the Global Environment*

Semester- VIII
Course Name: Research Methodology and Ethics
Course Code: BAPLSSRP801

(To be prepared later on as per the directions of the University)

Course Type: RP	**Course Details: RPC-1**			**L-T-P: 4 - 0 - 0**	
Credit: 4	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–		–	

Semester- VIII
Course Name: Research Project / Dissertation
Course Code: BAPLSSRP802

Course Type: RP	**Course Details: RPC-2**			**L-T-P: 0 - 0 - 16**	
Credit: 8	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		–		–	

1. A permanent faculty with Ph. D. degree and at least two publications in peer reviewed journals can supervise a candidate.
2. The topic of Research Project/Dissertation paper must be related within the major discipline of Political Science.
3. The student must have secure 75% marks and above in the first six semesters.

Semester- VIII
Course Name: Gender and Politics in India
Course Code: BAPLSMN801

Course Type: MINOR	**Course Details: MNC-7**			**L-T-P: 4 - 1 - 0**	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		_	30	_	70

Course Objectives

1 To understand the Gender-based participation in politics.

2 To understand conceptual differences between women and trans gender.

3 To understand Gender identity.

Content: Unit wise course content distribution
Theory
Unit 1: Conceptualizing Gender in Politics: Political Participation, policy making and development.

Unit 2: Security concern for Women and Third Gender/Transgender.

Unit 3: Effective participation of Women in Decision making structures: Issue of Reservation Impact.

Unit 4: Gender Identity: Women in riot and War.

Learning Outcome

1 Students will be able to understand the Gender-based participation in politics by this course.

2 They will be able to understand conceptual differences between women and trans gender.

3 This course will be beneficial for the students to understand Gender identity.

Suggested Readings

1. Geetha, V. *Gender*. (Calcutta: Stree).
2. Geetha, V. *Patriarchy*. (Calcutta: Stree).

3. Menon, Nivedita, *Gender and Politics in India*, Oxford India Paperbacks.

4. Saigol, Rubina, *Feminism in India*, (Women Unlimited Publication).

5. John, Mary E., *Women Studies in India: A reader* (ed.), (Penguin India Publication).

NEP SYLLABUS
ECONOMICS

SYLLABUS

ECONOMICS

UNDER CURRICULUM AND CREDIT FRAMEWORK

KAZI NAZRUL UNIVERSITY ASANSOL, WEST BENGAL

With effect from 2023-2024 Academic Session

Syllabus of Economics

Semester- I

Course Name: Introduction to Economic Theory

Course Code: BSCECOMJ101

Course Type: **Major (Theory)**	Course Details:MJC-1			L-T-P:4-1-0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Group A: Course Learning Outcomes

(After the completion of the course the students will be able to)

1. ***To compare Economic and Non-Economic activities, microeconomics and macroeconomics, Economic issues and problems. To illustrate demand supply framework with determinants and shifts.***
2. ***To analyse different theories of demand.***
3. ***To examine neo classical theories of production and cost.***

Group B: Course Learning Outcomes

(After the completion of the course the students will be able to)

1. ***To identify macroeconomic issues and relate different macroeconomic accounting methods.***
2. ***To explain and analyse the classical system.***
3. ***To compare the classical system with the simple Keynesian system.***

Content/ Syllabus: Unit wise course content distribution

Group A: Microeconomic Theory

Unit -1. Introduction to Economic Theory

Economic and Non-Economic activities, Basic Economic Issues and Problems, Distinction between Microeconomics and Macroeconomics, Concept of Equilibrium.

Concept of Demand. Demand Law and Demand Curve. Exceptions to the law of Demand. Concept of Supply Curve.
The market mechanism. Changes in market equilibrium.

Elasticities of demand – price, income and cross elasticities – relation between price elasticity of demand, price and marginal revenue – relation between price elasticity and total expenditure.

Unit-2. Theory of Demand

Utility: Concept and Measurement Issues. Cardinal and Ordinal Utility.
The Marshallian Approach: Equilibrium of the consumer – Derivation of demand curve. Concept of consumer's surplus.
Indifference curve approach: indifference curve and its properties,
The pathological cases, the equilibrium of the consumer – Price consumption curve and income consumption curve – Price effect – Income effect – Substitution effect – Slutsky's equation – Derivation of demand curve. Giffen's Paradox. Bandwagon effect – Snob effect – Veblen effect.
Relationship between Compensated demand curve and ordinary demand curve.

Unit -3. Theory of Production and Cost.

• Production function: the neo-classical production function – relation between total, average and marginal productivities – law of variable proportions – the fixed coefficient production function and variable coefficient production function.

• Iso- quant and Iso-cost line, definition and properties, economic region of production, marginal rate of technical substitution, elasticity of substitution, equilibrium of the producer - constrained output maximization and constrained cost minimization, expansion path, returns to scale.

.

• Cost function: different concepts of costs, short run cost analysis and long run cost analysis – relation between the expansion path and cost function – total, average and marginal cost curves – long run cost curves as envelope of short run cost curves.

Group B: Macroeconomic Theory

Unit -1. Basic Macroeconomic Issues and Accounts

• Scope and nature of Macro Economics with emphasis on macroeconomic problems and policies – Targets & Instruments of macroeconomic policies. Closed economy and open economy.

• Definition, Concepts and Measurement of GNP, NNP, GDP, NDP, NI, DI – The flow of product method and the flow of expenditure method; Concept of GNP deflator.

• Interrelation between measures of National Income in the absence and presence of Governmental sector and International Transactions

• The Accounting Identity of Saving and Investment

• Scope of using National Income as a measure of Economic Welfare.

Unit -2. The Classical System

• The Classical view of Macro Economics in respect of the determination of Employment, Output and Prices.

• The classical quantity theory of money and its criticism; The Classical Theory of Rate of Interest - Loanable fund theory.

• Say's Law and Walras' law - The Dichotomy between the real and monetary sectors Neutrality of money.

Unit -3 The Simple Keynesian Model of Income Determination

• Keynesian Consumption Function and its properties – Factors affecting Consumption Expenditure – Saving Function & its properties

• Determination of National Income – nature of equilibrium – unemployment, full employment and inflation – stability of equilibrium

• Comparative static analysis – the Multiplier analysis with and without government sector – Investment Multiplier, Government Expenditure Multiplier, Balanced Budget Multiplier; Limitations of the multiplier analysis. The Paradox of Thrift.

Group A: References/ Suggested Readings

1. Ryan, William James Louden, and David William Pearce. "Price theory." (1977). Macmillan India Limited.
2. Richard G. Lipsey: An Introduction to Positive Economics (6th Edition). ELBS.
3. A Koutsoyianiss: Modern Microeconomics, 2nd Edition, Macmillan Press Ltd. Hound mills/ Palgrave Macmillan (India).
4. Gould and Lazear: Microeconomic Theory (6th Edition), AITBS, New Delhi.
5. H.L Ahuja: Advance Economic Theory-Microeconomics Analysis, 21st Edition, S Chand & Co Ltd.
6. R. S. Pin Dyck and D. N. Rubinfeld: Microeconomics, 8th Edition, Pearson India.
7. Henderson and Quandt: Microeconomic theory: A mathematical approach, Tata McGraw-Hill.
8. Anindya Sen: Microeconomics (Second Edition). Oxford University Press.
9. Satya R. Chakravarty: Microeconomics, 1ST Edition, Allied Publishers Ltd.
10. Hal R. Varian: Intermediate Microeconomics: A Modern Approach, 8th edition, W.W. Norton and Company/Affiliated East-West Press (India).
11. C. Snyder and W. Nicholson, Microeconomic Theory: Basic Principles and Extensions, 12th Edition, Cengage Learning (India).

Group B: References/ Suggested Readings

1. Soumyen Sikdar: Principles of Macroeconomics, OUP.
2. Dornbusch, Fischer and Startz: Macroeconomics, 12th Edition. McGraw Hill Education India.
3. William H. Branson: Macroeconomic Theory and Policy, 2nd Edition, Universal Book Stall, New Delhi.
4. G, Ackley: Macroeconomic Theory. The MacMillian Company.
5. N. Gregory Mankiw and Mark P. Taylor: Macroeconomics, 4th Edition, Cengage Learning (India).
6. Richard T. Froyen: Macroeconomics Theories and Policies, 12th Edition, Pearson Education
India.
7. Abel, Bernanke and Croushore: Macroeconomics, 8th Edition, Pearson.
8. Olivier Blanchard: Macroeconomics, 7th Edition, Pearson Education India.
9. R. Jha – Macroeconomics for Developing Countries (2nd edition), Routledge.
10. L, Harris: Monetary Theory: McGraw-Hill
11. Errol D'Souza: Macroeconomics, Pearson Education

Semester- I

Course Name: Introduction to Economic Theory

Course Code: BSCECOMN101

Course Type: **Minor (Theory)**	Course Details: MNC-1			L-T-P:4-1-0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Group A: Course Learning Outcomes

(After the completion of the course the students will be able to)

1. ***To compare Economic and Non-Economic activities, microeconomics and macroeconomics, Economic issues and problems. To illustrate demand supply framework with determinants and shifts.***
2. ***To analyse different theories of demand.***
3. ***To examine neo classical theories of production and cost.***

Group B: Course Learning Outcomes

(After the completion of the course the students will be able to)

1. ***To identify macroeconomic issues and relate different macroeconomic accounting methods.***
2. ***To explain and analyse the classical system.***
3. ***To compare the classical system with the simple Keynesian system.***

Content/ Syllabus: Unit wise course content distribution

Group A: Microeconomic Theory

Unit -1. Introduction to Economic Theory

Economic and Non-Economic activities, Basic Economic Issues and Problems, Distinction between Microeconomics and Macroeconomics, Concept of Equilibrium.

Concept of Demand. Demand Law and Demand Curve. Exceptions to the law of Demand. Concept of Supply Curve.
The market mechanism. Changes in market equilibrium.

Elasticities of demand – price, income and cross elasticities – relation between price elasticity of demand, price and marginal revenue – relation between price elasticity and total expenditure.

Unit-2. Theory of Demand

Utility: Concept and Measurement Issues. Cardinal and Ordinal Utility.
The Marshallian Approach: Equilibrium of the consumer – Derivation of demand curve. Concept of consumer's surplus.
Indifference curve approach: indifference curve and its properties,
The pathological cases, the equilibrium of the consumer – Price consumption curve and income consumption curve – Price effect – Income effect – Substitution effect – Slutsky's equation – Derivation of demand curve. Giffen's Paradox. Bandwagon effect – Snob effect – Veblen effect.
Relationship between Compensated demand curve and ordinary demand curve.

Unit -3. Theory of Production and Cost.

• Production function: the neo-classical production function – relation between total, average and marginal productivities – law of variable proportions – the fixed coefficient production function and variable coefficient production function.

• Iso- quant and Iso-cost line, definition and properties, economic region of production, marginal rate of technical substitution, elasticity of substitution, equilibrium of the producer - constrained output maximization and constrained cost minimization, expansion path, returns to scale.

.

• Cost function: different concepts of costs, short run cost analysis and long run cost analysis – relation between the expansion path and cost function – total, average and marginal cost curves – long run cost curves as envelope of short run cost curves.

Group B: Macroeconomic Theory

Unit -1. Basic Macroeconomic Issues and Accounts

• Scope and nature of Macro Economics with emphasis on macroeconomic problems and policies – Targets & Instruments of macroeconomic policies. Closed economy and open economy.

• Definition, Concepts and Measurement of GNP, NNP, GDP, NDP, NI, DI – The flow of product method and the flow of expenditure method; Concept of GNP deflator.

• Interrelation between measures of National Income in the absence and presence of Governmental sector and International Transactions

• The Accounting Identity of Saving and Investment

• Scope of using National Income as a measure of Economic Welfare.

Unit -2. The Classical System

• The Classical view of Macro Economics in respect of the determination of Employment, Output and Prices.

• The classical quantity theory of money and its criticism; The Classical Theory of Rate of Interest - Loanable fund theory.

• Say's Law and Walras' law - The Dichotomy between the real and monetary sectors Neutrality of money.

Unit -3 The Simple Keynesian Model of Income Determination

• Keynesian Consumption Function and its properties – Factors affecting Consumption Expenditure – Saving Function & its properties

• Determination of National Income – nature of equilibrium – unemployment, full employment and inflation – stability of equilibrium

• Comparative static analysis – the Multiplier analysis with and without government sector – Investment Multiplier, Government Expenditure Multiplier, Balanced Budget Multiplier; Limitations of the multiplier analysis. The Paradox of Thrift.

Group A: References/ Suggested Readings

1. Ryan, William James Louden, and David William Pearce. "Price theory." (1977). Macmillan India Limited.
2. Richard G. Lipsey: An Introduction to Positive Economics (6th Edition). ELBS.
3. A Koutsoyianiss: Modern Microeconomics, 2nd Edition, Macmillan Press Ltd. Hound mills/ Palgrave Macmillan (India).
4. Gould and Lazear: Microeconomic Theory (6th Edition), AITBS, New Delhi.
5. H.L Ahuja: Advance Economic Theory-Microeconomics Analysis, 21st Edition, S Chand & Co Ltd.
6. R. S. Pin Dyck and D. N. Rubinfeld: Microeconomics, 8th Edition, Pearson India.
7. Henderson and Quandt: Microeconomic theory: A mathematical approach, Tata McGraw-Hill.
8. Anindya Sen: Microeconomics (Second Edition). Oxford University Press.
9. Satya R. Chakravarty: Microeconomics, 1ST Edition, Allied Publishers Ltd.
10. Hal R. Varian: Intermediate Microeconomics: A Modern Approach, 8th edition, W.W. Norton and Company/Affiliated East-West Press (India).
11. C. Snyder and W. Nicholson, Microeconomic Theory: Basic Principles and Extensions, 12th Edition, Cengage Learning (India).

Group B: References/ Suggested Readings

1. Soumyen Sikdar: Principles of Macroeconomics, OUP.
2. Dornbusch, Fischer and Startz: Macroeconomics, 12th Edition. McGraw Hill Education India.
3. William H. Branson: Macroeconomic Theory and Policy, 2nd Edition, Universal Book Stall, New Delhi.
4. G, Ackley: Macroeconomic Theory. The MacMillian Company.
5. N. Gregory Mankiw and Mark P. Taylor: Macroeconomics, 4th Edition, Cengage Learning (India).
6. Richard T. Froyen: Macroeconomics Theories and Policies, 12th Edition, Pearson Education
India.
7. Abel, Bernanke and Croushore: Macroeconomics, 8th Edition, Pearson.
8. Olivier Blanchard: Macroeconomics, 7th Edition, Pearson Education India.
9. R. Jha – Macroeconomics for Developing Countries (2nd edition), Routledge.
10. L, Harris: Monetary Theory: McGraw-Hill
11. Errol D'Souza: Macroeconomics, Pearson Education

Semester- I

Course Name: Basic Computer Applications

Course Code: BSCECOSE101

Course Type: **SEC**	Course Details: SEC-1			L-T-P:0-0-6	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30		20	

Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To illustrate the basic knowledge regarding use of Excel for sorting and filtering data to prepare various chart.

2. To examine how to carry out statistical analysis using Excel.

3. To choose a Project based on techniques taught in this paper which will be helpful to them in further research.

Content/ Syllabus: Unit wise course content distribution

***Unit -1.* Introduction to Excel**

- Sort: Sorting data on one column or multiple columns, in ascending or descending order
- Filter: Filter data to display records that meet certain criteria.
- Conditional Formatting: Highlight cells with a certain colour, depending on the cell's value.
- Charts: Line charts, column charts, pie charts, area charts and surface charts

***Unit-2.* Excel Basics needed for Statistical Analysis of the Data**

- Pivot Tables: To extract the significance from a large, detailed data set.
- Tables: Create tables to analyze data in Excel
- Solver: Use Excel tool called solver to use techniques from the operations research to find optimal solutions for all kind of decision problems.
- Creating a top-ten list with values or percentages
- Setting up subtotals
- Counting the number of unique items in a list
- Using SUMIF and COUNTIF functions

References/ Suggested Readings

1. Levine, Stephan, Krehbiel, Berenson: Statistics for Managers Using Microsoft Excel, 8th Edition, Pearson India.
2. Gary Koop: Analysis of Economic Data, 4th Edition, John Wiley & Sons Ltd.
3. C R Kothari and Gaurav Garg: Research Methodology: Methods and Techniques, 4th Edition, New Age International.

Semester- II

Course Name: Development Economics and Indian Economy

Course Code: BSCECOMJ201

Course Type: **Major (Theory)**	Course Details:MJC-2			L-T-P:4-1-0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Group A: Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To illustrate the concept of development, distinction between economic growth and economic development and also the contemporary concepts of sustainable development, inclusive development, human development etc.

2. To identify the issues of underdevelopment and to acquire theoretical knowledge about the poor economic status of the developing countries.

3. To make use of development strategies needed for a labour surplus economy.

Group B: Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To explain the situations of the Indian economy in the post- independence regime.

2. To make a survey of different policies, relating to agriculture, industry etc. undertaken after independence to build up a self-reliant economy.

3. To inspect issues of poverty, unemployment in the Indian Economy.

Content/ Syllabus: Unit wise course content distribution

Group A: Development Economics

Unit -1. Concept of Economic Development

Meaning of Development, different concepts of development –Sustainable development, Participatory development, Inclusive development, Human development, Growth and Development – Broad Indicators of Economic Development – Per capita Income – PQLI– Basic needs approach – Human Development Index – Gender Development Index –Gender Empowerment Measure - Human Poverty Index- Global Hunger Index.

Unit-2. Underdevelopment and Theories

- Characteristics of underdevelopment – Obstacles to underdevelopment
- Trap Models – Critical minimum effort thesis – Low level equilibrium trap – Process of cumulative causation
- Concept of surplus labour – Surplus labour as potential saving – Economic development with unlimited supplies of labour (Lewis Model).

Group B: Indian Economy

Unit -1. Structural Changes in Indian Economy

Trends in national income, per capita income - Changes in occupational pattern- Sectoral distribution of national income during the post-independence period.

Unit-2. Agricultural Sector

- Land reforms
- Farm size and Productivity
- Green revolution-causes and impacts.
- Agricultural marketing, concepts of food security and public distribution system in India.

Unit -3. Industrial Sector

Industrial policy resolution (1948, 1956) - licensing policy; New industrial policy, 1991; the EXIT policy; present problems of SSIs and large-scale industries in India and its remedies.

Unit -4. Poverty and Unemployment

Poverty-Concept and measurement issues
Nature and types of unemployment in India - Problem of measurement of unemployment
Unorganized labour market-Issues related to female and child labour.

Group A: References/ Suggested Readings

1. Michael P. Todaro and Stephen C. Smith: Economic Development, 12th Edition, Pearson Education India.
2. A.P Thirlwall: Growth&Development,8th Edition, Palgrave MacMillian
3. Kaushik Basu: Analytic Development Economics: The Less Developed Economy Revisited, 1st Edition, Oxford University Press.
4. Debraj Ray: Development Economics, 23rd Edition, Oxford University Press.
5. A.P Thirlwall and Penélope Pacheco-López: Economics of Development-Theory and Evidence,10th Edition, Bloomsbury Academic.

Group B: References/ Suggested Readings

1. Misra D. and Puri K.: Indian Economy, 38th Edition, Himalaya Publishing House.
2. Datt and Sundharam (Revised by G. Datt and A. Mahajan), Indian Economy, 72nd Edition, S. Chand company Pvt Ltd (New Delhi)
3. Arun Kumar: Indian Economy since Independence: Persisting Colonial Disruption, 1st Edition, Vision Books
4. Uma Kapila: Indian Economy Since Independence, 31st Edition, Academic Foundation.
5. Bimal Jalan: India's Economic Policy, Penguin Publisher
6. Bimal Jalan (Ed.): Indian Economy: Problems and Prospects, Penguin Publishers

Semester- II

Course Name: Development Economics and Indian Economy

Course Code: BSCECOMN201

Course Type: **Minor (Theory)**	Course Details: MNC-2		L-T-P:4-1-0	
Credit: 5	Full Marks: 100	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			30		**70**

Group A: Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To illustrate the concept of development, distinction between economic growth and economic development and also the contemporary concepts of sustainable development, inclusive development, human development etc.

2. To identify the issues of underdevelopment and to acquire theoretical knowledge about the poor economic status of the developing countries.

3. To make use of development strategies needed for a labour surplus economy.

Group B: Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To explain the situations of the Indian economy in the post- independence regime.

2. To make a survey of different policies, relating to agriculture, industry etc. undertaken after independence to build up a self-reliant economy.

3. To inspect issues of poverty, unemployment in the Indian Economy.

Content/ Syllabus: Unit wise course content distribution

Group A: Development Economics

Unit -1. Concept of Economic Development

Meaning of Development, different concepts of development –Sustainable development, Participatory development, Inclusive development, Human development, Growth and Development – Broad Indicators of Economic Development – Per capita Income – PQLI– Basic needs approach – Human Development Index – Gender Development Index –Gender Empowerment Measure - Human Poverty Index- Global Hunger Index.

Unit-2. Underdevelopment and Theories

- Characteristics of underdevelopment – Obstacles to underdevelopment
- Trap Models – Critical minimum effort thesis – Low level equilibrium trap – Process of cumulative causation
- Concept of surplus labour – Surplus labour as potential saving – Economic development with unlimited supplies of labour (Lewis Model).

Group B: Indian Economy

Unit -1. Structural Changes in Indian Economy

Trends in national income, per capita income - Changes in occupational pattern- Sectoral distribution of national income during the post-independence period.

Unit-2. Agricultural Sector

- Land reforms
- Farm size and Productivity
- Green revolution-causes and impacts.
- Agricultural marketing, concepts of food security and public distribution system in India.

Unit -3. Industrial Sector

Industrial policy resolution (1948, 1956) - licensing policy; New industrial policy, 1991; the EXIT policy; present problems of SSIs and large-scale industries in India and its remedies.

Unit -4. Poverty and Unemployment

Poverty-Concept and measurement issues
Nature and types of unemployment in India - Problem of measurement of unemployment
Unorganized labour market-Issues related to female and child labour.

Group A: References/ Suggested Readings

1. Michael P. Todaro and Stephen C. Smith: Economic Development, 12th Edition, Pearson Education India.
2. A.P Thirlwall: Growth&Development,8th Edition, Palgrave MacMillian
3. Kaushik Basu: Analytic Development Economics: The Less Developed Economy Revisited, 1st Edition, Oxford University Press.
4. Debraj Ray: Development Economics, 23rd Edition, Oxford University Press.
5. A.P Thirlwall and Penélope Pacheco-López: Economics of Development-Theory and Evidence,10th Edition, Bloomsbury Academic.

Group B: References/ Suggested Readings

1. Misra D. and Puri K.: Indian Economy, 38th Edition, Himalaya Publishing House.
2. Datt and Sundharam (Revised by G. Datt and A. Mahajan), Indian Economy, 72nd Edition, S. Chand company Pvt Ltd (New Delhi)
3. Arun Kumar: Indian Economy since Independence: Persisting Colonial Disruption, 1st Edition, Vision Books
4. Uma Kapila: Indian Economy Since Independence, 31st Edition, Academic Foundation.
5. Bimal Jalan: India's Economic Policy, Penguin Publisher
6. Bimal Jalan (Ed.): Indian Economy: Problems and Prospects, Penguin Publishers

Semester- II

Course Name: Data Analysis

Course Code: BSCECOSE201

Course Type: **SEC**	Course Details: SEC-2			L-T-P:0-0-6	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30		20	

Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To elaborate the methods of presentation of data in textual, tabular and diagrammatic form.

2. To identify the steps and problems associated with data processing and the analysis of various forms of data (quantitative, qualitative; cross section, time series).

3. To interpret a Project based on techniques taught in this paper which will be helpful to them in further research.

Content/ Syllabus: Unit wise course content distribution

***Unit -1.* Presentation of Data**

Introduction, methods of presentation of data, textual presentation of data, tabular presentation of data, diagrammatic representation of data.

***Unit-2.* Data Processing**

Introduction to Data Processing – Steps of Data Processing – Problems associated with Data Processing

***Unit -3.* Analysis of Data**

Various Types of Data Analysis (quantitative, qualitative; cross section, time series) – Introduction of Statistical Tools used in Data Analysis

References/ Suggested Readings

1. R.S.N Pillai Bhagavathi: Statistics Theory and Practice, 8th Edition, S. Chand & Sons Private Limited.
2. Gary Koop: Analysis of Economic Data, 4th Edition, John Wiley & Sons Ltd.
3. C R Kothari and Gaurav Garg: Research Methodology: Methods and Techniques,4th Edition, New Age International.
4. D. Bhattacharya and S. Roy Chowdhury: Statistics Theory and Practice, 3rd Edition, U.N Dhar & Son Pvt. Ltd.
5. Santosh Gupta: Research Methodology and Statistical Techniques, Deep and Deep Publication Pvt. Limited.

Semester- I

Course Name: Money and Banking

Course Code: BSCECOMDC111

Course Type: **MDC**	Course Details: MDC-11		L-T-P:3-0-0	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		35

Course Learning Outcomes:

(After the completion of the course the students will be able)

1. To explain some basic ideas relating to the concept and types of money.

2. To gain knowledge about the measures of the supply of money.

3 To develop idea regarding concept, functions and reforms of the banking system of India.

Content/ Syllabus: Unit wise course content distribution

Unit I: Money.

Evolution of Money, Concept, functions and types of Money.

Measures of Money Supply (M_1, M_2, M_3 etc).

Unit 2. Banking

Commercial Bank: Definition and functions of Commercial Banks. Credit creation by Commercial banks. Major Developments in Commercial banking in India since independence. Performance of Commercial banks in India.

Central Bank: Functions of Central Bank. Quantitative and Qualitative Credit Control Methods. Functions of Reserve Bank of India.

Unit 3. Banking Sector Reforms in India.

Banking Sector Reforms in India since 1991.

References/ Suggested Readings

1. S.B Gupta: Monetary Economics: Institutions, Theory and Policy, 4th edition, S. Chand Publishing.

2. M. Y. Khan, Indian Financial System, Tata McGraw Hill, 7th edition.

3. L. M. Bhole and J. Mahukud, Financial Institutions and Markets, Tata McGraw Hill, 5th edition.

4. Cauvery, Kruparani, Sudha and Manimekalai: Monetary Economics, 2nd Edition S. Chand Publishing.

NEP
SYLLABUS
CHEMISTRY

Syllabus of 3-Year Degree/4-Year Honours in Chemistry

Based on National Curriculum and Credit Framework for Undergraduate Programme With effect from 2023-24

KaziNazrulUniversity

Asansol,WestBengal

SEMESTER – I

COURSE TYPE: MAJOR

COURSE NAME: GENERAL CHEMISTRY–I

COURSE CODE: BSCCEMMJ101

Course Type: **MAJOR**	Course Details: MJC-1			L-T-P: **3-0-4**	
		CA Marks		ESE Marks	
Credit: **5**	Full Marks: **100**	Practical	Theoretical	Practical	Theoretical
3 (Theory) + 2(Practical)		**30**	**15**	**20**	**35**

On completion of this course, the students will be able to understand:

Learning objectives:

1. Learning scientific theory of atoms, concept of wave function.

2. Elements in periodic table; physical and chemical characteristics, periodicity.

3. To predict the atomic structure, chemical bonding, and molecular geometry based on accepted models.

4. Identity of given element, relative size, charges of proton, neutron and electrons, and their assembly to formdifferent atoms.

5. Physical and chemical characteristics of elements in various groups and periods according to ionic size, charge,etc. and position in periodic table.

6. Characterize bonding between atoms, molecules, interaction and energetics hybridization and shapes ofatomic, molecular orbitals, bond parameters, bond- distances and energies.

7. Basic of organic molecules, structure, bonding, reactivity and reaction mechanisms.

8. Aromatic compounds and aromaticity, mechanism of aromatic reactions.

9. Understanding hybridization and geometry of atoms, 3-D structure of organic molecules, identifying chiralcenters.

10. Electrophile, nucleophiles, free radicals, electronegativity, resonance, and intermediates along the reactionpathways.

11.Mechanism of organic reactions (effect of nucleophile/leaving group, solvent), substitution vs. elimination.

Syllabus:

1. AtomicStructure (8 Lectures)

Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de' Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of ψ and ψ^2. Quantum numbers and their significance. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Contour boundary and probability diagrams. Pauli's Exclusion Principle, Hund'srule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

2. PeriodicTable (7 Lectures)

Effective nuclear charge, shielding or screening effect, Slater rules,variation of effective nuclear charge in periodic table. Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. Electron gain enthalpy, trends of electron gain enthalpy. Electronegativity, Pauling, Mullikan, Allred-Rochow scales, electronegativity and bond order, partial charge, hybridization, group electronegativity. Sanderson electron density ratio.

3. Chemical Bonding (10 Lectures)

Covalent bond: Lewis structure, Valence Shell Electron Pair Repulsion Theory (VSEPR), Shapes of simple molecules and ions containing lone-and bond-pairs of electrons multiple bonding, sigma and pi-bond approach, Valence Bond theory, (Heitler-London approach). Hybridization containing s, p and s, p, d atomic orbitals, shapes of hybrid orbitals, Bents rule, Resonance and resonance energy, Molecular orbital theory. Molecular orbital diagrams of simple homonuclear and heteronuclear diatomic molecules, MO diagrams of simple tri and tetra-atomic molecules, e.g., N_2, O_2, C_2, B_2, F_2, CO, NO, and their ions; HCl, BeF_2, CO_2, BF_3 (idea of s-p mixing and orbital interaction to be given). Covalent character in ionic compounds, polarizing power and polarizability. Fajan rules, polarization. Ionic character in covalent compounds: Bond moment and dipole moment. ionic character from dipole moment and electronegativities. Metallic Bond: Qualitative idea of free electron model, Semiconductors, Insulators.

4. Basics of Organic Chemistry (20 Lectures)

Organic Compounds: Classification and nomenclature, concept of hybridization, orbital pictures of bonding and shapes of molecules, calculation of formal charges and double bond equivalent.

Electronic displacements: Inductive effect, electromeric effect, resonance, hyperconjugation, mesomeric effect, bond polarizability, steric effect, steric inhibition of resonance.

Reactive intermediates: Method of generation, shape and relative stability of carbocations, carbanions, free radicals, carbenes, nitrenes, arynes, energy profile diagrams, electrophilic/ nucleophilic behaviour of reactive intermediates (elementary idea).

Introduction to organic reactions: Electrophiles and nucleophiles, hemolytic and heterolytic bond cleavage, homogenic and heterogenic bond formation, addition, elimination (E_1, E_2, E_{1CB}etc.) and substitution (SN^1, SN^2, SN^ietc.) reactions, curly arrow rules in representation of mechanistic steps.

Stereochemistry: Concept of asymmetry; Stereoisomerism; Conformations and configurations; Flying-wedge, Fischer, Sawhorse and Newman projection formulae and their inter conversions; nomenclature D/L, R/S, E/Z

Practical:

Qualitative analysis of organic special element N, S, Cl, Melting point, Functional group detection $-NH_2$, $-NO_2$, $-CONH_2$, phenolic-OH, -COOH,>C=O, -CHO and derivative preparation.

Recommended Books :

1. R. L. Dutta and G. S. De, Inorganic Chemistry, Pt – I, 7th Edn, 2013, The New Book Stall, 2013.
2. R. Sarkar, General and Inorganic Chemistry, Pt- I, 2nd Edn, Books & Allied (P) Ltd, 2009.
3. A. K. Das, Fundamental Concepts of Inorganic Chemistry, (Vol. 1-3), 2nd Edn, CBS Publisher, 2012.
4. D. F. Shriver, P. W. Atkins and C. H. Langford, Inorganic Chemistry, Oxford University Press, New York, 1990.
5. J. E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry: Principles of Structure and Reactivity, 4th Edn, Pearson Education, India, 2006.

6. N. N. Greenwood and A. Earnshaw, Chemistry of the Elements, 2nd Edn, Elsevier, India, 2005.
7. J. D. Lee, Concise Inorganic Chemistry, 5th Edn, Oxford University Press, 1999.
8. F. A. Cotton, G. Wilkinson, C. M. Murillo and M. Bochmann, Advanced Inorganic Chemistry, 6th Edn, John Wiley and Sons, Inc., New York, 1999.
9. F.A. Carey and R.J. Sundberg, Advanced Organic Chemistry Part A and Part B, 4th Edn., Plenum Press, New York, 2001.
10. M. B. Smith, March's Advanced Organic Chemistry 8th Edition, Wiley.
11. T. H. Lowry and K.C. Richardson, Mechanism and Theory in Organic Chemistry, 3rd Edn., Harper and Row, New York, 1998.
12. H. Neurath, The Proteins: Composition, Structure and Function, Vols. 1-5, Academic Press, New York, 1963.
13. T. W. G. Solomons, C. B. Fryhle and S. A. Snyder, Organic Chemistry, 12th Edition, Wiley.
14. M. Loudon and J. Parise, Organic Chemistry 6th Edition, Mc Millan Learning.
15. J. Clayden, N. Greeves, S. Warren and P. Wothers, Organic Chemistry, Oxford University Press, Oxford, 2001.
16. P. Sykes, A Guide to Mechanism in Organic Chemistry 6th Edition, Orient Longman.
17. D. Nasipuri, Stereochemistry of Organic Compounds, 2nd Edn, Wiley Eastern, New Delhi, 1993.
18. E. L. Eliel, S.H. Wilen and L.N. Mander, Stereochemistry of Organic Compounds, John Wiley & Sons, New York, 1994.
19. N. Tewari, Organic Chemistry, A Modern Approach Volume 1 & 2, Mc Graw Hill Education.
20. R. T. Morrison and R. N. Boyd, Organic Chemistry 6th Edition, Prentice Hall of India.
21. L. Finar, Organic Chemistry, Vol I, 6th Edn., Addison Wesley Longmann, London, 1998.
22. A. K. Nad, B. Mahapatra & A. Ghosal, An Advanced Course in Practical Chemistry, New Central, 2007.
23. S. Ghosh, M. Das Sharma, D. Majumdar and S. Manna, Chemistry in Laboratory, Santra Publication Pvt. Ltd.
24. Vogel's Text Book of Practical Organic Chemistry 5th Edn. Longman.

COURSE TYPE: MINOR

COURSE NAME: GENERAL CHEMISTRY–I

COURSE CODE: BSCCEMMN101

Course Type: **MINOR**	Course Details: MNC-1			L-T-P: **3-0-4**	
		CA Marks		ESE Marks	
Credit: **5**	Full Marks: **100**	Practical	Theoretical	Practical	Theoretical
3 (Theory) + 2(Practical)		**30**	**15**	**20**	**35**

*** Syllabus of Minor Paper (GENERAL CHEMISTRY–I, COURSE CODE: BSCCEMMN101) is same as the Major Paper (GENERAL CHEMISTRY-I, COURSE CODE: BSCCEMMJ101).**

COURSE TYPE: SEC

COURSE NAME: INDUSTRIAL CHEMISTRY (SEC-1)

COURSE CODE: BSCCEMSE101

Course Type: **SEC (Theoretical)**	Course Details: SEC-1			L-T-P: **2-1-0**	
		CA Marks		ESE Marks	
Credit: **3**	Full Marks: **50**	Practical	Theoretical	Practical	Theoretical
			15		**35**

On completion of this course, the students will be able to understand:

Learning objectives:

1. *Understanding to the chemistry of paints, varnishes and dyes.*
2. *Preparation and uses of various compounds including KMnO4, CaC2, alloy steels etc.*
3. *Understanding the chemistry of ceramics.*
4. *Concepts of corrosion: cause and prevention.*
5. *Various fire-extinguishers and their chemical contents.*

Syllabus:

Paints (8 Lectures)

Paints, Varnishes and Synthetic Dyes: Primary constituents of a paint, binders and solvents for paints. Oil based paints, latex paints, baked-on paints (alkyd resins). Constituents of varnishes. Formulation of paints and varnishes. Synthesis of Methyl orange, Congo red, Malachite green, Crystal violet.

Electrochemical and Electro-thermal Industries (3 Lectures)

Preparation and use of Potassium permanganate, hydrogen peroxide, synthetic graphite, calcium carbide, carborundum, alloy steels

Ceramics (4 Lectures)

Refractories, pottery, porcelain, glass, fibre glass

Rusting of Iron and Steel (3 Lectures)

Cause and prevention of corrosion

Industrial Safety and Fire Protection(4 Lectures)

Flash point, fire extinguishers – foam, carbon dioxide, sprinkler system, inert gases.

Recommended Books:

1. G. T. Austin, Shreve's Chemical Process Industries, Mc Graw Hills, 5th Edition.
2. Jain, P.C. & Jain, M. Engineering Chemistry Dhanpat Rai & Sons, Delhi.
3. B.K. Sharma & H.Gaur, Industrial Chemistry, Goel Publishing House, Meerut 1996.
4. E.Stocchi, Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK 1990.

SEMESTER – II

COURSE TYPE: MAJOR

COURSE NAME: GENERALCHEMISTRY–II

COURSE CODE: BSCCEMMJ201

Course Type: **MAJOR**	Course Details: MJC-2			L-T-P: **3-0-4**	
		CA Marks		ESE Marks	
Credit: **5**	Full Marks: **100**	Practical	Theoretical	Practical	Theoretical
3 (Theory) + 2(Practical)		**30**	**15**	**20**	**35**

On completion of this course, the students will be able to understand:

Learning objectives:

1. Physical properties and related laws of gas and liquid states are described.

2. Understanding Kinetic model of gas and its properties.

3. Maxwell distribution, mean-free path, kinetic energies.

4. Behaviour of real gases, its deviation from ideal behaviour, equation of state, isotherm, and law of corresponding states.

5. Liquid state and its physical properties related to temperature and pressure variation.

6. Properties of liquid as solvent for various household and commercial use.

7. Understand the basics of chemical kinetics: determination of order, molecularity, theories of reaction rates, determination of rate of opposing/parallel/chain reactions with suitable examples, application of steady state kinetics, Steady-state approximation.

Syllabus :

1. Acid-Base and Ionic Equilibrium (12 Lectures)

Brönsted Lowry's concept, co-solvating agents, differentiating and leveling effect, Theory of solvent system, Lux Flood concept, Lewis concept- Stability of the adduct (Drago-Wayland equation), change of bond length parameter in adduct formation, -acidity of the ligands, synergistic effect, Usanovich's concept. Strength of hydracids and oxyacids, different factors in determining acid-base strength: steric effects (B- andF-strain), salvation, H-bonding; Hard and Soft acid base (HSAB) principle: classification and characteristic,

hardness and frontier molecular orbital (FMO), Non-aqueous solvent (liq. NH_3, liq.SO_2). Ionic Equilibria: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and tri-protic acids Ostwald's dilution law, pH, buffer solution and buffer capacity, Henderson equation, hydrolysis and hydrolysis constant of salts, indicators: acid-base and its function, Hammett acidity function

2. Redox Potential and Redox Equilibria (10 Lectures)

Some basic aspects of redox reactions, equivalent weights of oxidants and reductants,ion-electronmethodofbalancingredoxreactions,complimentaryandnoncomplimentary redox reactions, over potential, electron and atom transfer in redoxreactions, Standardred oxpotentials, sign convention, Nernst equation, electro chemical series, formal potential and its importance in analytical chemistry; Redox potential: effect of complex formation, effect of precipitation, effect of pH change, EMF Diagram (Latimer, Frost), thermodynamic aspects of disproportionation and comproportionation reactions, redox potential and equilibrium constants, redox titration and redox indicators, function of Zimmermann Reinhardt (ZR) solution

3. Chemical Kinetics –I (8 Lectures)

Introduction, reaction rate and extent of reaction, order and molecularity; kinetics of zero, first, second, fractional and pseudo-first order reactions; determination of order of reaction, opposing, consecutive and parallel reactions (first order), concept of steady state and rate determining step, chain reaction: elementary idea, illustrations with H_2-Br_2 and H_2-O_2 reactions. Temperature dependence of reaction rate, Arrhenius equation.

4. Properties of Fluids (15 Lectures)

a) Properties of Gas - Maxwell's speed and energy distributions in one-, two- and three-dimensions, distribution curves, different types of speeds and their significance, principle of equipartition of energy and its application to calculate the classical limit of molar heat capacity of gases, Transport properties of gas, Thermal conductivity, Viscosity: mechanism, temperature and pressure dependence, relationship with mean free path. Collision of gas

molecules, collision diameter, collision number and mean free path, frequency of binary collision in same and different molecules, wall collision and rate of effusion.

Nature of imperfect gases with reference to van der Waals, Diterici and virial equations of state; Amagat's and Andrews' curves; continuity of states; critical constants; Boyle temperature; reduced equation of state. Vapour density and limiting density, intermolecular forces.

b) Properties of Liquids - Viscosity of liquids: principles of determination (falling sphere, Poiseuille's equation and Ostwald viscometer); temperature dependence, liquid crystal.

Surface energy and surface tension: temperature dependence; vapour pressure over a curved surface; conditions of convexity and concavity of meniscus; wetting. Principles of determination (capillary-rise and drop-weight methods).

Practical:

1. **CO_3^{2-} /HCO_3^- estimation**

TitrationofNa$_2$CO$_3$+NaHCO$_3$mixturevsHClusingphenolphthaleinand methylorangeindicators

2. **HardnessofWater**

TofindthetotalhardnessofwaterbyEDTAtitration

3. **Estimation of Fe^{2+}**

TitrationofferrousironbyKMnO$_4$/K$_2$Cr$_2$O$_7$

4. **Estimation of alkali content in antacid tablet**
5. **Surface tension of a liquid/solution by drop-weight/drop number.**
6. **Viscosity coefficient of a liquid/solution by Ostwald viscometer.**

Recommended Books :

1. R. L. Dutta and G. S. De, Inorganic Chemistry, Pt – I, 7th Edn, 2013, The New Book Stall, 2013.
2. R. Sarkar, General and Inorganic Chemistry, Pt- I, 2nd Edn, Books & Allied (P) Ltd, 2009.
3. A. K. Das, Fundamental Concepts of Inorganic Chemistry, (Vol. 1-3), 2nd Edn, CBS Publisher, 2012.
4. D. F. Shriver, P. W. Atkins and C. H. Langford, Inorganic Chemistry, Oxford University Press, New York, 1990.

5. J. E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry: Principles of Structure and Reactivity, 4th Edn, Pearson Education, India, 2006.
6. N. N. Greenwood and A. Earnshaw, Chemistry of the Elements, 2nd Edn, Elsevier, India, 2005.
7. J. D. Lee, Concise Inorganic Chemistry, 5th Edn, Oxford University Press, 1999.
8. F. A. Cotton, G. Wilkinson, C. M. Murillo and M. Bochmann, Advanced Inorganic Chemistry, 6th Edn, John Wiley and Sons, Inc., New York, 1999.
9. G. W. Castellan, Physical Chemistry, Narosa Publishing House, Calcutta, 1995.
10. K.L. Kapoor, A Text Book of Physical Chemistry (Vol. 1 & 5), Macmillan India Limited, New Delhi.
11. P. C. Rakshit (Revised by S.C. Rakshit), Physical Chemistry, Sarat Book Distributers, Kolkata.
12. Ira N. Levine, Physical Chemistry, PHI Learning Pvt. Ltd.
13. R. A. Alberty and R. J. Silbey, Physical Chemistry, John Wiley and Sons, Inc., New York, 1995.
14. D. A. McQuarrie and J. D. Simon, Physical Chemistry: A Molecular Approach, Viva Books Private Limited.
15. P. W. Atkins & Julio De Paula, Physical Chemistry, Eighth Edition, Oxford University Press, Oxford
16. P. W. Atkins & Julio De Paula, Elements of Physical Chemistry, Fifth Edition, Oxford University Press, Oxford
17. A. Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S Chand Publications.
18. Pahari and Pahari, Problems on Physical Chemistry, New Central Book Agency (P) Ltd.
19. A. Ghoshal, Numerical Problems on Physical Chemistry,Books and Allied (P) Ltd.
20. A. K. Nad, B. Mahapatra & A. Ghosal, An Advanced Course in Practical Chemistry, New Central, 2007.
21. S. Ghosh, M. Das Sharma, D. Majumdar and S. Manna, Chemistry in Laboratory, Santra Publication Pvt. Ltd.

COURSE TYPE: MINOR

COURSE NAME: GENERAL CHEMISTRY–II

COURSE CODE: BSCCEMMN201

Course Type: **MINOR**	Course Details: MNC-2			L-T-P: **3-0-4**	
		CA Marks		ESE Marks	
Credit: **5**	Full Marks: **100**	Practical	Theoretical	Practical	Theoretical
3 (Theory) + 2(Practical)		**30**	**15**	**20**	**35**

*** Syllabus of Minor Paper (GENERAL CHEMISTRY–II, COURSE CODE: BSCCEMMN201) is same as the Major Paper (GENERAL CHEMISTRY-II, COURSE CODE: BSCCEMMJ201).**

COURSE TYPE: SEC

COURSE NAME: PHARMACEUTICAL CHEMISTRY (SEC-2)

COURSE CODE: BSCCEMSE201

Course Type: **SEC (Theoretical)**	Course Details: **SEC-2**			L-T-P: 2-**1-0**	
		CA Marks		ESE Marks	
Credit: **3**	Full Marks: **50**	Practical	Theoretical	Practical	Theoretical
			15		**35**

On completion of this course, the students will be able to understand:

Learning objectives:

1. *Understanding of different drug design and discoveries.*
2. *Different classes of drugs and their examples*
3. *Some knowledge about aerobic and anaerobic fermentation chemistry.*
4. *Some idea about production of various drug related components.*

Syllabus:

1. Drugs & Pharmaceuticals(15 Lectures)

What are drugs and why do we need new ones? Drug discovery and design, Sources of drugs and lead compounds, Natural sources, Drug synthesis, pharmacokinetics and pharmacodynamics? Introduction to drug action, Absorption, Distribution, Metabolism, Elimination, Solubility and drug design, The importance of water solubility, Salt formation, Structure–activity relationships (SARs), Lipophilicity, Electronic effects and steric effects.

Drugs & Pharmaceuticals Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, lbuprofen); antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Diazepam),Cardiovascular (Glyceryltrinitrate), antilaprosy (Dapsone), HIV-AIDS related drugs (AZTZidovudine).

2. Fermentation(5 Lectures)

Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.

Recommended Books :

1. G. L. Patrick, Introduction to Medicinal Chemistry, Oxford University Press, UK, 2013.
2. H. Singh & V.K. Kapoor, Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, New Delhi, 2012.

COURSE TYPE: MD

COURSE NAME: CHEMICAL SCIENCE

COURSE CODE: MDC213

Course Type: **MD**	Course Details: MDC213			L-T-P: **3-0-0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

On completion of this course, the students will be able to understand:

Learning objectives:

- *Knowledge of Polymer chemistry*
- *Application of polymer in everyday life*
- *Basic concepts and classifications of drugs, medicines, cancer therapy*
- *Knowledge of applications of different essential drug molecules*
- *Elementary idea about bioinorganic chemistry*

Syllabus:

1. Polymers (15 Lectures)

Basic concept, definition of polymers, natural and synthetic polymers, monomers, polymers, degree of polymerization, simple idea of polymer structure: homopolymer (linear, branched, cross-linked) and copolymer (random, block, graft), polymerization reaction step (growth, addition, ring opening), importance of polymers both natural and synthetic, Biodegradable polymers. Number and weight average molecular weights of polymers – significance, structure, properties and use of natural rubber, synthetic rubber (neoprene), synthetic fibres (Nylon 66, polyester), plastics like polyethylene and PVC, macromolecules and environment.

2. Chemistry in everyday life (30 Lectures)

Drugs: Definition of drug, relation between drugs and medicine, designing a drug: drug target & drug metabolism, drug-target interaction, side effects, secondary effects and toxic effects of drugs, classification of drugs, Some important class of drugs and its use: antacids,

antihistamines, antifertility, neurologically active drugs (tranquilizers, narcotic analgesic and non-narcotic analgesic), antimicrobials, antibiotics, antiseptics, disinfectants.

Cancer treatment: Anticancer compounds (Pt-complexes and metallocenes), Basic concept in chemotherapy, radiation therapy, immunotherapy.

Bioinorganic Chemistry: metal dependent disease, Essential metals: role of metal ions in biological systems (specially Na+, K^{+}, Mg^{2+}, Ca^{2+}, $Fe^{3+/2+}$, $Cu^{2+/+}$, and Zn^{2+}) detoxification by chelation therapy for Pb and As poisoning, lithium therapy in psychiatric mind disorder.

Recommended Books:

1. S. R. Palit, Elementary Physical Chemistry; Book Syndicate Private Limited.
2. M. S. Bhatnagar, A text book of polymer chemistry, S. Chand Publication
3. Mamta & M. Nithya Devi, Elements of Polymer Chemistry, Anmol Publishers.
4. A. K. Das, Bioinorganic Chemistry, 2nd Edn, Books & Allied (P) Ltd, Kolkata, 2004.
5. G. L. Patrick, Introduction to Medicinal Chemistry, Oxford University Press, UK, 2013.
6. H. Singh & V.K. Kapoor, Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, New Delhi, 2012.
7. A. Kar, Medicinal Chemistry, New Age International (P) Limited, Publishers.

NEP
SYLLABUS
PHYSICS

Syllabus

for

Semester I to IV

B.Sc (Honours) in Physics

w.e.f. Academic Session 2023-24

Kazi Nazrul University

Asansol, Paschim Bardhaman
West Bengal 713340

Semester-I:

MAJOR COURSE

Mechanics and General properties of Matter

Course Code: BSCPHYMJ101

Course Type: MJC -1 **(Theory and Practical)**	Course Details: **Mechanics & General Properties of Matter**			L-T-P: 3-0-4	
Credit: 5	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand vector calculus, classical mechanics of single as well as system of particles within the scope the Newtonian formulation.
2. Understand the dynamics of rigid body and concept of moment of inertia. Study of moment of inertia of different bodies and its applications.
3. Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor in a driven system.
4. Apply Kepler's laws to describe the motion of planets and satellite in circular orbit.
5. Study the properties of matter, response of the classical systems to external forces and their elastic deformation and its applications and comprehend the dynamics of Fluid and concept of viscosity and surface tension along with its applications.

Course Content

MJC-1: Mechanics & General Properties of Matter

45 Hrs

Vector Calculus : Vector triple product(review); Derivatives of vectors; Gradient, Divergence, Curl of a vector field; Vector integrations-line, surface and volume integration; Gauss' divergence theorem, Stoke's theorem, Green's theorem (statement only with simple applications); Introduction to Orthogonal curvilinear Co-ordinate systems, unit vectors, Jacobian; Special cases: plane, spherical and

cylindrical co-ordinate systems; Infinitesimal line segment, area and volume elements in them.

10L

Mechanics of Single Particle: Introduction to Inertial & Non-inertial reference frames; Velocity and Acceleration - tangential and normal components, Radial and Cross-radial components; Newton's laws, Inertial frame, Work, Energy, Impulse of a force, Freely falling bodies, Motion in a resistive medium. Projectile motion. Conservative force and concept of potential; Conservation of energy; Dissipative forces; Translation invariance and conservation of linear momentum; Central force (preliminary idea) & Conservation of angular momentum; Torque; Brief reference to fundamental forces in nature.

6L

Oscillations: Oscillations: Simple Harmonic Motion and its properties, energy of a simple harmonic oscillator, Damped oscillations: under damped, over-damped, and critically damped motion, Forced Oscillations and Resonance, Q factor and Sharpness; Examples of Oscillators from various branches of physics.

8L

Gravitation: Kepler's laws, Newton's law of gravitation, Motion of satellites in circular orbit. Geosynchronous orbits.

2L

Systems of particles: Degrees of freedom, Centre of mass and Centre of gravity, Momentum, Angular momentum, Torque, Kinetic energy of a system of particles; Conservation of linear momentum, angular momentum, and Energy for a system of particles; Centre of mass motion and Centre of mass coordinate; Examples: two coupled harmonic oscillators, two-body systems with (i) gravitaional, (ii) Coulomb interaction etc.

5L

Rigid body Dynamics : Concept of rigid body, Euler's theorem, General motion of rigid bodies: Chasle's theorem, Rotational motion about an axis, Moment of inertia, Radius of gyration, Perpendicular and Parallel Axis Theorems; Moment of inertia of a uniform body-Solid and hollow cylinders, Solid and hollow spheres, Rectangular plane, thin rod; Rotational energy, Conservation of energy, Work and Power, Motion of a flywheel, Theory of compound pendulum- Bar and Kater's pendulum, Foucault Pendulum; determination of "g"; Principal axis and Product of Inertia; Rotating Cordinate & Coriolis force.

7L

General properties of matter: Elasticity: Relation between different elastic moduli and Poisson's ratio, Torsional pendulum, Bending of beam;

Surface Tension: Angle of contact, surface tension and surface energy, pressure difference across curved surface example, excess pressure inside spherical liquid drop;

Viscocity: Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poiseulle's method, Stoke's method. Bernoulli's theorem and its applications.

7L

References/ Suggested Readings

1. *Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (Tata McGraw-Hill)*
2. *Classical Mechanics – J. C. Upadhyay, (Himalaya Publ.).*
3. *Introduction to Classical Mechanics - R. G. Takwale and P. S. Puranik (Tata McGraw-Hill).*
4. Theoretical Mechanics - M. R. Spiegel, (Schaum's Outline Series) (McGraw-Hill).
5. Berkeley Physics Course, Vol – I (Mechanics) (Mc Graw Hill).
6. Advanced Accoustics- D. P. Raychaudhury.
7. Waves and Oscillations by N K Bajaj
8. Waves and Oscillations by R. N. Chowdhury
9. An Introduction to Mechanics by Kleppner and Kolenkow
10. Classical Mechanics by Rana Joag
11. Introduction to classical Mechanics with problems and solutions by Davis Morin, Cambridge University Press
12. Feynman Lectures Vol. 1, R. P. Feynman, R. B. Leighton, M. Sands, 2008, Pearson Education
13. Elements of properties of matter by D.S. Mathur
14. A Treatise on general properties of matter by Sengupta and Chatterjee

Students can also explore these sites for additional reading -
https://nptel.ac.in/courseshttps://ocw.mit.edu/search/?q=courses

Experiments to be performed in the first semester (At least 6 experiments have to be performed):

1. To study the Motion of Spring and calculate (a) Spring constant, (b) Acceleration due to gravity.

2. To determine the Moment of Inertia of a Flywheel / regular-shaped body.

3. To determine Coefficient of Viscosity of water by Capillary Flow (Poiseuille‟s) Method.

4. Determination of Young‟s modulus by method of flexure.

5. To determine the Young's Modulus of a Wire by Optical Lever Method.

6. To determine the elastic Constants of a wire by Searle‟s method.

7. To determine the value of acceleration due to gravity using Bar Pendulum.

8. 7. To determine the value of acceleration due to gravity using Kater’s Pendulum.

9. Determination of surface tension of a liquid by Jaeger‟s method.

10. Determination of surface tension of a liquid by capillary-rise method.

11. Determination of the rigidity modulus of a wire by statical /dynamical method

Reference Books for Laboratory Experiments:

1. Physics through experiments	B. Saraf	Vikas Publications
2. A laboratory manual of Physics for undergraduate classes, 1st Edition,	D P Khandelwal	Vikas Publications.
3. B.Sc. Practical Physics (Revised Edition)	C. L Arora	S.Chand& Co.
4. An advanced course in practical physics.	D. Chatopadhyay, PC Rakshit, B. Saha	New Central Book Agency Pvt Ltd.

MINOR COURSE

Mechanics and General properties of Matter

Course Code: BSCPHYMN101

Course Type: MNC-1 **(Theory and Practical)**	Course Details: **Mechanics & General Properties of Matter**			L-T-P: 3-0-4	
Credit: 5	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand vector calculus, classical mechanics of single as well as system of particles within the scope the Newtonian formulation.
2. Understand the dynamics of rigid body and concept of moment of inertia. Study of moment of inertia of different bodies and its applications.
3. Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor in a driven system.
4. Apply Kepler's laws to describe the motion of planets and satellite in circular orbit.
5. Study the properties of matter, response of the classical systems to external forces and their elastic deformation and its applications and comprehend the dynamics of Fluid and concept of viscosity and surface tension along with its applications.

Course Content
MNC-1: Mechanics & General Properties of Matter

45 Hrs

Vector Calculus : Vector triple product(review); Derivatives of vectors; Gradient, Divergence, Curl of a vector field; Vector integrations-line, surface and volume integration; Gauss' divergence theorem, Stoke's theorem, Green's theorem (statement only with simple applications); Introduction to Orthogonal curvilinear Co-ordinate systems, unit vectors, Jacobian; Special cases: plane, spherical and cylindrical co-ordinate systems; Infinitesimal line segment, area and volume elements in them.

10L

Mechanics of Single Particle: Introduction to Inertial & Non-inertial reference frames; Velocity and Acceleration - tangential and normal components, Radial and Cross-radial components; Newton's laws, Inertial frame, Work, Energy, Impulse of a force, Freely falling bodies, Motion in a resistive medium. Projectile motion. Conservative force and concept of potential; Conservation of energy; Dissipative forces; Translation invariance and conservation of linear momentum; Central force (preliminary idea) & Conservation of angular momentum; Torque; Brief reference to fundamental forces in nature.

6L

Oscillations: Oscillations: Simple Harmonic Motion and its properties, energy of a simple harmonic oscillator, Damped oscillations: under damped, over-damped, and critically damped motion, Forced Oscillations and Resonance, Q factor and Sharpness; Examples of Oscillators from various branches of physics.

8L

Gravitation: Kepler's laws, Newton's law of gravitation, Motion of satellites in circular orbit. Geosynchronous orbits.

2L

Systems of particles: Degrees of freedom, Centre of mass and Centre of gravity, Momentum, Angular momentum, Torque, Kinetic energy of a system of particles; Conservation of linear momentum, angular momentum, and Energy for a system of particles; Centre of mass motion and Centre of mass coordinate; Examples: two coupled harmonic oscillators, two-body systems with (i) gravitaional, (ii) Coulomb interaction etc.

5L

Rigid body Dynamics: Concept of rigid body, Euler's theorem, General motion of rigid bodies: Chasle's theorem, Rotational motion about an axis, Moment of inertia, Radius of gyration, Perpendicular and Parallel Axis Theorems; Moment of inertia of a uniform body-Solid and hollow cylinders, Solid and hollow spheres, Rectangular plane, thin rod; Rotational energy, Conservation of energy, Work and Power, Motion of a flywheel, Theory of compound pendulum- Bar and Kater's

pendulum, Foucault Pendulum; determination of "g"; Principal axis and Product of Inertia; Rotating Cordinate & Coriolis force.

7L

General properties of matter: Elasticity: Relation between different elastic moduli and Poisson's ratio, Torsional pendulum, Bending of beam;

Surface Tension: Angle of contact, surface tension and surface energy, pressure difference across curved surface example, excess pressure inside spherical liquid drop;

Viscocity: Streamline flow, turbulent flow, equation of continuity, determination of coefficient of viscosity by Poiseulle's method, Stoke's method. Bernoulli's theorem and its applications.

7L

References/ Suggested Readings

1. *Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (Tata McGraw-Hill)*
2. *Classical Mechanics – J. C. Upadhyay, (Himalaya Publ.).*
3. *Introduction to Classical Mechanics - R. G. Takwale and P. S. Puranik (Tata McGraw-Hill).*
4. Theoretical Mechanics - M. R. Spiegel, (Schaum's Outline Series) (McGraw-Hill).
5. Berkeley Physics Course, Vol – I (Mechanics) (Mc Graw Hill).
6. Advanced Accoustics- D. P. Raychaudhury.
7. Waves and Oscillations by N K Bajaj
8. Waves and Oscillations by R. N. Chowdhury
9. An Introduction to Mechanics by Kleppner and Kolenkow
10. Classical Mechanics by Rana Joag
11. Introduction to classical Mechanics with problems and solutions by Davis Morin, Cambridge University Press
12. Feynman Lectures Vol. 1, R. P. Feynman, R. B. Leighton, M. Sands, 2008, Pearson Education
13. Elements of properties of matter by D.S. Mathur
14. A Treatise on general properties of matter by Sengupta and Chatterjee

Experiments to be performed in the first semester (At least 6 experiments have to be performed):

1. To study the Motion of Spring and calculate (a) Spring constant, (b) Acceleration due to gravity.

2. To determine the Moment of Inertia of a Flywheel / regular-shaped body.

3. To determine Coefficient of Viscosity of water by Capillary Flow (Poiseuille's) Method.

4. Determination of Young's modulus by method of flexure.

5. To determine the Young's Modulus of a Wire by Optical Lever Method.

6. To determine the elastic Constants of a wire by Searle's method.

7. To determine the value of acceleration due to gravity using Bar Pendulum.

8. 7. To determine the value of acceleration due to gravity using Kater's Pendulum.

9. Determination of surface tension of a liquid by Jaeger's method.

10. Determination of surface tension of a liquid by capillary-rise method.

11. Determination of the rigidity modulus of a wire by statical /dynamical method

Reference Books for Laboratory Experiments:

1. Physics through experiments	B. Saraf	Vikas Publications
2. A laboratory manual of Physics for undergraduate classes, 1st Edition,	D P Khandelwal	Vikas Publications.
3. B.Sc. Practical Physics (Revised Edition)	C. L Arora	S.Chand& Co.
4. An advanced course in practical physics.	D. Chatopadhyay, PC Rakshit, B. Saha	New Central Book Agency Pvt Ltd.

MD COURSE

PHYSICAL SCIENCE

COURSE CODE: MDC101

Course Type: **MDC-1**	Course Details: Physical Science			L-T-P: **3-0-0**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
			15		**35**

Learning objectives:

1) *On completion of this course students should be able to demonstrate a comprehensive understanding of the fundamental concepts of matter, energy, gravity, and space, as well as their applications in various fields including medicine, communication, and modern storage technology.*

2) Students will also be able to critically analyze the universe's structure and evolution based on the Big Bang theory.

3) Additionally, they should have an awareness of the role of physics in everyday life and technological advancements.

Course Content
MDC-1: Physical Science

Matter and Energy

What is matter? Constituents of matter (upto elementary particles), States of Matter, Fundamental forces in Nature

What is energy?, Types of energy, Conservation of energy dissipation of energy, Conversion of one form of energy to another, Equivalence of matter and energy, energy generation and distribution in our daily life (Nuclear reactors, electrical energy), Renewable and Non-renewable sources of energy; Solar energy, tidal energy, hydro energy

Gravity, Force and Space:

The force of Gravity; Planetary motion, Newton's third law; Weightlessness; Low earth orbit; Geosynchronous satellites; Spy satellites; Medium Earth Orbit satellite; Circular Acceleration; momentum; Rockets; Airplanes, helicopters and fans; Hot air and helium balloons;

Structure of the Universe (Milkyway, solar system, planets, comets), Evolution of the Universe (Big Bang theory)

Applications of Physics

Medical Physics: stethoscope, x-ray, Ultrasound, Laser, Endoscopy, Colonoscopy, NMR, Pet-scan, Radiation- radiation hazards and safety

Communication: optical communication, radars, broad-band, mobile communication

Modern storage system: magnetic storage, solid state devices, holography

SEC COURSE

Computer Programming in C / FORTRAN/ Python/ SciLab

Course Code: BSCPHYSE101

<table>
<tr><td>Course Type: SEC-1</td><td colspan="2">Course Details: Computer Programming in C / FORTRAN/ Python/ SciLab</td><td colspan="2">L-T-P: 0-0-6</td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>15</td><td></td><td>35</td><td></td></tr>
</table>

Course Content

SEC-1: Computer Programming in C / FORTRAN/ Python/ SciLab

1. **Introduction and Overview**: Computer architecture and organization, memory and Input/output devices.

2. **Basics of scientific computing:** Decimal, Binary, octal and hexadecimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow &overflow emphasize the importance of making equations in terms of dimensionless variables, Iterative methods.

3. **Errors and error Analysis**: Truncation and round off errors, Absolute and relative errors, Floating point computations.

4. **Programming fundamentals:** Introduction to Programming, constants, variables and data types, simple and logical operators and Expressions, I/O statements, Input and output statements. Reading Input and sending output from/to files., Manipulators for data formatting, Control statements (decision making and looping statements) (*If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops*), Arrays (*1D & 2D*) and strings. user defined functions, Pointers, Structures and Unions, Idea of classes and objects (for C/C++).

Sample Programming (suggested atleast eight):

1. (a) Conversion of components of a vector among cartesian, polar and cylindrical coordinate systems. (b) Conversion of list of temperatures from celsius to fahrenheit scale. (c) Calculating the positions,

velocities of a particle from given mass, acceleration. (d) Finding the real / complex roots of a quadratic equation using Sridharacharya method.

2. To check the divisibility of an integer and find a set of prime numbers.

3. Conversion of a number between decimal, binary, octal, hexadecimal number systems.

4. Find the area / perimeter of circle / square /ellipse, volume of sphere / cube etc. using user defined functions.

5. Generation of terms, sum, ratios for arithmetic, geometric and Fibonacci / series.

6. To evaluate an infinite series with pre-assigned accuracy.

7. To find the largest/second largest/smallest of a given list of numbers. Find their locations in a sequence.

8. Sorting of numbers in ascending / descending order.

9. To generate a frequency distribution, mean, mode, median (from formula), standard deviation , correlation functions etc from a given data.

10. Fitting an experimental data with linear least-square method.

11. To find the trace of a square matrix. Find the sum, difference and product of two square matrices.

12. Generation of pseudo-random numbers and test their auto-correlations.

13. To write in and read from an external file in a program.

References/ Suggested Readings:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.

2. Computer Programming in Fortran 77". V. Rajaraman (Publisher: PHI).

3. LaTeX–A Document Preparation System", Leslie Lamport (Second Edition, Addison-Wesley, 1994).

4. Gnuplot in action: understanding data with graphs, Philip K Janert, (Manning 2010)

5. Schaum"s Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A Poe, 1986Mc-Graw Hill Book Co.

6. Computational Physics: An Introduction, R. C. Verma, et al. New Age International Publishers, New Delhi (1999)

7. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning

8. Elementary Numerical Analysis, K.E. Atkinson, 3 rd Edn. , 2007, Wiley India.

Semester-II:

MAJOR COURSE

Electricity and Magnetism

Course Code: BSCPHYMJ201

Course Type: MJC -2 **(Theory and Practical)**	Course Details: **Electricity and Magnetism**			L-T-P: 3-0-4	
Credit: 5	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Explain the properties of (i) the electric field produced due to charges at rest; (ii) the magnetic field produced due to steady current, both in free-space and inside matter.*
2. *Develop an understanding on the unification of electric and magnetic fields and Maxwell's eqution governing electromagnetic waves.*
3. *Understand the phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q- factor, Power factor and the comparative study of series and parallel resonant circuits.*

Course Content

MJC-2: Electricity and Magnetism

45 Hours

Electric Field for a point charge : Concept of charge, Conservation and quantization of charge, Coulomb's law, Electric field strength, electric field lines, point charge in an electric field; Electric dipole. work done by a charge (derivation of the expression for potential energy).

2L

Electrostatic potential for a point charge : Electric potential, line integral, gradient of a scalar function, relation between field and potential. Potential due to point charge and Constant potential surfaces. Poisson's and Laplace's equations. Uniqueness Theorem.

3L

Multipole expansion of potential : Potential and electric field due to a dipole. Multipole expansion – monopole, dipole, quadrupole.

2L

Gauss law in Electrostatics : Electric Flux, Gauss's law, Continuous Charge distribution, Calculation of Electric fields of a (i) spherical charge distribution, (ii) line charge and (iii) an infinite flat sheet of charge. Calculation of Potential.

3L

Concept of Voltage and current Sources : Concept of Voltage and Current Sources, Kirchhoff's Laws, Network Theorems- Thevenin's, Norton's, Maximum Power Transfer Theorem, Reciprocity Theorem.

4L

Electrostatics in Conductors and Dielectrics : Electric field and surface charge density for conductors, Electric Polarisation (atomic view) and bound charge densities for Dielectric materials, Displacement Vector and Gauss's law in dielectrics. Capacitors-parallel plate capacitor with dielectric inside, Electrostatic Energy stored in a capacitor.

5L

DC steady currents : Electric currents and current density. Lorentz Force on a moving charge. Electrical conductivity and Ohm's law. Physics of electrical conduction, conduction in metals and semiconductors, circuit elements and circuits: Transient currents in RC, LR and LCR circuits.

4L

Magnetostatics : Definition of magnetic field, Ampere's law and Biot-Savart law (magnetic force and magnetic flux), Magnetic force on a current carrying conductor. Magnetic moment of a current-carrying circular loop, electric current in atoms, electron spin and magnetic moment, Hall effect in a conductor.

5L

Magnetic materials : Magnetic intensity and magnetic induction, Intensity of magnetization, Susceptibility, Permeability, Types of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials. Magnetization and magnetic susceptibility.

3L

Electromagnetic Induction : Electromagnetic induction, conducting rod moving in a magnetic field, Faraday's laws of induction, Lenz's Law, expression for self-inductance and energy stored in a magnetic field. Mutual inductance**.**

4L

AC circuits : RMS and average value of AC, Response of RL, RC, LC, LCR circuits using j-operator method, quality factor, admittance and impedance, power and energy in series and parallel resonance AC circuits. AC bridges- Anderson bridge, Wien bridge, De'Sauty's bridge.

5L

Electromagnetic waves : Equation of continuity, Maxwell's equations, Brief reference to Magnetic Monopole; Introduction to Gauges; displacement current, equation for propagation of electromagnetic wave, transverse nature of electromagnetic wave, energy transported by electromagnetic waves. Poynting vector.

5L

References/ Suggested Readings

1. Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.

2. Electricity and Magnetism, By Rakshit and Chatterjee

3. Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education

4. Electricity and Magnetism, J. H. Fewkes& J. Yarwood. Vol. I, 1991, Oxford Univ. Press.

5. Feynman Lectures Vol.2, R. P. Feynman, R. B. Leighton, M. Sands, 2008, Pearson Education

6. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw-Hill Education

Experiments to be performed in the Second semester (At least 6 experiments has to be performed):

1. To study the characteristics of a series RC Circuit.

2. To determine an unknown low resistance using Potentiometer.

3. To determine an unknown low resistance using Carey Foster's Bridge.

4. To compare capacitances using De' Sauty's bridge.

5. To determine self inductance of a coil by Anderson's bridge.

6. Measurement of magnetic field strength B and its variation in a solenoid (determinination of dB/dx).

7. To verify the Thevenin and Norton theorems in a wheatstone bridge.

8. To verify the superposition, and maximum power transfer theorems in a wheatstone bridge.

9. To study response curve of a Series LCR circuit and determine its (a) Resonant

frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.

10. To study the response curve of a parallel LCR circuit and determine its (a) anti-resonant frequency and (b) Quality factor Q.

11. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer

12. Determine a high resistance by leakage method using Ballistic Galvanometer.

13. To determine self-inductance of a coil by Rayleigh's method.

14. To determine temperature co-efficient of resistance of a metal / semiconductor by a meter-bridge.

MINOR COURSE

Electricity and Magnetism

Course Code: BSCPHYMN201

<table>
<tr><td>Course Type: MNC-2
(Theory and Practical)</td><td colspan="2">Course Details: Electricity and Magnetism</td><td colspan="2">L-T-P: 3-0-4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks: 100</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

After the completion of course, the students will have ability to:

1. *Explain the properties of (i) the electric field produced due to charges at rest; (ii) the magnetic field produced due to steady current, both in free-space and inside matter.*
2. *Develop an understanding on the unification of electric and magnetic fields and Maxwell's eqution*s

governing electromagnetic waves.

3. *Understand the phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q- factor, Power factor and the comparative study of series and parallel resonant circuits.*

Course Content

MJC-2: Electricity and Magnetism

45 Hours

Electric Field for a point charge : Concept of charge, Conservation and quantization of charge, Coulomb's law, Electric field strength, electric field lines, point charge in an electric field; Electric dipole. work done by a charge (derivation of the expression for potential energy).

2L

Electrostatic potential for a point charge : Electric potential, line integral, gradient of a scalar function, relation between field and potential. Potential due to point charge and Constant potential surfaces. Poisson's and Laplace's equations. Uniqueness Theorem.

3L

Multipole expansion of potential : Potential and electric field due to a dipole. Multipole expansion – monopole, dipole, quadrupole.

2L

Gauss law in Electrostatics : Electric Flux, Gauss's law, Continuous Charge distribution, Calculation of Electric fields of a (i) spherical charge distribution, (ii) line charge and (iii) an infinite flat sheet of charge. Calculation of Potential. 3L

Concept of Voltage and current Sources : Concept of Voltage and Current Sources, Kirchhoff's Laws, Network Theorems- Thevenin's, Norton's, Maximum Power Transfer Theorem, Reciprocity Theorem.

4L

Electrostatics in Conductors and Dielectrics : Electric field and surface charge density for conductors, Electric Polarisation (atomic view) and bound charge densities for Dielectric materials, Displacement Vector and Gauss's law in dielectrics. Capacitors-parallel plate capacitor with dielectric inside,

Electrostatic Energy stored in a capacitor.

5L

DC steady currents : Electric currents and current density. Lorentz Force on a moving charge. Electrical conductivity and Ohm's law. Physics of electrical conduction, conduction in metals and semiconductors, circuit elements and circuits: Transient currents in RC, LR and LCR circuits.

4L

Magnetostatics : Definition of magnetic field, Ampere's law and Biot-Savart law (magnetic force and magnetic flux), Magnetic force on a current carrying conductor. Magnetic moment of a current-carrying circular loop, electric current in atoms, electron spin and magnetic moment, Hall effect in a conductor.

5L

Magnetic materials : Magnetic intensity and magnetic induction, Intensity of magnetization, Susceptibility, Permeability, Types of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials. Magnetization and magnetic susceptibility.

3L

Electromagnetic Induction : Electromagnetic induction, conducting rod moving in a magnetic field, Faraday's laws of induction, Lenz's Law, expression for self-inductance and energy stored in a magnetic field. Mutual inductance**.**

4L

AC circuits : RMS and average value of AC, Response of RL, RC, LC, LCR circuits using j-operator method, quality factor, admittance and impedance, power and energy in series and parallel resonance AC circuits. AC bridges- Anderson bridge, Wien bridge, De'Sauty's bridge.

5L

Electromagnetic waves : Equation of continuity, Maxwell's equations, Brief reference to Magnetic Monopole; Introduction to Gauges; displacement current, equation for propagation of electromagnetic wave, transverse nature of electromagnetic wave, energy transported by electromagnetic waves. Poynting vector.

5L

References/ Suggested Readings

1. Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.

2. Electricity and Magnetism, By Rakshit and Chatterjee

3. Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education

4. Electricity and Magnetism, J. H. Fewkes& J. Yarwood. Vol. I, 1991, Oxford Univ. Press.

5. Feynman Lectures Vol.2, R. P. Feynman, R. B. Leighton, M. Sands, 2008, Pearson Education

6. Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw-Hill Education

Experiments to be performed in the Second semester (At least 6 experiments has to be performed):

1. To study the characteristics of a series RC Circuit.

2. To determine an unknown low resistance using Potentiometer.

3. To determine an unknown low resistance using Carey Foster's Bridge.

4. To compare capacitances using De' Sauty's bridge.

5. To determine self inductance of a coil by Anderson's bridge.

6. Measurement of magnetic field strength B and its variation in a solenoid (determinination of dB/dx).

7. To verify the Thevenin and Norton theorems in a wheatstone bridge.

8. To verify the superposition, and maximum power transfer theorems in a wheatstone bridge.

9. To study response curve of a Series LCR circuit and determine its (a) Resonant

frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.

10. To study the response curve of a parallel LCR circuit and determine its (a) anti-resonant frequency and (b) Quality factor Q.

11. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer

12. Determine a high resistance by leakage method using Ballistic Galvanometer.

13. To determine self-inductance of a coil by Rayleigh's method.

14. To determine temperature co-efficient of resistance of a metal / semiconductor by a meter-bridge.

SEC Course

(Any one from the two listed below will be provided)

Electrical Circuits and Network Skill

Course Code: BSCPHYSE201

Course Type: SEC-2	Course Details: **Electrical Circuits and Network Skill**			L-T-P: 0-0-6	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		15		35	

Course Content

SEC-2: Electrical Circuits and Network Skill

1. Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations of resistances, capacitor and inductor. ACElectricity and DC Electricity. Response of resistor, inductors and capacitors in DC or AC circuits., Familiarization with voltmeter, ammeter and multimeter.

2. Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money.

3. Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop.

4. Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Basic operation of transformers.

5. Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor.

6. Solid-State Devices: Identification of resistors, inductors, capacitors, diode, transistor and ICs. Colour code reading and value determination of carbon resistances.

7. Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device).

8. Electrical Wiring: Different types of conductors and cables. Voltage drop and losses across cables and conductors. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Joining cables, Basics of House wiring, preparation of extension board.

Suggested Experiments (atleast five):

1. Determine the values of resistors from their colour code and their effect on series and parallel connection.
2. Designing equivalent star and delta network.
3. Preparation of extension board for use in house wiring (220 V AC).
4. Two-way Switch connections.
5. Drawing of lay out for a prototype connections in domestic purposes.
6. Pin identification of a 741 IC and design an inverting amplifier.
7. Using multimeter determine the values of resistance, capacitor, inductor and construct a series LCR circuit with a known frequency ac voltage source. Draw the phrasor diagram by determining the voltages across each components.
8. Using multimeter determine the values of resistance, capacitor, inductor and construct a parallel LCR circuit with a known frequency ac voltage source. Draw the phrasor diagram by determining the voltages across each components.
1. Fabrication of tank circuit and study of signal generation of particular frequency.
2.

References/ Suggested Readings:

1. A text book in Electrical Technology - B L Theraja - S Chand & Co.
2. A text book of Electrical Technology - A K Theraja
3. Performance and design of AC machines - M G Say ELBS Edn.

Basic Instrumentation Skills

Course Code: BSCPHYSE202

Course Type: SEC-2	Course Details: **Basic Instrumentation Skills**			L-T-P: 0-0-6	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		15		35	

Course Content

SEC-2: Basic Instrumentation Skills

1. Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.

2. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. specifications of a multimeter and their significance.

3. Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specification of an electronic Voltmeter/Multimeter and their significance.

4. AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifieramplifier. Block diagram ac millivoltmeter, specifications and their significance.

5. Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Frontpanel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.

6. Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator.Brief idea for testing, specifications. Distortion factor meter, wave analysis.

7. Impedance Bridges & Q-Meters: Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges.

8. Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. 9. Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time- base stability, accuracy and resolution.

Suggested Experiments (atleast five):

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q- meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/frequency counter.
6. Measurement of rise, fall and delay times using a CRO.
7. Measurement of distortion of a RF signal generator using distortion factor meter.
8. Measurement of R, L and C using a LCR bridge/ universal bridge.
9. Converting the range of a given measuring instrument (voltmeter, ammeter).

References/ Suggested Readings:

1. A text book in Electrical Technology - B L Theraja - S Chand and Co.
2. Performance and □ design of AC machines - M G Say ELBS Edn.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
4. Logic circuit design, Shimon P. Vingron, 2012, Springer.
5. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
6. Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3 rd Ed., 2012, Tata Mc-Graw Hill.
7. Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk, 2008, Springer.
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India.

Semester-III

MJC-3, Mathematical Methods of Physics

(BSCPHYMJ301, 60 Hrs)

Credit: 5 (4-1-0). F.M: 100 (30+70)

Course Type: **MJC-3**	Course Details: **Mathematical Methods of Physics**			L-T-P: 4**-1-0**	
Credit: **5**	Full Marks: 10**0**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		.....	**30**	.....	**70**

Course outcome: Students will have achieved the ability to:

1. Use concepts of calculus and concepts of random variables
2. Solve differential equations of various types.
3. Describe special functions and their recurrence relations
4. Do fourier expansion and use Fourier transforms and delta function
5. evaluate some special integrals

Course Content:

Theory

Module	Contents	Lec. (Hrs)
Calculus	Infinite sequences and series; Conditional and Absolute Convergence; Tests for Convergence (proofs not required), Functions of several real variables - partial differentiation, Constrained Maximization using Lagrange Multipliers.	8
Statistics	Random variables - joint and conditional probabilities,; Moments - mean, variance, skewness and curtosis, Examples of continuous probability distribution functions (Binomial, Gaussian, and Poisson). Citation of simple examples from Physics.	6

Determinant and Matrices	Basic idea of matrix algebra , Rank of a matrix; Solution of simultaneous equation of matrices by Cramer's rule; Solution of systems of linear homogenous and inhomogeneous equations by matrix method; Cayley-Hamilton theorem; Characteristics equation for a square matrix and diagonalization; Properties of Eigenvalues and eigenvectors of matrices; Symmetric, Skew- symmetric, Hermitian, Orthogonal and Unitary matrices and their properties.	12
Ordinary Differential Equations	Classifications of singularities for a Second Order Ordinary Differential Equation (ODE) - Fuchs' theorem; Series Solution of second order ODE with variable coefficients by Frobenius-Fuchs" method; Solutions of Legendre, Bessel and Hermite ODE. about x=0.	8
Partial Differential Equations	Partial Differential Equations in Physics; Types – elliptical, hyperbolic and parabolic (examples from Physics), Solutions by separation of variables method; Basic examples- Laplace's equation, Diffusion equation, Wave equation. Solution of Laplace's equation in Cartesian, spherical polar (spherically symmetric cases), and cylindrical polar (cylindrically symmetric problems) coordinate systems.	8
Special Functions	Properties of Legendre Polynomials: Rodrigues Formula, Generating Function. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions and Orthogonality.	8
Some Special Integrals	Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions.	3

Fourier Series and Transform	(a) Periodic functions in Physics, Dirichlet Conditions (Statement only). Wronskian of two functions - linear independence and completeness, orthogonality; Fourier series expansion of periodic functions in terms of sine and cosine as basis, Calculation of Fourier coefficients in some simple cases, Complex representation of Fourier series. Expansion of non-periodic functions, Even and odd functions as special cases. Applications in Physics – vibration of string. (b) Introduction of Fourier transform as Fourier series of infinite period, propeties of Fourier transform, Inverse Fourier transform, Parseval Identity. Dirac delta function and its important properties.	7

References/ Suggested Readings

1. Mathematical Methods in the Physical Sciences, Mary L. Boas
2. Essential Mathematical Methods for Physicists by Hans J. Weber and George B. Arfken
3. Introduction to Mathematical Physics - C. Harper (Prentice-Hall of India).
4. Mathematical Physics by Binoy Bhattacharya
5. Mathematical Physics by D. Biswas
6. Mathematical Physics by B S Grewal
7. Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (Tata McGraw-Hill).
8. Mathematical Physics – P.K. Chattopadhyay (Wiley Eastern)

References/ Suggested Readings

1. Vector Analysis - M. R. Spiegel, (Schaum's Outline Series) (Tata McGraw-Hill)

1. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
2. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
3. Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
4. Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
5. Partial Differential Equations for Scientists & Engineers, S.J. Farlow, 1993, Dover Pub.
6. Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books Mathematical Physics by Binoy Bhattacharya
7. Mathematical Physics by D. Biswas
8. Mathematical Physics by B S Grewal
9. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn. , 2012, PHI Learning Pvt. Ltd.
10. Schaum's Outline of Programming with C++. J. Hubbard, 2000, McGraw-Hill Pub.
11. Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal, 3rd Edn., 2007, Cambridge
University Press.

12. A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.
13. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006,Cambridge University Press.

Course type: **MAJOR- MJC-4**

Course code: **BSCPHYMJ302**

Course details: **OPTICS**

Course Type: **MJC-4**	Course Details: **OPTICS**			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 10**0**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Objective:-

This course reviews the concepts of waves and optics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with explaining ideas of lens and different types of optical devices. The course also provides an in depth understanding of wave phenomena of light, namely, interference, diffraction and polarization with emphasis on practical applications of the same.

Course Learning Outcomes:

On successfully completing the requirements of this course, the students will have the skill and knowledge to:

• Understand Interference as superposition of waves from coherent sources derived from same parent source.

• Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from aperture, understand Fraunhoffer and Fresnel Diffraction.

• In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc.

Course Content:

Theory

Module	Contents	Class Reqd. (Hrs)
Introduction to Geometrical Optics	Concept of ray, ray optics limit, geometrical and optical path, Fermat's Principle, Principle of least path and extremum paths-example of extremum path. Aplanatic surface, Application to laws of reflection and refraction for a) plane surface and b) spherical surface. Application to determine lens formula	**(4L)**
Matrix Method	Translation, refraction and reflection matrix. System matrix for thick and thin lenses. Cardinal points of optical system. Application to image formation by combination of two lenses. Concept of objective and eyepiece, Huygens Eyepiece and Ramsden Eyepiece as examples of lens combination, merits and demerits.	**(8L)**
Aberration	Seidal aberration and its different types. Its removal, Abbes Sine condition. Aplanatism and Aplanatic Surface. Its application to high power microscope objective. Chromatic aberration – longitudinal and transverse. Achromatism-achromatic doublet and separated doublet.	**(4L)**
Wave Motion	Plane Progressive elastic waves, Spherical and Cylindrical Waves; Longitudinal and Transverse Waves, Differential Equation for progressive wave (1d and 3d) and harmonic solutions, Relations among dilatation, condensation and excess pressure, Derivations of wave velocity of a longitudinal wave through an elastic medium and transverse wave through a string, Phase and Group velocity, Energy Transport associated with a Longitudinal Wave, Intensity of Wave. Definition and properties of wave front, Huygens Principle	**(8L)**
Interference of light waves	Definition and properties of wave front, Huygens Principle, Young's experiment; spatial and temporal coherence; intensity distribution; Fresnel's biprism, interference in thin film; fringes of equal inclination and equal thickness; Newton's ring. Michelson's interferometer, Multiple beam interference – reflected and transmitted pattern. Fabry-Perot interferometer	**(7L)**

Diffraction of light waves	Fresnel and Fraunhofer class, Fresnel's half period zones; explanation of rectilinear propagation of light; zone plate. Fraunhofer diffraction due to a single slit, double slit and circular aperture (qualitative). Plane diffraction grating (transmission). Rayleigh criterion of resolution; resolving power of prism, telescope, microscope and transmission grating.	**(7L)**
Polarisation	Different states of polarisation; double refraction, Malus law, Huygen's construction for uniaxial crystals; polaroids and their uses. Lissajous Figures: Production and analysis of plane, circularly and elliptically polarised light by retardation plates and Babinet compensator; Rotatory polarisation and optical activity; Fresnel's explanation of optical activity; Biquartz and half shade polarimeter	**(7L)**

***References/ Suggested Readings*:**

1. Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.

2. Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill

3. Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.

4. Optics, Ajoy Ghatak, 2008, Tata McGraw Hill

5. The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.
6. Fundamental of optics, F. A. Jenkins & H. E. White, 1981, Tata McGraw hill.

7. Introduction To Optics- A.K. Ghatak

8. Optics- Hetch And Zajack.

9. A Textbook On Optics- B. Ghosh And K.G. Mazumdar.

WEB REFERENCES:

1. MIT Open Learning - Massachusetts Institute of Technology,
https://openlearning.mit.edu/

2. National Programme on Technology Enhanced Learning (NPTEL),
https://www.youtube.com/user/nptelhrd

Optics Lab(FM-50) [At least five experiments to be done]

1. To verify the law of Malus for plane polarized light.

2. To determine the specific rotation of sugar solution using polarimeter.

3. To analyze elliptically polarized light by using a Babinet‟s compensator.

4. Determination of angle of prism and to determine refractive index of the material of a prism using sodium source.

5. To determine the dispersive power and Cauchy constants of the material of a prism using mercury/helium source.

6. To determine wavelength of sodium light using Fresnel biprism.

7. To determine wavelength of sodium light using Newton's rings.

8. To determine wavelength of (1) sodium source and (2) spectral lines of mercury/helium source using plane diffraction grating.

9. Determination of separation of D_1 and D_2 lines of sodium by using plane transmission grating.

10. Draw the calibration curve between μ and λ using mercury discharge tube and find out the unknown wavelength of a particular light.

11. Determination of grating element of a diffraction grating using a semiconductor laser.

12. Determination of wavelength of light using laser and single slit/wire.

SEMESTER: III

Course Name: Fundamentals of Optics

Course type: **MINOR**
Course code: **BSCPHYMN301**

Course details: **MNC-3**

Course Type: **MNC-3**	Course Details: **Fundamentals of Optics**			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 10**0**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Objective:-

This course reviews the concepts of waves and optics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with explaining ideas of lens and different types of optical devices. The course also provides an in depth understanding of wave phenomena of light, namely, interference, diffraction and polarization with emphasis on practical applications of the same.

Course Learning Outcomes:

On successfully completing the requirements of this course, the students will have the skill and knowledge to:

• Understand Interference as superposition of waves from coherent sources derived from same parent source.

• Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from aperture, understand Fraunhoffer and Fresnel Diffraction.

• In the laboratory course, student will gain hands-on experience of using various optical instruments.

Course Content:

Theory

Module	Contents	Class Reqd. (Hrs)

Introduction to Geometrical Optics	Concept of ray, ray optics limit, geometrical and optical path, Fermat's Principle, Principle of least path and extremum paths-example of extremum path. Aplanatic surface, Application to laws of reflection and refraction for a) plane surface and b) spherical surface. Application to determine lens formula	**(5L)**
Waves	Plane Progressive elastic waves, Longitudinal and Transverse Waves, Differential Equation for 1d progressive wave and its solutions, Relations among dilatation, condensation and excess pressure, Derivations of wave velocity of a longitudinal wave through an elastic medium and transverse wave through a string, Phase and Group velocity, Energy Transport associated with a Longitudinal Wave, Intensity of Wave.	**(8L)**
Interference	Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. Young's experiment; spatial and temporal coherence; intensity distribution; Fresnel's biprism, interference in thin film; fringes of equal inclination and equal thickness; Newton's ring.	**(10L)**
Diffraction	Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to a single slit, double slit. Plane diffraction grating (transmission). Rayleigh criterion of resolution; resolving power of prism.	**(8L)**
Polarisation	Transverse nature of light waves. Different states of polarization; double refraction, retardation plates, Malus law, polaroids and their uses. polarizer and analyzer, Production and analysis of plane, circularly and elliptically polarized light, Rotatory polarisation and optical activity; Fresnel's explanation of optical activity; Biquartz and half shade polarimeter	**(7L)**
Laser, LED , and Optical Fiber	Spontaneous and stimulated emissions, Population inversion, theory of lasing action (Laser). Basic principle of LED , Characteristics and applications . Basic principle of optical fiber, Characteristics and applications. Numerical aperture.	**(7L)**

References/ Suggested Readings:

1. *Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill •*
2. *Principles of Optics, B.K. Mathur, 1995, Gopal Printing 16 •*
3. *Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication*
4. *UniversityPhysics.FWSears,MWZemanskyandHDYoung13/e, 1986.AddisonWesley*

WEB REFERENCES:

1. MIT Open Learning - Massachusetts Institute of Technology,
https://openlearning.mit.edu/

2. National Programme on Technology Enhanced Learning (NPTEL), https://www.youtube.com/user/nptelhrd

Fundamentals of Optics Lab(FM-50) [At least five experiments to be done]

1. To determine the focal length of a concave lens by combination method.
2. To determine the focal length of a concave lens by auxiliary method.
3. Determination of the refractive index of a liquid by using a plane mirror and a convex lens.
4. Determination of the refractive index of a water by using traveling microscope.
5. Determination of angle of prism and to determine refractive index of the material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury/helium source.
7. To determine wavelength of sodium light using Newton's rings.
8. Draw the calibration curve between μ and λ using mercury discharge tube and find out the unknown wavelength of a particular light.
9. Determination of grating element of a diffraction grating using a semiconductor laser / sodium source.
10. Determination of wavelength of light using laser and single slit/wire.
11. To determine the specific rotation of sugar solution using polarimeter.

SEM 3: Course Name: Indian Astronomy

Course type: **MDC**

Course code: **MDC-303**

Course Type: **MD**	Course Details: MDC=303			L-T-P: 2-1-0=3	
Credit: 3	Full Marks: 50	CA Marks		ESE Marks	
			Theoretical		Theoretical
			15		**35**

Course Objective:-

Course Learning Outcomes:

On successfully completing the requirements of this course, the students will have the skill and knowledge to:

•***Course Content:***

Theory

Module	**Contents**	**Reqd. (Hrs)**

Introduction to Indian Astronomy	**Historical Background**: **Vedic Period** **Rigveda**: Reference to celestial bodies and their movements. **Yajurveda and Atharvaveda**: References to the Sun, Moon, and stars. **Vedanga Jyotisha**: Early systematic approach to astronomy, focusing on the calendar and timekeeping. **Classical Period** **Aryabhata**: His heliocentric model, calculation of the Earth's circumference, and the concept of the Earth's rotation. **Varahamihira**: Contributions to meteorology, astrology, and his encyclopedic work, Brihat Samhita. **Medieval Period**: **Bhaskara II**: His work on calculus, accurate prediction of eclipses, and the Siddhanta Shiromani.	**(7L)**
Basic Concepts and Terminology	**Astronomical Units**: **Yojana**: Detailed explanation of its use in ancient texts and its approximate modern equivalent. **Nakshatra**: The 27 lunar mansions, their names, and significance in astrology and astronomy. **Kala, Kashta, and Nimesha**: Definitions and their use in timekeeping.	**(3L)**
Indian Astronomical Texts	**Siddhāntas**: **Surya Siddhanta**: Detailed contents, including planetary motion, eclipses, and timekeeping methods. **Aryabhatiya**: Aryabhata's contributions to mathematics and astronomy, such as his calculation of the value of pi and the concept of the Earth's rotation. **Brahmasphuta siddhanta**: Brahmagupta's work on algebra, his methods for solving quadratic equations, and his contributions to astronomy.	**(6L)**
Calendars and Time keeping	**Lunisolar Calendar**: **Structure**: Detailed explanation of the combination of lunar months and solar years in the Indian calendar. **Significance**: Importance of the lunisolar calendar in religious and agricultural activities. **Time Measurement**: **Tithi**: Definition and use of a lunar day in the calendar. **Nakshatra**: Description of the lunar mansions and their role in timekeeping. **Yoga**: Explanation of the combination of the Sun and Moon's positions and its significance.	**(6L)**

Modern Indian Astronomy	**Institutions**: Contributions of institutions like the Indian Institute of Astrophysics and the Inter-University Centre for Astronomy and Astrophysics, NCRA, GMRT, Radio Astronomy Center ,TIFR, ISRO etc **Key Researchers**: Notable modern Indian astronomers and their work; Meghnad Saha, Subhrmanyam Chandrasekhar, Nikhil Ranjan Sen, A. K. Roychowdhury, J. V. Narlikar. **ISRO's Space Missions**: Overview of missions like Chandrayaan, Mangalyaan, and their impact on astronomy.	**(8L)**

***References/ Suggested Readings*:**

1. Indian Astronomy, S. Balachandra Rao, University Press
2. NCERT book on Knowledge Traditions and Practices of India, Chapter-5
3. Astronomy in India A perspective, R. Kochar & J. Narlikar, Indian National Science Academy, new Delhi
4. Astronomy in India: A historical perspective, Thanu Padmanabham(Ed), Springer
5. Indian Astronomy, A Source Book, Compiled by B. V. Subbarayappa, and K. V. Sarma, Nehru Centre, Bombay(now Mumbai).

Semester-IV:

MAJOR COURSE

Classical Mechanics and Special Theory of Relativity

Course Code: BSCPHYMJ401

Course Type: **MJC-4**	Course Details: **Classical Mechanics and Special Theory of Relativity**			L-T-P: 4-**1-0**	
Credit: **5**	Full Marks: 10**0**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**30**	……	**70**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Explain the classical mechanics of particle under central force.
2. Understand the Lagrangian and Hamiltonian formulations of classical mechanics.
3. Explain the necessity of replacing Newtonian relativity through Einstein's special relativity, concept of space-time and elaborate on the classical mechanics of fast particles under the special relativity.

Course Content:

Theory

Module	Contents	Class Reqd. (Hrs)
Central force Motion	Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram, Determination of orbits from central force and determination of central force from orbits.	**[8L]**

Constrained Motion	Constraints – Definition and classification with examples. Forces of constraint. Degrees of Freedom. Generalized coordinates. Virtual displacement and Principle of Virtual work. D'Alembert's principle and its applications in simple cases.	**[5L]**
Lagrangian Formulation	Lagrange's equation of motion from D'Alembert's principle and its application to simple cases. Comparison of Newtonian & Lagrangian formulations. Newton's equation of motion from Lagrange's equations. Generalized momenta and energy. Cyclic coordinates and its applications. Properties of kinetic energy function T, Ordinary potential energy function, Euler Lagrange equation of motion for conservative system.	**[10L]**
Hamiltonian Formulation	Hamilton's equations from Legendre's dual transformation to the Lagrangian of a system. Determination of Hamiltonian from Lagrangian for simple cases. Properties of the Hamiltonian and Hamilton's equations of motion. Application to simple systems. Configuration space, Phase space and State space. Homogeneity of time and conservation of energy; Homogeneity of space and conservation of linear momentum, Isotropy of space and conservation of angular momentum.	**[8L]**
Calculus of Variation.	Variational principle, Euler Lagrange equation of motion from variational principle, shortest distance between two points, Brachistochrone, Geodesic, Minimum surface of revolution. Hamilton's principle and its significance. Lagrange's equation and Hamilton's equations from Hamilton's principle.	**[6L]**
Canonical Transformations	Canonical transformations; Generating functions; examples of canonical transformations; Integral variants of Poincare; Lagrange and Poisson brackets; Infinitesimal canonical transformations; Conservation theorem in Poisson bracket formalism; Jacobi's identity; Angular momentum Poisson bracket relations.	**[8L]**
Small amplitude oscillations	Minima of potential energy and points of stable equilibrium, expansion of the potential energy around a minimum, small amplitude oscillations about the minimum, normal modes of oscillations example of *N*identical masses connected in a linear fashion to (*N* -1) - identical springs.	**[5L]**

Special Theory of Relativity	Galilean Transformation.Non-invariance of Maxwell's equations under Galilean transformation. Michelson Morley experiment and its outcome. Steller aberration and Fizeau's experiment. Postulates of Special Theory of Relativity. Lorentz transformation-length contraction and time dilation. Relativity of simultaneity. Proper frame. Velocity addition formula. Relativistic mass and energy. Mass-energy equivalence. Energy-momentum relationship. Force and acceleration in relativity. Spacelike and timelike intervals. Twin paradox. Doppler effect (non- relativistic and relativistic).	**[12L]**

References/ Suggested Readings

1. *Classical Mechanics- H. Goldstein, C.P. Poole, J.L. Safko (Pearson Education)*
2. *Mechanics- L. D. Landau and E. M. Lifshitz (Pergamon)*
3. *Classical Mechanics- N. C. Rana and P. S. Joag (Tata McGraw-Hill).*
4. *Classical Mechanics- Gupta, Kumar, Sharma (Pragati Prakashan, Meerat)*
5. *Classical Mechanics: A Course of Lectures- A.K. Raychaudhuri (Oxford University Press)*
6. *Theoretical Mechanics- M.R. Spiegel (Tata McGraw Hill)*
7. *Introduction to Special Relativity- R. Resnick (John Wiley and Sons)*
8. *The Special Theory of Relativity- S. Banerji and A. Banerjee (Prentice Hall of India)*

Semester-IV

Heat and Thermal Physics
BSCPHSMJ402

Course Credit: **5 [**L-T-P: **3-0-4]**

Course Type: **MJC-6**	Course Details: **Heat and Thermal Physics**			L-T-P: **3-0-4**	
Credit: **5**	Full Marks: 10**0**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Objective:-

Course Outcomes:

- Learn interrelation between pressure and molecular motion, and the concept of temperature as kinetic energy.
- Learn distribution of velocity, energy, their dependence on randomness of molecular motion, idea about dimension of molecules
- Learn about energy and momentum transport in gases
- Get the idea about the behaviours of real gases and intermolecular forces
- Can analyseone and three dimensional heat flow
- Learn about blackbody radiation and its applications.

Course Content:

Theory (45 Lectures)

Module	Contents	Class Reqd. (Hrs)
Kinetic Theory of Gases	**Growth of Kinetic Theory:** Basic assumptions of kinetic theory,Pressure exerted by ideal gas using concepts of spherical polar coordinates and solid angle, Deduction of perfect gas laws, concepts of temperature, rms speed, Avogardo's Hypothesis, Boltzman Constant. **Maxwell's velocity distribution law:** Maxwell's assumptions, derivation of the law, root mean square and most probable speeds. Experimental confirmation of the distribution law: Zartman and Ko method, Simpson and Ster's method, Richardson experiment. Reduced form of Maxwell's distribution, Energy distribution and momentum distribution, Dependence of the distribution on temperature and pressure of the gas. **Effect of finite size of molecules:** Collision probability, Mean free path, Distribution of free paths, derivation of mean free path using the concept of collision cross section, Clausius mean free path, correction by Maxwell(no derivation, only corrected expression). Experimental determination of mean free path by Born.	**(17 L)**
	Equipartition of energy: Degrees of freedom, mono, di and tri-atomic molecules, Equipartition of energy, Derivation using the concepts of Maxwell's energy distribution and taking energy as homogeneous function of position and momentum coordinates, applications of equipartition of energy to specific heat of gas and derivation of DoulongPetit's law. **Transport phenomena:** Viscosity, Conductivity and Diffusion, General method of viscosity and conductivity from kinetic theory, Diffusion, Discussion on Interrelation between these coefficients and mean free path. **Experimental evidence of molecular motion:** Brownian motion, Special features, Distribution of pressure in a vertical column of gas in equilibrium under gravity and derivation of particle distribution, modification due to modification of mass of Brownian particle due to Buoyancy, Concept of determination of Avogadro's number using Brownian motion.	

Equation of state for Real Gases	**Experimental Background:** Insufficiency of ideal gas equation, Amagat's experiment, Virial equation of state and Boyle temperature, Andrews' experiment and concept of critical temperature, state of matter near critical point, van der-Waals equation of state. **DIscussion on van der Wall's equation:** Roots of van der Wall's equations, isotherms from van der wall's equation, Critical Constants, Reduced equation of state and law of corresponding state, critical coefficient, critical coefficient of a gas, law of corresponding states; Virial Coefficients, Boyle temperature. **Other equations of state:** Defects of van der Wall's equation, Clausius equation, Dieterici's equation and Barthelot'sequation(no derivation of any of these equations is required).	**(8L)**
Conduction of Heat	Difference between conduction and other processes of heat transfer, dependence of rate of heat conduction on structure and property of the medium and idea of thermal conductivity. **1L** **One dimensional heat flow:**Mathematical theory of heat conduction and Fourier's equation for one dimensional heat flow, thermal and thermometric conductivity, solution for of Fourier's equation for rectilinear flow of heat, Ingen Hausz's experiment, freezing of pond and heat conduction through composite slab, Periodic flow of heat, conductivity of earth's crust. **Three dimensional heat flow:** spherical and cylindrical flow of heat, Wideman- Franz law(statement and discussion).	**(10L)**
Radiation	**Source of thermal radiation:** Material radiation and energy radiation examples, similarities of thermal radiation and light, Blackbody, Spectral emissive and absorptive powers, total emission from an elementary area, Kirchoff's law, Ritche's experiment, properties of blackbody radiation,Total energy of radiation, Stefan-Boltzmann law, Newton's law of cooling, Determination of Stephan's constant by hemispherical blackbody and thermocouple. **Energy distribution in the blackbody:** Wien's law, Rayleigh-Jeans formula, ultraviolet catastrophe, Planck's law, and deduction of Wien's law, Rayleigh Jeans law and Stephan's constant from Planck's law, Temperature of the Sun from Plank's law and Wien's law. **Radiation pyrometer:** Basic principle based on Stephan's law.	**(10L)**

***Books Recommended**:*

1. *P K Chakraborty, Thermal Physics, Sreedhar Publications*
2. *Roy and Gupta, Thermal Physics, Books and Allied.*
3. *Garg, Bansal, and Ghosh, Thermal Physics, 2nd Ed, Mac Graw Hill.*

***Reference Books**:*

1. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, McGraw-Hill.
2. A Treatise on Heat, MeghnadSaha, and B.N.Srivastava, Indian Press
3. Kinetic Theory & Statistical Thermodynamics, Sears & Salinger. Narosa.
4. Thermodynamics & Statistical Physics, Brij Lal and Subramaniam, S. Chand publications

Heat and Thermal Physics - Lab [Marks: 50]

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
3. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
4. To determine the Temperature Coefficient of Resistance of platinum by Platinum Resistance Thermometer
5. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
6. To determine temperature coefficient of resistance by meter-bridge.
7. Determination of coefficient of linear expansion by optical lever.
8. Determination of coefficient of linear expansion by Pullinger's apparatus
9. Determination of pressure coefficient of air by Jolly's apparatus.
10. To determine the Coefficient of Thermal Conductivity of Cu by Searle"s Apparatus.
11. To study the variation of Thermo-emf of a Thermocouple with Difference ofTemperature of its Two Junctions using a null method.

Draft Syllabus (Semester IV)

Course type: **MINOR**

Fundamentals of Thermal Physics

BSCPHSMN401

Course Type: **MNC-4**	Course Details: **Fundamentals of Thermal Physics**	L-T-P: **3-0-4**

Credit: **5**	Full Marks: 10**0**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	20	**35**

Course Objective:-

Course Outcomes:

- Learn interrelation between pressure and molecular motion, and the concept of temperature as kinetic energy.
- Learn distribution of velocity, energy, their dependence on randomness of molecular motion, idea about dimension of molecules .
- Learn about energy and momentum transport in gases Get the idea about the behaviors of real gases and intermolecular forces.
- Learn about blackbody radiation and its applications.

Course Content:

Theory

Module	**Contents**	**Class Reqd. (Hrs)**

Kinetic Theory of Gases	**Growth of Kinetic Theory:** Basic assumptions of kinetic theory,Pressure exerted by ideal gas using concepts of spherical polar coordinates and solid angle, Deduction of perfect gas laws, concepts of temperature, rms speed, Avogardo's Hypothesis, Boltzman Constant. **Maxwell's velocity distribution law:** Maxwell's assumptions, derivation of the law, root mean square and most probable speeds. Experimental confirmation of the distribution law: Zartman and Ko method, **Effect of finite size of molecules:** Collision probability, Mean free path, Distribution of free paths, derivation of mean free path using the concept of collision cross section, Clausius mean free path, correction by Maxwell (no derivation, only corrected expression). **Real gas :** Deviation from ideal behaviour. Vander Waal's equation of state, critical constant from P-V isotherms	**(8L)**
	Equipartition of energy: Degrees of freedom, mono, di and tri-atomic molecules, Equipartition of energy (no derivation), applications of equipartition of energy to specific heat of gas and derivation of DoulongPetit's law. **Transport phenomena:** Viscosity, Conductivity and Diffusion, General method of viscosity and conductivity from kinetic theory, Diffusion, Discussion on Interrelation between these coefficients and mean free path. **Experimental evidence of molecular motion:** Brownian motion, Special features, Distribution of pressure in a vertical column of gas in equilibrium under gravity and derivation of particle distribution, Concept of determination of Avogadro's number using Brownian motion.	**(6L)**
Conduction of Heat	**One dimensional heat flow:** Mathematical theory of heat conduction and Fourier's equation for one dimensional heat flow, thermal and thermometric conductivity, solution for of Fourier's equation for rectilinear flow of heat, Ingen Hausz's experiment, Periodic flow of heat, conductivity of earth's crust (no derivation) **Three dimensional heat flow:** spherical and cylindrical flow of heat, Wideman- Franz law (statement and discussion).	**(6L)**
Radiation	**Source of thermal radiation:** Material radiation and energy radiation examples, similarities of thermal radiation and light, Blackbody, Spectral emissive and absorptive powers, total emission from an elementary area, Kirchoff's law, properties of blackbody radiation, Total energy of radiation, Stefan-Boltzmann law, Newton's law of cooling. **Energy distribution in the blackbody:** Wien's law, Rayleigh-Jeans formula, ultraviolet catastrophe, Planck's law. **Radiation pyrometer:** Basic principle based on Stephan's law.	**(7L)**

Thermodynamics	Laws of Thermodynamics: Thermodynamic Description of system, Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Various Thermodynamical Processes, Applications of First Law: General Relation between C_P & C_V, Work Done during Isothermal and Adiabatic Processes, Compressibility &Expansion Coefficient, Reversible & irreversible processes, Second law & Entropy, Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics, Un attainability of absolute zero.	**10L**
Statistical Mechanics	Phase space, Macrostate and Microstate, Entropy and Thermodynamic probability, Boltman entropy relation, Maxwell-Boltzmann distribution from entropy maximization. Quantum statistics - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law - photon gas - comparison of three statistics (Derivation not required) Qualitative discussion on Fermi Level, B-E Condensation.	(**8L**)

***Books Recommended**:*

1. *P K Chakraborty, Thermal Physics, Sreedhar Prakashani*
2. *Roy and Gupta, Thermal Physics, Books Allied.*
3. *Garg, Bansal, and Ghosh, Thermal Physics, 2nd Ed, Mac Graw Hill.*
4. *Thermodynamics & Statistical Physics, Brij Lal and Subramaniam, 1st Edn., 2008, S. Chand.*

Heat and Thermal Physics - Lab [Marks: 50]

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
3. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method.
4. To determine the Temperature Coefficient of Resistance of platinum by Platinum Resistance Thermometer

5. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions.
6. To determine temperature coefficient of resistance by meter-bridge.
7. Determination of coefficient of linear expansion by optical lever.
8. Determination of coefficient of linear expansion by Pullinger's apparatus
9. Determination of pressure coefficient of air by Jolly's apparatus.
10. To determine the Coefficient of Thermal Conductivity of Cu by Searle"s Apparatus.
11. To study the variation of Thermo-emf of a Thermocouple with Difference ofTemperature of its Two Junctions using a null method.

SKILL ENHANCEMENT COURSE

(Evaluation is to be done internally)

Course Name: Computer Oriented Numerical Analysis

Course Code: BSCPHSSE401

Course Type: **SEC(Practical)**	Course Details: **SEC-IV**			L-T-P: **0-0-6**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	…….	20	……

Course Learning Outcomes:

After the completion of course, the students will have ability to:

-
-
-

1. Numerical Differentiation and Integration: Trapezoidal and Simpson's 1/3 rd rule and 3/5 th rule, Gauss method, Error propagation. Fourier Series and Fast Fourier Transform. Analysis of Noise from Physical and Physiological (cardiac signal) data.

2. Solution of Algebraic and Transcendental equations: methods of Bisection, Newton Raphson, Regula falsi, Matrix Inversion. Solution of linear and quadratic equation.

3. Solution of Linear system of equations: Gauss elimination method-Pivortal condensation, Gauss Seidal method. Electrical Circuit analysis using Kirchhoff's law

4. Solution of 1st order and 2nd order ODE: Euler, Heun's, Polygon, Runge-Kutta 4th order methods, Predictor Corrector, finite difference method. Applications to Physics Problems linear and nonlinear oscillators – free, damped, forced, bifurcation and chaos in atmospheric, epidemic and sociological models.

5. Curve fitting: Least square fit- linear and quadratic regression, exponential and logarithmic fit. Goodness of fit, standard deviation. Applications: Ohms law to calculate R, Hooke's law to calculate spring constant.

6. Diagonalization of matrices, Inverse of a matrix, Eigen vectors, eigen values problems : Solution ofmesh equations of electric circuits (3 meshes), Solution of coupled spring mass systems (3 masses).

7. Other applications in mathematical modelling in Physics using numerical analysis and associated techniques.

References/ Suggested Readings:

1. Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.

2. Schaum"s Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A

Poe, 1986Mc-Graw Hill Book Co.

3. Computational Physics: An Introduction, R. C. Verma, et al. New Age International

Publishers, New Delhi (1999)

4. Computer Oriented Numerical analysis by V. Rajaraman.

4. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning

5. Elementary Numerical Analysis, K.E. Atkinson, 3 rd Edn. , 2007, Wiley India.

6. Numerical Methods by S.A. Molla.

7. *Computation Physics: Problem Solving with Python, 3rd Edition by Rubin H. Landau, Manuel J Páez, Cristian C. Bordeianu.*

9. *Computational Physics by N.H.Giordano and H. Nakanishi, Person.*

SKILL ENHANCEMENT COURSE

(Evaluation is to be done internally)

Course Name: Scientific writing and Documentation

Course Code: BSCPHSSE402

Course Type: **SEC(Practical)**	Course Details: **SEC-IV**			L-T-P: **0-0-6**	
Credit: **3**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	…….	20	……

Course Learning Outcomes:

After the completion of course, the students will have ability to:

-
-
-

Course Content:

1. Scientific word processing: Introduction to LaTeX: TeX/LaTeX word processor, preparing a basic LaTeX file, Document classes, Preparing an input file for LaTeX, Compiling LaTeX File, LaTeX tags for creating different environments, Defining LaTeX commands and environments, Changing the type style, Symbols from other languages.

Equation representation: Formulae and equations, Figures and other floating bodies, Lining in

columns- Tabbing and tabular environment, Generating table of contents, bibliography and

citation, Making an index and glossary, List making environments, Fonts, Picture environment and colors, errors.

2. Handling with Excel: basic cell management, use of functions, control to different sheet.

3. Plotting with graphical software: Use of gnuplot / Origin for plotting functions and data for graphical visualization (2D and 3D). Curve fitting: Linear least square fitting of data. Plotting data from a data file, plotting functions (inbuilt), histograms, and graphs, overlapping plots, least square fit of data points, Generation of pseudo-random numbers using inbuilt functions and plot frequency distribution. Use Plotting functions (inbuilt) for MATLAB and matplotlib LIBRARY for PYTHON (if applicable).

References/ Suggested Readings:

1. LaTeX–A Document Preparation System", Leslie Lamport (Second Edition, Addison-Wesley,

1994).

2. Modelling with Microsoft Excel by B.V.Liengme.

3. LateX in 24 hours: A practical guide for scientific writing by Dilip Dutta, Springer

International Publishing.

4. Gnuplot 5.2 Manual : An Interactive Plotting Program by Thomas Williams and Colin Kelly,

(2017).

NEP SYLLABUS
STATISTICS

Structure and Detailed Syllabus

for

Undergraduate Course

in

Statistics

Under Curriculum and Credit Framework for Undergraduate Programmes
(CCFUP) - NEP 2020

With effect from Academic Session 2023-24

Kazi Nazrul University
Asansol 713 340
West Bengal
www.knu.ac.in

Scheme for the Curriculum under CCFUP (As per NEP 2020)

✧ Major Course (MJC)

BSCSTSMJ101 – **Descriptive Statistics and Probability - I**

BSCSTSMJ201 **– Bivariate Data Analysis and Probability - II**

BSCSTSMJ301 – **Sampling Distributions**

BSCSTSMJ302 – **Linear Algebra**

BSCSTSMJ401 – **Statistical Inference - I**

BSCSTSMJ402 – **Sampling Techniques and Indian Official Statistics** BSCSTSMJ501 – **Statistical Computing with R**

BSCSTSMJ502 – **Linear Model and Design of Experiments**

BSCSTSMJ503 – **Statistical Inference – II**

BSCSTSMJ601 – **Time Series Analysis**

BSCSTSMJ602 – **Non Parametric Inference**

BSCSTSMJ603 – **Predictive Analysis**

BSCSTSMJ604 – **SQC and Reliability Analysis**

BSCSTSMJ701 – **Distribution Theory**

BSCSTSMJ702 **- Econometrics**

BSCSTSMJ703 – **Applied Multivariate Analysis**

BSCSTSMJ704 – **Linear Programming and Game Theory**

BSCSTSMJ801 – **Stochastic Process and Queuing Theory**

BSCSTSMJ802 – **Bayesian Inference**

BSCSTSMJ803 – **Survival Analysis**

BSCSTSMJ804 – **Data Analysis Using Python**

✧ Minor Course (MNC)

BSCSTSMN101 – **Descriptive Statistics and Probability - I**

BSCSTSMN201 – **Bivariate Data Analysis and Probability - II**

BSCSTSMN301 – **Introduction to Statistical Inference**

BSCSTSMN401 – **Introduction to Applied Statistics**

BSCSTSMN501 – **Sampling Techniques and Design of Experiments**

BSCSTSMN701 – **Statistical Computing Using R**

BSCSTSMN801 – **Economic Statistics**

✧ Ability Enhancement Compulsory Elective/ Course (AECE/ AECC)

AEC-1 - **English/ MIL Communication**

AEC-2 - **English Communication**

✧ Skill Enhancement Course (SEC)

BSCSTSSE101 – **Index Number and Demography**

BSCSTSSE201 – **Numerical Analysis**

BSCGEOSE401 – **Real Analysis**

✧ Value Added Course (VAC)

VAC201 - **Environment Studies**

VAC401 - **Health and Wellness**

VAC402 - **Social Values and Ethics**

VAC403 - **Digital and Technological Solutions**

VAC404 - **Understanding India**

✧ Summer Internship/ Apprenticeship

BSCSTSSI601 - **Summer Internship**

✧ Research Project/ Dissertation

BSCSTSRP801 - **Research Project/ Dissertation**

✧ Credits and Marks Distribution Scheme for Course Structure under CCFUP: UG Statistics

Discipline Code: BSCSTS

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
I Marks: 350 Credits: 20	Major MJC-1	BSCSTSMJ101: Descriptive Statistics and Probability - I	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-1	Choose from the Pool of Minor Courses offered in 1st Semester by the other Disciplines	5	3 - 0 - 4	30	15	20	35	100
	MD Multidisciplinary Course-1	Choose from the Pool of Multidisciplinary Courses offered in 1st Semester	3	3 - 0 - 0	----	15	----	35	50
	AEC-1 Ability Enhancement Elective Course	AECE: English/ MIL Communication (See Pool)	4	4 - 0 - 0	----	15	----	35	50
	SEC Skill Enhancement Course-1	BSCSTSSE101: Index Number and Demography	3	2 - 1 - 0	----	15	---	35	50
II Marks: 350 Credits: 20	Major MJC-2	BSCSTSMJ201: Bivariate Data Analysis and Probability - II	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-2	Minor Course opted for in the 1st Semester should be continued in the 2nd Semester with the Syllabus Content of 2nd Semester	5	3 - 0 - 4	30	15	20	35	100
	MD Multidisciplinary Course-2	Choose from the Pool of Multidisciplinary Courses offered in 2nd Semester	3	3 - 0 - 0	----	15	----	35	50

	VAC **Value Added Course-1**	**VAC-201: Environment Studies**	**4**	**4 - 0 - 0**	**----**	**15**	**----**	**35**	**50**
	SEC **Skill** **Enhancement** **Course -2**	**BSCSTSSE201: Numerical Analysis**	**3**	**2 - 1 - 0**	**---**	**15**	**----**	**35**	**50**

Students exiting the programmes after securing **40 credits** will be awarded **UG Certificate** in the relevant Discipline/ Subject, provided they secure **4 credits** in work-based vocational courses offered during the **Summer Term** or **Internship/ Apprenticeship** in addition to **6 credits** from **skill-based courses** earned during the first and second semesters.

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
III **Marks: 400** **Credits: 22**	Major MJC-3	BSCSTSMJ301: Sampling Distributions	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-4	BSCSTSMJ302: Linear Algebra	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-3	Choose from the Pool of Minor Courses offered in 3rd Semester by the other Disciplines	5	3 - 0 – 4	30	15	20	35	100
	MD Multidisciplinary Course-3	Choose from the Pool of Multidisciplinary Courses offered in 3rd Semester	3	2 - 1 - 0	----	15	----	35	50
	AEC-2 Ability Enhancement Compulsory Course	AECC: English Communication	4	4 - 0 - 0	----	15	----	35	50
IV **Marks: 400**	Major MJC-5	BSCSTSMJ401: Statistical Inference - I	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-6	BSCSTSMJ402: Sampling Techniques and Indian Official Statistics	5	3 - 0 - 4	30	15	20	35	100

Credits: 22	**Minor** **MNC-4**	**Choose from the Pool of Minor Courses offered in 4th Semester by the other Disciplines**	**5**	**3 - 0 – 4**	**30**	**15**	**20**	**35**	**100**
	SEC **Skill Enhancement Course-3**	**BSCSTSSE401: Real Analysis**	**3**	**2 - 1 - 0**	**----**	**15**	**----**	**35**	**50**

	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
	VAC Value Added Course-2 (Any One)	VAC-401: Health and Wellness	4	4 - 0 - 0	----	15	----	35	50
		VAC-402: Social Values and Ethics		4 - 0 - 0	----	15	----	35	
		VAC-403: Digital and Technological Solutions		4 - 0 - 0	----	15	----	35	
		VAC-404: Understanding India		4 - 0 - 0	----	15	----	35	
Students exiting the programmes after securing **80 credits** will be awarded **UG Diploma** in the relevant Discipline/ Subject, provided they secure additional **4 credits** in **skill-based vocational courses** offered during first year or second year summer term.									
V Marks: 400 Credits: 22	Major MJC-7	BSCSTSMJ501: Statistical Computing with R	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-8	BSCSTSMJ502: Linear Model and Design of Experiments	5	3 - 0 – 4	30	15	20	35	100
	Major MJC-9	BSCSTSMJ503: Statistical Inference - II	5	3 - 0 – 4	30	15	20	35	100
	Minor MNC-5	Choose from the Pool of Minor Courses offered in 5th Semester by the other Disciplines	5	3 - 0 – 4	30	15	20	35	100
VI Marks: 450 Credits: 22	Major MJC-10	BSCSTSMJ601: Time Series Analysis	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-11	BSCSTSMJ601: Non Parametric Inference	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-	BSCSTSMJ603: Predictive Analysis	5	3 - 0 - 4	30	15	20	35	100

	12								
	Major **MJC-13**	**BSCSTSMJ604: SQC and Reliability Analysis**	**5**	**3 - 0 - 4**	**30**	**15**	**20**	**35**	**100**
	SI **Summer Internship-1**	**BSCSTSSI601: Summer Internship**	**2**	**0 - 0 - 4**	**30**	**----**	**20**	**----**	**50**

Total Credit and Marks	Total Credit	126		Total Marks	2350

Students who want to undertake **3-year** UG programme will be awarded **UG Degree** in the relevant Discipline / Subject upon securing **126 credits**.

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
VII Marks: 500 Credits: 25	Major MJC-14	BSCSTSMJ701: Distribution Theory	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-15	BSCSTSMJ702: Econometrics	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-16	BSCSTSMJ703: Applied Multivariate Analysis	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-17	BSCSTSMJ704: Linear Programming and Game Theory	5	3 - 0 – 4	30	15	20	35	100
	Minor MNC-6	Choose from the Pool of Minor Courses offered in 7th Semester by the other Disciplines	5	3 - 0 – 4	30	15	20	35	100
VIII Marks: 500 Credits: 22	Major MJC-18	BSCSTSMJ801: Stochastic Process and Queuing Theory	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-19	BSCSTSMJ802: Bayesian Inference	4	3 - 0 - 4	30	15	20	35	100
	Major MJC-20	BSCSTSMJ803: Survival Analysis	4	3 - 0 - 4	30	15	20	35	100
	Major MJC-21	BSCSTSMJ804: Data Analysis Using Python	4	3 - 0 - 4	30	15	20	35	100
	Minor MNC-7	Choose from the Pool of Minor Courses offered in 8th Semester by the other Disciplines	5	3 - 0 – 4	30	15	20	35	100

Total Credit and Marks	**Total Credit**	**173**		**Total Marks**	**3350**
Students will be awarded **UG Degree** (**Honours**) in the relevant Discipline / Subject provided they secure **173 credits**.					

4-year UG Degree (Honours with Research)									
Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
VII Marks: 500 Credits: 25	Major MJC-14	BSCSTSMJ701: Distribution Theory	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-15	BSCSTSMJ702: Econometrics	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-16	BSCSTSMJ703: Applied Multivariate Analysis	5	3 - 0 - 4	30	15	20	35	100
	Major MJC-17	BSCSTSMJ704: Linear Programming and Game Theory	5	3 - 0 - 4	30	15	20	35	100
	Minor MNC-6	Choose from the Pool of Minor Courses offered in 7th Semester by the other Disciplines	5	3 - 0 – 4	30	15	20	35	100
VIII Marks: 500 Credits: 22	Major MJC-18	BSCSTSMJ801: Data Classification Techniques	5	3 - 0 - 4	30	15	20	35	100
	RP Research Project-1	BSCSTSRP801: Research Project/ Dissertation	12	0 - 0 - 24	180	----	120	----	300
	Minor MNC-7	Choose from the Pool of Minor Courses offered in 8th Semester by the other Disciplines	5	3 - 0 – 4	30	15	20	35	100
Total Credit and Marks		Total Credit	173		Total Marks				3350
Students will be awarded **UG Degree** (**Honours**) in the relevant Discipline / Subject provided they secure **173 credits**.									

Semester wise Pool of **Multidisciplinary Courses** offered for **Major** Disciplines									
Semester	**Course Type and Details**	**Course Code and Name**	**Credits**	**Credit Pattern (L-T-P)**	**Marks Distribution**				
					Continuous Assessment Marks		**End Semester Marks**		**Total Marks**
					Practical Exam	**Theoretical Exam**	**Practical Exam**	**Theoretical Exam**	
I **Marks: 50** **Credits: 3**	**MD** **Multidisciplinary Course -1**	**Physical Science** (Department of Physics/ Chemistry)	3	3 - 0 - 0	----	15	----	35	50
		E-Commerce (Department of Commerce/ BBA)	3	3 - 0 - 0	----	15	----	35	50
		Human Rights (Department of Political Science)	3	3 - 0 - 0	----	15	----	35	50
		Disaster Management (Department of Geography/ Geology)	3	3 - 0 - 0	----	15	----	35	50
		Film Appreciation (Department of English)	3	3 - 0 - 0	----	15	----	35	50
II **Marks: 50** **Credits: 3**	**MD** **Multidisciplinary Course -2**	**Business Environment** (Department of Commerce)	3	3 - 0 - 0	----	15	----	35	50
		Adhunik Bangla Sahitya (Department of Bengali)	3	3 - 0 - 0	----	15	----	35	50
		Adhunik Hindi Sahitya (Department of Hindi)	3	3 - 0 - 0	----	15	----	35	50
		Application of Bio-Science (Department of Zoology/ Botany/ Microbiology)	3	3 - 0 - 0	----	15	----	35	50
		Educational Philosophy (Department of Education)	3	3 - 0 - 0	----	15	----	35	50
		Sports and Fitness (Department of Physical Education)	3	3 - 0 - 0	----	15	----	35	50
III **Marks: 50** **Credits: 3**	**MD** **Multidisciplinary Course -3**	**Mathematical Science** (Department of Mathematics)	3	3 - 0 - 0	----	15	----	35	50
		Cultural History of Bengal (Department of History)	3	3 - 0 - 0	----	15	----	35	50
		Business Management (Department of BBA)	3	3 - 0 - 0	----	15	----	35	50

Semester	Course Type and Details	Course Code and Name	Credits	Credit Pattern (L-T-P)	Marks Distribution				
					Continuous Assessment Marks		End Semester Marks		Total Marks
					Practical Exam	Theoretical Exam	Practical Exam	Theoretical Exam	
	MD Multidisciplinary Course -3	Nutrition and Public Health (Department of Nutrition)	3	3 - 0 - 0	----	15	----	35	50
		Stress Management (Department of Psychology/ Philosophy/ Sociology)	3	3 - 0 - 0	----	15	----	35	50
Pool of **Communication Courses** offered as **Ability Enhancement Compulsory Courses**									
I Marks: 50 Credits: 4	AEC-1 Ability Enhancement Elective Course	AECEE101: English Communication	4	4 - 0 - 0	----	15	----	35	50
		AECEB101: Bengali Communication	4	4 - 0 - 0	----	15	----	35	50
		AECEH101: Hindi Communication	4	4 - 0 - 0	----	15	----	35	50
		AECEU101: Urdu Communication	4	4 - 0 - 0	----	15	----	35	50
Semester wise Pool of **Minor Courses** offered by this Discipline for other Disciplines									
I	Minor MNC-1	BSCSTSMN101: Descriptive Statistics and Probability – II	5	3- 0- 4	30	15	20	35	100
II	Minor MNC-2	BSCSTSMN201: Bivariate Data Analysis and Probability – II	5	3- 0- 4	30	15	20	35	100
III	Minor MNC-3	BSCSTSMN301: Introduction to Statistical Inference	5	3- 0- 4	30	15	20	35	100
IV	Minor MNC-4	BSCSTSMN401: Introduction to Applied Statistics	5	3- 0- 4	30	15	20	35	100
V	Minor MNC-5	BSCSTSMN501: Sampling Techniques and Design of Experiments	5	3- 0- 4	30	15	20	35	100
VII	Minor MNC-6	BSCSTSMN701: Statistical computing Using R	5	3- 0- 4	30	15	20	35	100

VIII	**Minor** **MNC-7**	**BSCSTSMN801: Economic Statistics**	**5**	**3- 0- 4**	**30**	**15**	**20**	**35**	**100**

Semester–I (Major)

Course Name: Descriptive Statistics and Probability- ICourse

Code: BSCSTSMJ101

Course Type: MAJOR **Course Details: MJC- 1**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

- **Descriptive Statistics:**

Introduction: Nature of Statistics, Uses of Statistics, Statistics in relation to other disciplines, Abuses of Statistics, Statistics in India, and A historical note.

Types of Data: Concepts of population and sample, quantitative and qualitative data, cross- sectional and time- series data, discrete and continuous data, different types of scales. Primary data, Secondary data.

Collection of data: Concepts of population and sample, complete enumeration and sample surveys, different methods of collection of data including the questionnaire and interviewer methods.

Presentation of data: Scrutiny of data, frequency and non-frequency data, Textual and tabular presentation of data with one or more factors of classification, diagrammatic representation frequency distributions and cumulative frequency distributions and their graphical presentations, histograms, frequency polygons, frequency curves and ogives, Stem and Leaf.

Univariate data: different measures of location, mean- AM, GM and HM, median, mode, different measures of dispersion, range, MD, SD, QD, relative dispersion, moments, factorial moments, skewness and kurtosis. Sheppard's correction and Charliers' check, outlier Detection. Box-plot.

- **Probability -I:**

Random Experiment: Trials, events, outcomes, mutually exclusive events, equally likely and exhaustive, Sample point, Sample space, Different types of events.

Definition of probability: Classical and relative-frequency approach to probability, limitations of Classical definition, Geometric definition of Probability, Kolmogorov's Axiomatic definition. Examples based on classical approach, repeated trials and geometric definition of probability.

Some theorems on Probability: Probability of union and intersection of events, Poincare's theorem, Boole's Inequality, Theorem of total probability.

Conditional probability and Independence of events, theorem of compound probability, Bayes' Theorem and its applications.

Random Variables : Definition of discrete and continuous random variables, cumulative distribution function (c.d.f.) and its properties, probability mass function (p.m.f.) and probability density function (p.d.f), Expectation and Moments, Dispersion, Skewness, Kurtosis, Quartiles.

Probability Inequalities: Markov's and Chebyshev's inequalities, Uniqueness and Inversion Theorems (without proof), Weak Law of Large numbers (without proof).

List of Practical:

1. Data visualization using the statistical software R. Bar diagram, histogram, ogive, pie chart etc.
2. Computation of measures of central tendency and dispersion using the statistical software R. Use of an appropriatemeasure and interpretation of results.
3. Computation of the measures of skewness and kurtosis using the statistical software R.
4. Outlier detection using Box plot in R.
5. Q-Q plot, stem and leaf plot using the statistical software R.
6. Graphical interpretation of WLLN using R.

Suggested Readings:

1. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I , World Press, Kolkata.
2. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
3. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
4. Mood, A.M. Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edn., Tata McGraw-Hill Pub. Co. Ltd.
5. Chung, K. L.(1974) A Course in Probability Theory .Second Edition. Cambridge University Press.
6. Feller, William. An Introduction to Probability Theory and its Applications .Vol-I. Wiley.
7. Hoel P.G., Port S.C., Stone C.J. Introduction to Probability Theory

Suggested OnlineLinks/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Semester–I (Minor)

Course Name: Descriptive Statistics and Probability- ICourse

Code: BSCSTSMN101

Course Type: MINOR **Course Details: MNC- 1**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

- **Descriptive Statistics:**

Introduction: Nature of Statistics, Uses of Statistics, Statistics in relation to other disciplines, Abuses of Statistics, Statistics in India, and A historical note.

Types of Data: Concepts of population and sample, quantitative and qualitative data, cross- sectional and time- series data, discrete and continuous data, different types of scales. Primary data, Secondary data.

Collection of data: Concepts of population and sample, complete enumeration and sample surveys, different methods of collection of data including the questionnaire and interviewer methods.

Presentation of data: Scrutiny of data, frequency and non-frequency data, Textual and tabular presentation of data with one or more factors of classification, diagrammatic representation frequency distributions and cumulative frequency distributions and their graphical presentations, histograms, frequency polygons, frequency curves and ogives, Stem and Leaf.

Univariate data: different measures of location, mean- AM, GM and HM, median, mode, different measures of dispersion, range, MD, SD, QD, relative dispersion, moments, factorial moments, skewness and kurtosis. Sheppard's correction and Charliers' check, outlier Detection. Box- plot

- **Probability -I:**

Random Experiment: Trials, events, outcomes, mutually exclusive events, equally likely and exhaustive, Sample point, Sample space, Different types of events.

Definition of probability: Classical and relative-frequency approach to probability, limitations of Classical definition, Geometric definition of Probability, Kolmogorov's Axiomatic definition. Examples based on classical approach, repeated trials and geometric definition of probability.

Some theorems on Probability: Probability of union and intersection of events, Poincare's theorem, Boole's Inequality, Theorem of total probability.

Conditional probability and Independence of events, theorem of compound probability, Bayes' Theorem and its applications.

Random Variables : Definition of discrete and continuous random variables, cumulative distribution

function (c.d.f.) and its properties, probability mass function (p.m.f.) and probability density function (p.d.f), Expectation and Moments, Dispersion, Skewness, Kurtosis, Quartiles.

Probability Inequalities: Markov's and Chebyshev's inequalities, Uniqueness and Inversion Theorems (without proof), Weak Law of Large numbers, (without proof) .

List of Practical:

1. Data visualization using the statistical software R. Bar diagram, histogram, ogive, pie chart etc.
2. Computation of measures of central tendency and dispersion using the statistical software R. Use of an appropriatemeasure and interpretation of results.
3. Computation of the measures of skewness and kurtosis using the statistical software R.
4. Outlier detection using Box plot in R.
5. Stem and leaf plot using the statistical software R.
6. Graphical interpretation of WLLN using R.

Suggested Readings:

1. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I , World Press, Kolkata.
2. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
3. Miller, I. and Miller, M. (2006). John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
4. Mood, A.M. Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory ofStatistics, 3rd Edn., Tata McGraw-Hill Pub. Co. Ltd.
5. Chung, K. L.(1974) A Course in Probability Theory .Second Edition. Cambridge University Press.
6. Feller, William. An Introduction to Probability Theory and its Applications.Vol-I. Wiley.
7. Hoel P.G., Port S.C., Stone C.J. Introduction to Probability Theory.

Suggested Online links/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Semester – I (SEC)

Course Name: Index Number and Demography

Course Code: BSCSTSSE101

Course Type: SEC **Course Details: SEC- 1**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 2-1-0	
Credit: 3	Full Marks:50	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		-	15	-	35

Index numbers: Definition of index numbers, price and quantity index numbers; criteria of good index number, their construction, Laspeyres', Paasche's and Fisher's index numbers. Value index. Tests of index numbers.

Fixed-base and chain-base index numbers.

Consumer price index number, Wholesale price index number and index of industrial production. Uses of price index numbers and its limitations.

Demography: Sources of demographic data, census, registration, ad hoc surveys, hospital records, demographic profiles of the Indian census.

Measurement of Mortality and Life Table: Crude death rate, Standardized death rates, Age-specific death rates, Infant Mortality rate, Death rate by cause, Complete life table and its main features, Uses of life table.

Measurement of Fertility: Crude birth rate, general fertility rate, age specific birth rate, total fertility rate, gross reproduction rate, and net reproduction rate. Rates and ratios.

Suggested Readings:

1. Allen, R.G.D. Allen (1975).Index Numbers in Theory and Practice. Macmillan.
2. Benjamin, B. (1959). Health and Vital Statistics. Allen and Unwin.
3. Mudgett, B.D.(1951). Index Numbers. John Wiley.
4. Mukhopadhyay, P. (1994). Applied Statistics. New Central Book Agency Pvt. Ltd. Calcutta.
5. Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications.
6. Srivastava O.S. (1983). A TextBook of Demography. Vikas Publishing House.

Semester – II (Major)

Course Name: Bivariate Data Analysis and Probability- II.

Course Code: BSCSTSMJ201

Course Type: MAJOR **Course Details: MJC- 2**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

- **Bivariate Data Analysis:**

Correlation and Regression: Meaning of correlation, scatter diagram, Karl Pearson's correlation coefficient and its properties, probable error of Correlation Coefficient. Correlation Ratio, Intra–class Correlation, Multiple and Partial Correlation– Yule's

Rank correlation – Spearman's and Kendall's measures (tied and untied case).

Regression: Concept of Linear regression and properties of regression coefficient, plane of regression, standard error of Estimate and residual variance, R^2, Principles of least squares, Fitting of polynomial and exponential curves.

Association between two attributes: Contingency table, Marginal and Conditional independence. Odds ratio, Properties of odds ratio, Relative Risk, Relationship between odds ratio and relative risk.

- **Probability II:**

Probability distributions of a few standard discrete random variables: Uniform, Binomial, Poisson, Geometric, Hyper-geometric and Negative Binomial distribution.

Probability distributions of a few standard continuous random variables: Rectangular, Normal, Exponential, Gamma, Beta-I, Beta-II, Cauchy and log-Normal distribution.

Fitting of univariate standard probability distributions with the data.

Central Limit Theorem (iid case only).

Bivariate probability distributions: Properties of pmf, pdf and cdf of bivariate random variables. Marginal and conditional distributions, Sum and Product rules of expectations, Conditional expectation.

Bivariate Normal (BVN) distribution and its properties. Marginal and conditional pdf

List of practical:

1. Analysis of bivariate data with the application of correlation and linear regression in R.
2. Computation of rank correlation (both ties and non ties) in R.
3. Fitting of polynomial and exponential curves by least square method using the statistical software R.
4. Computing odd ratio and relative risk using R.
5. Fitting of univariate (binomial, poisson, geometric, hypergeometric, negative binomial, normal) distributions and computation of expected frequencies, mean variance, m.g.f. by using R programming.
6. Problems based on area property of normal distribution using normal table.
7. Q-Q plot to check the normality of the data using R.
8. Theory of Attributes: Making contingency table and computation of measure of association using the statistical software R. Calculation of odds ratio and relative risk.

Suggested Readings:

1. S. C. Gupta and V. K.Kapoor. Fundamentals of Mathematical Statistics.
2. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
3. B. L.Aggarwal. Basic Statistics.
4. Ross, S, Prentice Hall. A First Course in Probability.
5. Feller, W, John Wiley. An Introduction to Probability Theory and its Applications.

Suggested OnlineLinks/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Semester – II (Minor)

Course Name: Bivariate Data Analysis and Probability- II.

Course Code: BSCSTSMN201

Course Type: MINOR **Course Details: MNC- 2**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

- **Bivariate Data Analysis:**

Correlation and Regression: Meaning of correlation, scatter diagram, Karl Pearson's correlation coefficient and its properties, probable error of Correlation Coefficient.Correlation Ratio, Intra–class Correlation, Multiple and Partial Correlation– Yule's

Notation, Coefficient of Multiple Correlation- Properties of Multiple Correlation Coefficient, Coefficient of Partial Correlation.

Rank correlation – Spearman's and Kendall's measures (tied and untied case).

Regression: Concept of Linear regression and properties of regression coefficient, plane of regression, standard error of Estimate and residual variance, R^2, Principles of least squares, Fitting of polynomial and exponential curves.

Association between two attributes: Contingency table, Marginal and Conditional independence. Odds ratio, Properties of odds ratio, Relative Risk, Relationship between odds ratio and relative risk.

- **Probability II:**

Probability distributions of a few standard discrete random variables: Uniform, Binomial, Poisson, Geometric, Hyper-geometric and Negative Binomial distribution.

Probability distributions of a few standard continuous random variables: Rectangular, Normal, Exponential, Gamma, Beta-I, Beta-II, Cauchy and log-Normal distribution.

Fitting of univariate standard probability distributions with the data.

Bivariate probability distributions: Properties of pmf, pdf and cdf of bivariate random variables. Marginal and conditional distributions, Sum and Product rules of expectations, Conditional expectation.

Bivariate Normal (BVN) distribution and its properties. Marginal and conditional pdf

List of practical:

1. Analysis of bivariate data with the application of correlation and linear regression in R.
2. Computation of rank correlation (both ties and non ties) in R.
3. Fitting of polynomial and exponential curves by least square method using the statistical software R.
4. Computing odd ratio and relative risk using R.
5. Fitting of univariate (binomial, poisson, geometric, hypergeometric, negative binomial, normal) distributions and computation of expected frequencies, mean variance, m.g.f. by using R programming.
6. Problems based on area property of normal distribution using normal table.
7. Theory of Attributes: Making contingency table and computation of measure of association using the statistical software R. Calculation of odds ratio and relative risk.

Suggested Readings:

1. S. C. Gupta and V. K.Kapoor. Fundamentals of Mathematical Statistics.
2. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
3. B. L.Aggarwal. Basic Statistics.
4. Ross, S, Prentice Hall. A First Course in Probability.
5. Feller, W, John Wiley. An Introduction to Probability Theory and itsApplications.

Suggested OnlineLinks/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics

Semester – II (SEC)

Course Name: Numerical Analysis

Course Code: BSCSTSSE201

Course Type: SEC **Course Details: SEC- 2**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 2-1-0	
Credit: 3	Full Marks:50	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		-	15	-	35

Numerical Analysis: Factorial with positive and negative index. Operators: Shift operator, forward difference, backward difference, central difference, average, differential and interrelations between them. Finite differences of order n, divided differences of order n and interpolation.

Interpolation: Newton's forward, backward and divided difference interpolation formulae with error term. Lagrange's interpolation formula. Central difference formulae: Gauss and Stirling's formulae.
Inverse interpolation: Lagrange's inverse interpolation formula, Method of successive approximation and method of reversion of series. Summation of finite series.

Finding Root of an Equation: Bisection, Regula Falsi and Newton Raphson Methods. Numerical differentiation.

Numerical integration: Newton-Cote's integration formula, Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule and Weddle's rule with error term. Euler-Maclaurin's summation formula. Stirling's approximation to factorial n. Solution of difference equations of first order with variable coefficients and linear difference equations with constant coefficients.

Suggested Readings:

1. S. C. Gupta and V. K.Kapoor. Fundamentals of Mathematical Statistics.
2. Gun, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World
3. Bradie, B. (2006). A friendly introduction to Numerical Analysis, Pearson Education, India.
4. Gerald, C. F. and Wheatly, P. O. (2005). Applied Numerical Analysis, Pearson Education, India.
5. Hilderbrand, F.B. (1987). Introduction to Numerical Analysis, Second Edition, Dover

Publications.

6. Jain, M.K., Iyengar, S.R. K. and Jain, R.K. (2007). Numerical Methods for Scientific and Engineering Computation, Second Edition, Wiley Eastern Ltd.
7. Saxena, H.C. (2005). Finite Differences and Numerical Analysis, 15th Revised Edn. (Reprint). S. Chand & Co.

Semester- II

Course Name: Basic Statistics

Course Code: MDC203

Course Type: Multidisciplinary Course Details: MD- 2

<table>
<tr><td>Course Type:
Multidisciplinary (Theoretical)</td><td colspan="3"></td><td colspan="2">L-T-P:3-0-0</td></tr>
<tr><td rowspan="3">Credit:3</td><td rowspan="3">Full Marks:50</td><td colspan="2">CA</td><td colspan="2">ESE</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td></td><td>15</td><td></td><td>35</td></tr>
</table>

Introduction- Origin and development of Statistics, Definition and Scope of Statistics.

Statistical data: Qualitative & Quantitative. Collection of data- primary and secondary data.

Scales of measurement: Nominal, Ordinal, Interval and Ratio. Attribute and Variable (Discrete and continuous).

Frequency distribution of the data. Diagrammatic and Graphical representation of Data: Pie chart, Bar diagram, Histogram, Ogive.

Measures of Central tendency and Dispersion- Measure of central tendency- Mean (AM, GM, HM), Median and Mode. Measures of dispersion- Range, Quartile Deviation, Mean Deviation, Variance, Standard Deviation, Root Mean Square Deviation, Coefficient of Variation.

Correlation and Regression- Scatter diagram, Correlation and its properties, Regression equation using Method of least square (linear, bi-variate case only).

Spearman rank correlation (non-tie case only).

Probability and Random variable- Classical definition of Probability and its limitations. Geometric and frequency definition of probability. Use of Venn diagram in calculation of probability. Conditional probability and Bayes' Theorem.

Definition of random variable. Probability distribution (pmf, pdf, cdf) of discrete and continuous random variable. Expectation of random variable.

Index number- Definition of index number, purpose of index number, Paasche's index number,

Laspeyres' index number, Fisher's index number. Time reversal test and factor reversal test, cost of living index number, wholesale price index number.

Time series Data analysis- What is time series data? Different components of time series data and their significance. Finding trend using moving average method, fitting of linear trend equation,

List of references:

1) A.M. Goon, M.K. Gupta, B. Dasgupta: *Fundamentals of Statistics* (Vol. I)
2) A.M. Goon, M.K. Gupta, B. Dasgupta: *Fundamentals of Statistics* (Vol. II)
3) N.G. Das : Statistical Methods (Vol I and II)
4) S. Ross : A First Course in Probability.

****

Semester–III (Major)

Course Name: Sampling Distributions

Course Code: BSCSTSMJ301

Course Type: MAJOR **Course Details: MJC- 3**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

Unit I

Definitions of random sample, parameter and statistic, sampling distribution of a statistic, sampling distribution of sample mean, standard error of sample mean, sample variance and sample proportion. Order Statistics: Introduction, distribution of the r^{th} order statistic, smallest and largest order statistics. Joint distribution of r^{th} and s^{th} order statistics, distribution of sample median and sample range.

Unit II

Concept of degrees of freedom, Exact sampling distribution: Definition and derivation of pdf of χ^2 with n degrees of freedom (d.f.) using mgf, nature of pdf curve for different degrees of freedom, mean, variance, mgf, mode, additive property and limiting form of χ^2 distribution.

Unit III

Exact sampling distributions: Student's and Fishers t-distribution, Derivation of its pdf, nature of probability curve with different degrees of freedom, mean, variance, moments and limiting form of t distribution.

Unit IV

Snedecor's F Distribution: Derivation of pdf, nature of pdf nature of pdf curve with different degrees of freedom, mean, variance and mode. Distribution of $1/F(n_1,n_2)$ and various other properties. Relationship between t, F and χ^2 distributions.

List of Practical:

Problems on

1. sampling distributions of sample mean and sample variance of normal population.
2. generating random samples from a chi square ($\chi 2$) distribution using other standard distributions (like binomial, normal etc.)
3. generating random samples from t and F distributions using other standard distributions (like binomial, normal etc.)

References:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2003). An Outline of Statistical Theory,Vol. I, 4th Ed., World Press, Kolkata.
2. Hogg, R.V. and Tanis, E.A. (2009). A Brief Course in Mathematical Statistics. Pearson Education.
3. Johnson, R.A. and Bhattacharya, G.K. (2001). Statistics-Principles and Methods, 4th Ed., John Wiley and Sons.
4. Mood, M.A., Graybill, F.A. and Boes, C.D. (2007). Introduction to the Theory of Statistics, 3rd Ed., (Reprint). Tata McGraw-Hill Pub. Co. Ltd.
5. Rohatgi, V. K. and Saleh, A.K. Md. E. (2009). An Introduction to Probability and Statistics, 2nd Ed., (Reprint) John Wiley and Sons.
6. Chougule, S, P.(2022) .Statistical Inference: Testing of Hypothesis. Bluerose Publishers Pvt. Ltd.; First edition

Online links/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Semester – III (Major)

Course Name: Linear Algebra

Course Code: BSCSTSMJ302

Course Type: MAJOR **Course Details: MJC- 4**

<table>
<tr><td colspan="2">Course Type: Discipline Specific Core (Theoretical+Practical)</td><td colspan="3"></td><td colspan="2">L-T-P: 3-0-4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks:50</td><td colspan="2">CA</td><td colspan="2">ESE</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Unit 1

Definition of vectors, operation of vectors (angle, distance etc.). Vector Spaces over the field of real numbers, subspaces, linear span, linear dependence and independence, dimension and basis and related theorems. Orthogonal vectors, Gram-Schmidt Orthogonalization. Algebra of matrices. Linear transformation. Matrices with special structures: symmetric and skew symmetric, diagonal, scalar, identity, triangular and related theorems. Idempotent and orthogonal matrices. Trace of a matrix. Elementary operations on matrices. Partitioned matrices.

Unit 2

Rank and inverse of a matrix and their properties. Null space of a matrix. Theorems on rank of sum and product of two matrices. Singular and non-singular matrices. Inverse of a partitioned matrix. Reduction of matrices to echelon form and Hermite canonical form.

Unit 3

System of linear equations Ax= b conditions for consistency, uniqueness of solution, infinite solutions. Solution of the system Ax= b. Applications. Determinants of matrices- Definition, Properties and evaluation of determinants of order 3 or above. Cramer's rule for solution of the system Ax= b. Adjoint and inverse of a square matrix.

Unit 4

Properties of Characteristic polynomial of a matrix, characteristic roots and characteristic vectors. Quadratic forms, their classification and canonical reduction.

List of Practical:

Problems on

1. operations on vectors, subspaces, linear independence of vectors, basis and Gram-Schmidt orthogonalization process.
2. finding the rank and inverse of a matrix by elementary row operations, transformation of matrices, transforming matrix.
3. evaluation of determinants of matrices.
4. solution of linear system of equations Ax=b by sweep-out method and method of pivotal condensation.
5. finding characteristic roots and vectors of matrices, quadratic forms.

References:

1. Artin, M. (1994): Algebra. Prentice Hall of India.
2. Biswas, S. (1997): A Textbook of Matrix Algebra, New Age International
3. Chakraborty, Arnab (2014): Linear Algebra, first edition. Sarat Book House.
4. Datta, K.B (2002): Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd.
5. Gun, A.M. (1988): Vectors and Matrices, World Press
6. Gupta, S.C. (2008).: An Introduction to Matrices (Reprint). Sultan Chand & Sons.
7. Hadley, G (2002) : Linear Algebra. Narosa Publishing House (Reprint).
8. Rao, A.R. and Bhimasankaram, P. (1996): Linear Algebra
9. Rao, C.R. (2009). Linear Statistical Inference and its Applications, Second Edition, Wiley.
10. Schaum's Outline Series (2006): Linear Algebra, Tata McGraw-Hill Edition, 3rdEdition
11. Searle, S.R (1982).: Matrix Algebra Useful for Statistics. John Wiley &Sons

---

Semester–III (Minor)

Course Name: Introduction to Statistical Inference

Course Code: BSCSTSMN301

Course Type: MINOR **Course Details: MN- 3**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

Unit I

Parametric model, parameter, random sample and its likelihood, brief idea of statistics and their sampling distributions. Point estimation: Method of moments, Maximum likelihood estimation. Properties of good estimators: unbiased estimator, Consistency and efficiency of estimators.

Unit II

Testing of hypothesis : Definitions of hypothesis, null hypothesis (H0), and alternative hypothesis (H1), Type I and Type II errors, Significance level (α) and power of the test, Test for population proportion, One sample Z- test, Two-sample z-test for comparing means, One-sample t-test, Independent two-sample t-test.

Unit III

Definition and purpose of interval estimation, Point estimation vs. interval estimation, Confidence intervals: Basic concepts and interpretation, Confidence interval for a population mean (z-distribution and t-distribution). Application and interpretation in real-world scenarios.

Unit IV

Non Parametric Inference: Introduction to non-parametric tests, Chi-square goodness-of-fit test. Chi-square test for independence (2x2 contingency table), Mann-Whitney U test, Wilcoxon signed-rank test, Kruskal-Wallis test

List of Practical: (Use R for computation)

Problems on

1. Maximum Likelihood Estimation for Population Mean and Proportion.
2. Testing of significance and confidence intervals for single proportion.
3. Testing of significance and confidence intervals for single mean and difference of two means and paired tests.
4. Testing of goodness of fit using $\chi 2$ distributions.
5. Testing and confidence intervals of equality of two population variances.
6. Man-Whitney U test.

7. Sign test, Wilcoxon signed-rank test.

References:

1. Bickel, P.J. and Doksum, K.A. (2000). Mathematical Statistics, Second Edition, Prentice Hall.

2. Casella, G. and Berger, R.L. (2001). Statistical Inference, Second Edition, Cengage Learning.

3. Gupta, M.K., Gun, A.M., and Dasgupta, B. (2013). An Outline of Statistical Theory, Vol. 2. The World Press Publishers Pvt. Ltd., Calcutta.

4. Hogg, R.V., McKean J.W. and Craig, A.T. (2006). Introduction to Mathematical Statistics, Paperback Edition, Pearson.

5. Kale, B.K. (2005). A First Course on Parametric Inference. Alpha Science International Ltd.

6. Mood, A.M., Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edition., (Indian Edition), Tata McGraw-Hill Pub. Co. Ltd.

7. Rajagopalan, M. and Dhanavanthan, P. (2012). Statistical Inference. PHI Learning Pvt. Ltd., New Delhi.

8. Rao, C.R. (2009). Linear Statistical Inference and its Applications, Second Edition, Wiley.

9. Rohatgi, V. K. and Saleh A.K.M.E. (2008). An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.

Suggested OnlineLinks/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Semester – IV (Major)

Course Name: Statistical Inference- I

Course Code: BSCSTSMJ401

Course Type: MAJOR **Course Details: MJC- 5**

Course Type: **Discipline Specific Core (Theoretical+Practical)**		L-T-P: 3-0-4

Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

Unit I

Concepts of parameter, parametric space, statistic, estimator, estimate. Point estimation: Properties of good estimators, mean square and minimum mean square error estimator, unbiasedness, BLUE and minimum variance unbiased estimator, Cramer- Rao lower bound, Fisher amount of information.

Unit II

Consistency of estimators and sufficient conditions for consistency, relative efficiency of an estimator, unbiased estimator, sufficiency, factorization theorem, concept of complete sufficient statistics, Rao- Blackwell and Lehmann Scheffe theorems (without proof).

Unit III

Minimum variance unbiased estimators for the parameters of binomial, Poisson, gamma and normal families. Cramer- Rao inequality and MVB estimators. Methods of estimation: Moments, maximum likelihood, minimum chi-square, least squares with examples.

Unit IV

Point estimators of measures of location, dispersion and other useful parameters. Concepts of confidence interval and confidence coefficient, confidence intervals for the parameters of univariate normal, two independent normal distributions and exponential distributions.

List of Practicals-

Problems on

1. Checking the unbiasedness using suitable empirical examples to prove that the sample mean is an unbiased estimator of population mean.
2. Checking the unbiasedness of sample variance and sample mean square as an estimator of population variance.
3. Calculating by the method of maximum likelihood for Binomial, Poisson and Normal parameters and obtaining variances of these estimates.
4. Calculation of asymptotic distribution of maximum likelihood estimators.
5. Calculations of Minimum chi-square, Moment estimators for standard distributions.
6. Calculation of Interval estimates, for mean and variance of normal distribution.

References:

1. Bickel, P.J. and Doksum, K.A. (2000). Mathematical Statistics, Second Edition, Prentice Hall.

2. Casella, G. and Berger, R.L. (2001). Statistical Inference, Second Edition, Cengage Learning.

3. Gupta, M.K., Gun, A.M., and Dasgupta, B. (2013). An Outline of Statistical Theory, Vol. 2. The World Press Publishers Pvt. Ltd., Calcutta.

4. Hogg, R.V., McKean J.W. and Craig, A.T. (2006). Introduction to Mathematical Statistics, Paperback Edition, Pearson.

5. Kale, B.K. (2005). A First Course on Parametric Inference. Alpha Science International Ltd.

6. Mood, A.M., Graybill, F.A. and Boes, D.C. (2011). Introduction to the Theory of Statistics, 3rd Edition., (Indian Edition), Tata McGraw-Hill Pub. Co. Ltd.

7. Rajagopalan, M. and Dhanavanthan, P. (2012). Statistical Inference. PHI Learning Pvt. Ltd., New Delhi.

8. Rao, C.R. (2009). Linear Statistical Inference and its Applications, Second Edition, Wiley.

9. Rohatgi, V. K. and Saleh A.K.M.E. (2008). An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.

Suggested OnlineLinks/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics
- https://www.coursera.org/search?query=statistics&

Semester – IV (Major)

Course Name: Sampling Techniques and Indian Official Statistics.

Course Code: BSCSTSMJ402

Course Type: MAJOR **Course Details: MJC- 6**

<table>
<tr><td colspan="2">Course Type: Discipline Specific Core (Theoretical+Practical)</td><td colspan="3"></td><td colspan="2">L-T-P: 3-0-4</td></tr>
<tr><td rowspan="3">Credit: 5</td><td rowspan="3">Full Marks:100</td><td colspan="2">CA</td><td colspan="2">ESE</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>30</td><td>15</td><td>20</td><td>35</td></tr>
</table>

Unit I

Basic concepts: population and sample, census and sample survey, sampling frame, sampling distribution, standard error, sampling design, sampling and non-sampling errors, sample surveys, principles of sample survey, principal steps in sample survey, limitations of sampling, Sample survey versus complete enumeration survey.

Unit II

Simple Random Sampling (with and without replacement): Notations and terminology, various probabilities of selection. Random numbers tables and its uses. Methods of selecting simple random samples, lottery method, method based on random numbers. Estimates of population total, mean and their variances and standard errors, determination of sample size, simple random sampling of attributes.

Unit III

Stratified random sampling: principles of stratification, notations, estimation of population mean and variances, cost function, allocation techniques, proportional and optimum allocations. Comparison of stratified sampling with simple random sampling.

Unit IV

Probability proportional to size (PPS) sampling- Definition and terminology, cumulative total method and Lahiri's methods of selecting PPS sampling with and without replacement. Systematic sampling: linear systematic sampling, estimates of population total, mean, and their variances and standard errors. Interpenetrating sub samples. Systematic sampling with linear trend. Circular systematic sampling, concepts and examples. Comparison of systematic sampling with simple random sampling.

Unit V

Statistical organizations in India and their functions: CSO, ISI, NSS, IIPS (Devnar, Mumbai), Bureau of Economics and statistics.

Official Statistics: (a) Need, Uses, Users, Reliability, Relevance, Limitations, Transparency, its visibility (b) Compilation, Collection, Processing, Analysis and Dissemination, Agencies Involved, Methods

National Statistical Organization: Vision and Mission, NSSO, CSO and State Bureau of Economics and statistics; roles and responsibilities; Important activities, Publications, etc.

National Statistical Commission: Need, Constitution, its role, functions, etc.; Legal Acts/ Provisions/ Support for Official Statistics; Important Acts

List of Practicals:

Problems on

1. Simple Random Sampling – Lottery, random number method and other related problems, Sample size calculation.
2. Stratified Random Sampling – Problems related to Different types of allocation.
3. Stratified Random Sampling – Problems related to Optimum allocation and other related problems.
4. Sample size calculations.
5. Systematic Sampling – Problems related to Linear and Circular systematic sampling.
6. Probability Proportional to Size Sampling: Cumulative total method & Lahiri's method.

References:

1. Ardilly, P. and Yves T. (2006). Sampling Methods: Exercise and Solutions. Springer.
2. Cochran, W.G. (2007). Sampling Techniques. (Third Edition). John Wiley & Sons, New Delhi
3. Des Raj. (1976). Sampling Theory. Tata McGraw Hill, New York. (Reprint 1979)
4. Mukhopadyay, P. (2007). Survey Sampling. Narosa Publisher, New Delhi.
5. Sampath, S. (2005). Sampling Theory and Methods, 2nd Edition, Alpha Science International Ltd.
6. Singh, D. and Choudhary, F.S. (1977). Theory and Analysis of Sample Survey Designs. Wiley Eastern Ltd, New Delhi. (Reprint 1986)
7. Sukhatme, P.V. and Sukhatme, B.V. (1970). Sampling Theory Surveys with Applications (Second Edition). Iowa State University Press.
8. Thompson, S.K. (2012). Sampling. John Wiley & Sons.

Semester – IV (SEC)

Course Name: Real Analysis.

Course Code: BSCSTSSE401

Course Type: SEC **Course Details: SEC- 3**

<table>
<tr><td colspan="2">Course Type: Discipline Specific Core (Theoretical)</td><td colspan="3"></td><td colspan="2">L-T-P: 2-1-0</td></tr>
<tr><td rowspan="3">Credit: 3</td><td rowspan="3">Full Marks:100</td><td colspan="2">CA</td><td colspan="2">ESE</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td>-</td><td>15</td><td>-</td><td>35</td></tr>
</table>

Unit I

Introduction to Real Analysis: Bounded and unbounded sets, neighbourhood of a point, Supremum and infimum, review of limit, continuity and differentiability, uniform Continuity and boundedness of a function. Rolle's and Lagrange's Mean Value theorems. Taylor's theorem with lagrange's and Cauchy's form of remainder(without proof). Taylor's and Maclaurin's series expansions of sin x, cosx, log (1+x), Uncountable sets and Uncountability of $\mathbb{R}$.

Unit II

Sequences and Series of real numbers: Sequences of real numbers, their convergence, and limits. Cauchy sequences and their convergence. Monotonic sequences and their limits. Limits of standard

sequences. Infinite series and its convergence, and divergence. Convergence of series with non-negative terms. Tests for convergence and divergence of a series. Comparison test, limit comparison test, D'Alembert's ratio test, Cauchy's n^{th} root test, Cauchy's condensation test and integral test. Absolute convergence of series. Leibnitz's test for the convergence of alternating series. Conditional convergence. Convergence of power series and radius of convergence.

References:

1. Bartle, R.G. and Sherbert, I D. R. Introduction to Real Analysis, 3rd Ed., John Wiley and Sons.
2. Berberian, S.K. (1994). A First Course in Real Analysis, Springer Verlag, New York.
3. Shirali, S. andH. L. Vasudeva (2013). An Introduction to Mathematical Analysis, Alpha Science International Ltd.
4. Thomson, Brian S., Andrew. M. Bruckner and Judith B. Bruckner (2001). Elementary Real Analysis, Prentice Hall.

Semester -IV(Minor)

Course Name: Introduction to Applied Statistics

Course Code: BSCSTSMN401

Course Type: MINOR **Course Details: MN- 4**

Course Type: **Discipline Specific Core (Theoretical+Practical)**				L-T-P: 3-0-4	
Credit: 5	Full Marks:100	CA		ESE	
		Practical	Theoretical	Practical	Theoretical
		30	15	20	35

Unit I

Time Series Data Analysis:

Definition and examples of time series data, Components of time series: trend, seasonality, cyclic, and irregular components, Time series plots and visualization.

Measurement of Trend: Method of Moving Average, Fitting of Mathematical Curve. Measurement of Seasonal fluctuation: Ratio to trend, Ratio to Moving Average.

Concept of stationarity in time series. Differencing and transformations to achieve stationarity. Autocorrelation Function (ACF).

Case studies and real-world data analysis.

Unit II

Vital Statistics:

Definition and scope of vital statistics, Rates and ratios, importance of vital statistics in public health and demography, Vital registration systems: Births, deaths, marriages, and divorces. International sources: WHO, UN, World Bank etc.
Death Statistics: Measures of mortality: Crude Death Rate (CDR), Age-Specific Death Rates (ASDR), Standardized death rates (STDR), Infant Mortality Rate (IMR)

Birth Statistics: Measures of fertility and birth rates: Crude Birth Rate (CBR), Total Fertility Rate (TFR), Gross Reproduction Rate (GRR), Net Reproduction Rate (NRR), Crude Rate of Natural Increase (CRNI).

Infant mortality rate (IMR) and under-5 mortality rate.

Life Tables: Construction and interpretation of life tables, Measures of mortality derived from life tables.

Unit III

Official Statistics:

Statistical organizations in India and their functions: CSO, ISI, NSS, IIPS (Devnar, Mumbai), Bureau of Economics and statistics.

Official Statistics: (a) Need, Uses, Users, Reliability, Relevance, Limitations, Transparency, its visibility (b) Compilation, Collection, Processing, Analysis and Dissemination, Agencies Involved, Methods

National Statistical Organization: Vision and Mission, NSSO, CSO and State Bureau of Economics and statistics; roles and responsibilities; Important activities, Publications, etc.

National Statistical Commission: Need, Constitution, its role, functions, etc.; Legal Acts/ Provisions/ Support for Official Statistics; Important Acts

List of Practical: (Use R for computation)

Problems on

1. Plot time series data using R.
2. Measurement of Trend: Method of Moving Average, Fitting of Mathematical Curve
3. Measurement of Seasonal fluctuation: Ratio to trend, Ratio to Moving Average.
4. Plotting ACF and their interpretation.
5. Calculation of Birth and Death rates.
6. Problems on lifetables.

References:

1. Box, G.E.P., Jenkins, G.M., Reinsel, G.C. and Ljung, G.M. (2015). Time Series Analysis:

Forecasting and Control. 5th Edition. John Wiley & sons, Inc.

2. Brockwell, P.J. and Davis, R.A. (2003). Introduction to Time Series Analysis. Springer.
3. Chatfield, C. (2001). Time Series Forecasting., Chapman & Hall.
4. Fuller, W.A. (1996). Introduction to Time Series. 2nd Edition. Wiley.
5. Kendall, M.G. and Ord, J.K. (1990). Time Series. 3rd edition. Edward Arnold.
6. Montgomery, D.C., Jennings, C.L. and Kulahci, M. (2012). Introduction to Time Series Analysis and Forecasting, John Wiley.
7. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2003). Fundametal of Statistics,Vol. II, 4th Ed., World Press, Kolkata.

Suggested OnlineLinks/Readings:

- http://heecontent.upsdc.gov.in/SearchContent.aspx
- https://swayam.gov.in/explorer?searchText=statistics
- https://nptel.ac.in/course.html
- https://www.edx.org/search?q=statistics

https://www.coursera.org/search?query=statistics&

NEP SYLLABUS
ZOOLOGY

National Curriculum and Credit Framework (NCCF)

Syllabus

for

Major Courses and Skill Enhancement Courses in Zoology

w.e.f. Academic Session 2023-24

Kazi Nazrul University

Asansol, Paschim Bardhaman

West Bengal 713340

ASSIGNMENTS OF DIFFERENT SEMESTERS

Semester	COURSE DETAILS	PPT PRESTN.	PROJECT REPORT	DISSECTION	EXCURSION	LAB/FARM VISIT	ALBUM/VIDEO DOCUMENTARY
I	MJC-1	√		√	√		√ (Album)
	SEC-1						
II	MJC-2	√		√			√ (Album), √ (Video)
	SEC-2						

Guidelines for Individual / Team Projects and Field Reports

The aim of the individual/ team project/s is to develop an aptitude for research in Zoology and to inculcate proficiency to identify appropriate research topic and presentation. The topics of biological interest and significance can be selected for the project. Project is to be done by a group not exceeding 5 students. The project report should be submitted on typed A4 paper, 12 Font, 1.5 Space in spirally bound form and duly attested by the supervising teacher and the Head of the Department on the day of practical examination before a board of two Examiners for End Semester. The viva-voce based on the project is conducted individually. Project topic once chosen shall not be repeated by any later batches of students. The project report may have the following sections: 1. Preliminary (Title page, declaration, certificate of the supervising teacher, content etc.) 2. Introduction with relevant literature review and objective 3. Materials and Methods 4. Result 5. Discussion 6. Conclusion / Summary 7. References.

Field Study / Study tour

Students have to visit one research institute and one wild life sanctuary / museum / zoo. Scientifically prepared hand-written study tour report along with photographs of candidate at the places of visit must be submitted by each student for End Semester on the day of the examination of project.

Video presentation

Students have to develop a short film (2-5 min duration) based on relevant animal/topic given solely by themselves along with voice command/floating comments. It will help them to be competent in video documentation of a matter also a career prospect too.

Semester-I

Course name: Diversity of Non-chordates

Course code: BSCZOOMJ101

Course Type: **Major (Theoretical & Practical)**	Course Details: **MJC-1**			L-T-P: **3-0-4**	
Credit: 5	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

About the course :

The course is a walk for the Bachelor's entrant through the amazing diversity of living forms from simple to complex one. It enlightens how each group of organisms arose and how did they establish themselves in the environment with their special characteristics. It also deals with the differences and similarities between organisms on the basis of their morphology and anatomy which led to their grouping into taxa and clades.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Develop understanding on the diversity of life with regard to protists and non-chordates.
- Group animals on the basis of their morphological characteristics/structures.
- Develop a critical understanding how animals changed from a primitive cell to a collection of simple cells to form a complex body plan.
- Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/ cladistics tree.
- Understand how morphological change due to change in environment helps drive evolution over a long period of time.
- The project assignment will also give them a flavour of research to find the process involved in studying biodiversity and taxonomy besides improving their writing skills.
- It will further enable the students to think and interpret individually due to different animal species chosen

THEORY (MJC-1)

Unit I: Principles of Animal Classification (15 Lectures)

1. Definitions: Systematics, taxonomy, Hierarchy, taxonomic levels/types (alpha, beta, gamma, omega, cytotaxonomy, numerical taxonomy, and chemotaxonomy).
2. Principles of codes of Zoological Nomenclature: Binomial nomenclature and utility of scientific names. Principle of priority; Principle of typification (Holotype, Syntype, Allotype, Paratype, Lectotype, Paralectotype, Neotype); Principle of Homonymy and synonymy.
3. Classification: morphological and evolutionary (molecular): Artificial, Natural and phylogenetic concept, Basic idea on Phenetics and Cladistics

Unit II: Multicellularity and Origin of Metazoa (12 Lectures)

1. Species concept: Biological, evolutionary.
2. Origin of Metazoans: diploblastic and triploblastic organization; symmetries; body cavities; protostomes and deuterostomes.
3. Metamerism and its relevance.

UNIT III: Diversity in Protists, Acoelomate and Pseudocoelomate Metazoa (15 Lectures)

1. Structure and diversity in Protists (classification up to Phylum).
2. Porifera : Classification up to classes; Canal system; Structural diversity of skeletal organization.
3. Cnidaria : Classification up to classes ; Polymorphism and division of labour;
4. Coral reef: Types, formation & significance.
5. Classification and characteristics of Platyhelminthes up to classes.
6. Classification and characteristics of Nematoda up to classes.
7. Type study: *Paramecium, Taenia, Ascaris*

UNIT IV: Diversity in and Coelomate Non chordates and hemichordates (18 Lectures)

1. Classification and characteristics of Annelids up to classes, Excretory organ in *Pheretima*
2. Classification and characteristics of arthropods up to classes.
3. Affinities of living fossils: *Limulus* and *Peripatus.*
4. Classification and characteristics of Molluscs up to classes.
5. Torsion and Detorsion in Mollusca.
6. Classification and characteristics of Echinoderms up to classes; their affinity with Chordates.
7. Type study: *Periplaneta*

Note: ***Classification to be followed from Ruppert and Barnes Invertebrate Zoology VI edition, except for Protozoa (American Association of Protozoologist ref: Levine 1980) and Porifera (Brusca and Brusca 2002; IV edition. Invertebrate Zoology).***

PRACTICAL (MJC-1)

1. Identification of animals through slides and museum specimens/photographs with their classification and diagnostic features **(record book)**. Animals to be included for the study are as follows:

Non-chordates :
i. **Protista:** *Euglena, Amoeba, Paramecium.*
ii. **Porifera:** *Euspongia, Scypha.*
iii. **Cnidaria:** *Obelia, Physalia, Porpita, Aurelia, Tubipora,* Sea Anemone, *Pennatula, Fungia.*
iv. **Platyhelminthes:** *Fasciola, Taenia solium.*
v. **Nematoda:** *Ascaris.*
vi. **Annelida:** *Aphrodite, Neanthus, Chaetopterus, Pheretima, Hirudinaria*
vii. **Arthropoda:** *Carcinoscorpius, Macrobrachium, Balanus, Julus, Periplaneta, Peripatus.*
viii. **Mollusca:** *Chiton, Pila, Lamellidens, Sepia, Octopus.*
ix. **Echinodermata:** *Astropecten, Cucumaria, Antedon.*
x. **Larval forms:** Ephyra, Trochophore, Nauplius, Zoea, Glochidium, Veliger, Bipinnaria, Brachiolaria.

2. **Excursion:** Study of animals in nature during a survey of a National Park or Forest area or coastal area or any local biodiversity rich area.

3. Dissection of *Periplaneta* to expose- (a) Digestive, (b) Nervous and (c) Reproductive system.

4. Dissection of earthworm to expose the Nervous system.

5. Group discussion or Seminar presentation on following topics:

Pool of Topics for Group Discussion or Seminar presentation :		
1. Tree of Life.	6. Molecular systematics vs Traditional taxonomy.	12. Protostome vs deuterostome
2. Polymorphism.	7. Metamerism and its relevance.	13. Coelom and animal development
3. Freshwater sponges.	8. Principle of Typification	14. Torsion-an evolutionary outbreak
4. Concept of symmetry	9. Basis of classification	15. Molecular system of classification.
5. Species concept	10. Coral reef – A marine rainforest.	16. Significance of living fossils
	11. Type study: Any one animal as per your syllabus.	

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission -3+3+2=**8** **3.** Attendance and Participation in class-**4** **4.** Practical skills, laboratory reports, etc-**3** **5.** Participation in excursion -**5**	**1.** Identification - 2 items (item 1 and 7)- [Sc. Name, systematic position (3 taxa), generic characters, habit & habitat,] 0.5+0.5+1+0.5=2.5 **(2.5x3=5)** **2.** Dissection/mounting- Exposing and display/mounting-3, Drawing-2, Labelling-1. **(6)** **3.** Field Report (Item no 2) -**3** **4.** LNB (Laboratory Note Book) -**3** **5.** Viva -**3**

NOTE :

- *Identification could be done by using a card printed with a photograph/drawing/data /preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared (item 1, 4, 5, 6 & 7) in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VII Edition. Thompson Brooks Cole (International Edition)
2. Barnes, R.S.K., Callow, P., Olive, P. J. W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
3. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition.
4. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
5. Hall B.K. and Hallgrimsson B. (2008), Strickberger's Evolution. 4th Edition. Jones and Bartlett Publishers Inc.
6. Chattopadhyay, S (2014) LIFE: Evolution, adaptation, ethology, 2nd Ed, Books & Allied.
7. Lomolino, M. V. et al (2010) Biogeography, 4th Edition, Sinauer Associates.
8. Simpson, G G (2012) Principles of animal taxonomy, Scientific publishers.
9. Mayr, E and Ashlock P D (2014) Principles of systematic zoology, 2nd, McGraw-Hill Education.
10. Verma, A (2017) Principles of animal taxonomy, 1st Ed, Narosa.
11. Ghosal, S (2020) Taxonomy Principle and Problems, 1st Ed, Techno world.
12. Quicke, Donald L (1993) Principles and Techniques of Contemporary Taxonomy (Tertiary Level Biology), 1st Ed, Springer
13. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. I. New Central Book Agency (p) Ltd.
14. Kapoor, V C (2019) Theory And Practice Of Animal Taxonomy And Biodiversity 8th Ed, Oxford & IBH Publishing
15. Ruppert, E.E., Fox, R.S., Barnes, R. D. (2003). Invertebrate Zoology: A Functional Evolutionary Approach. VII Edition, Cengage Learning, India
16. Pechenik, J. A. (2015). Biology of the Invertebrates. VII Edition, McGraw-Hill Education

17. Miller S.A. & Harley J.P. (2015) Zoology. 10th Ed., McGraw-Hill Education
18. Hickman C., *et. al*. (2019) Integrated principles of zoology., 18th Ed., McGraw-Hill Education.

Course Name: Public Health and Hygiene

Course Code: BSCZOOSE101

Course Type: **SEC (Theoretical)**	Course Details: **SEC-1**		L-T-P: **3-0-0**
Credit: 3	Full Marks: **50**	CA Marks	ESE Marks
		Theoretical	Theoretical
		15	**35**

About the course :
The course designed for public health and hygiene at graduation level will give understanding for health hygiene, dietary issues, diseases related to malnutrition, communicable and non-communicable diseases.

Learning outcomes :
After successfully completing this course, the students will be able to:

- Identify current national and global public health problems.
- Aware about the issues of food safety, water safety, vaccination, exercise and obesity, exposure to toxins.
- Frame a public health plan during any epidemic or spread of infectious disease etc.
- Analyze case studies of infant mortality and obesity.
- Assess the health inequalities with regard to gender, race, ethnicity, income etc.

THEORY (SEC-1)

Unit-I: Maintenance of personal and community hygiene (13 Lectures)

1. Introduction to public health and hygiene- General concept, determinants and factors.
2. Pollution and health hazards; Causative agent, symptoms, and control/treatment of common water and air borne diseases: Cholera, Typhoid, SARS-CoV.
3. Radiation hazards: Mobile Cell tower and electronic gadgets (recommended levels, effects and precaution).
4. Importance and maintenance of Community Hygiene.

Unit-II: Nutrient deficiency & diseases (13 Lectures)

1. Classification of food into micro and macro nutrients.
2. Balanced diet.
3. Importance of dietary fibers.
4. Significance of breast feeding.
5. Malnutrition anomalies – Anaemia (Iron and B12 deficiency), Kwashiorkar, Marasmus, Rickets, Goiter (cause, symptoms, precaution and cure).

Unit-III: Communicable and contagious diseases (13 Lectures)

1. Communicable viral diseases (causative agent, symptoms, precaution and remedy)- chicken pox, dengue, chickungunya, and hepatitis.

2. Communicable bacterial diseases (causative agent, symptoms, precaution and remedy)- tuberculosis, tetanus, plague, diphtheria.
3. Sexually transmitted diseases (causative agent, symptoms, precaution and remedy)- AIDS, syphilis and gonorrhoea.

Unit-IV: Non-communicable diseases and cure (13 Lectures)

1. Non-communicable diseases such as Atherosclerosis, Asthma, Osteoporosis, osteoarthritis and rheumatoid arthritis-cause, symptom, precautions.
2. Diabetes- types and their effect on human health.
3. Gastrointestinal disorders- acidity, peptic ulcer, piles (cause, symptoms, precaution and remedy). Obesity (Definition and consequences).
4. Mental illness (depression and anxiety).
5. Oral and lung cancer (Cause and preventive measures).

Recommended readings :

1. Mary Jane Schneider (2011) Introduction to Public Health.
2. Muthu, V.K. (2014) A Short Book of Public Health.
3. Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
4. Gibney, M.J. (2013) Public Health Nutrition.
5. Wong, K.V. (2017) Nutrition, Health and Disease.

Semester-II

Course name: Diversity of Chordates

Course code: BSCZOOMJ201

Course Type: **Major (Theoretical & Practical)**	Course Details: **MJC-2**			L-T-P: **3-0-4**	
Credit: 5	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**15**	**20**	**35**

About the course :

The course is a walk for the Bachelor's entrant through the amazing diversity of living forms from simple to complex one. It enlightens how each group of organisms arose and how did they establish themselves in the environment with their special characteristics. It also deals with the differences and similarities between organisms on the basis of their morphology and anatomy which led to their grouping into taxa and clades.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Develop understanding on the diversity of life with regard to chordates.
- Group animals on the basis of their morphological characteristics / structures.
- Develop critical understanding of how aquatic to terrestrial journey happens in chordate animals.
- Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/ cladistics tree.
- Understand how morphological change due to change in environment helps drive evolution over a long period of time.
- The project assignment will also give them a flavour of research to find the process involved in studying biodiversity and taxonomy besides improving their writing skills.
- It will further enable the students to think and interpret individually due to different animal species chosen.

THEORY (MJC-2)

Unit 1: Protochordata and Agnatha (15 Classes)

1. Characters and affinities of Hemichordates
2. General characteristics of Urochordata and Cephalochordata
3. Study of larval forms in protochordate
4. Retrogressive metamorphosis in *Ascidia,*
5. Theories of origin of Chordata
6. General characteristics and affinities of cyclostomes

Unit 2: Ectotherms: Pisces, Amphibia and Reptilia (18 Classes)

1. General characteristics and Classification of fish up to subclass,
2. Migration of Fishes,
3. Affinities of lung fishes
4. Origin of Tetrapoda (Evolution of terrestrial ectotherms)

1. General characteristics and classification of Amphibia up to living order; Parental care in Amphibia

5. General characteristics and classification of reptiles up to living order
6. Affinities of *Sphenodon*
7. Type study (respiratory system, circulatory system, urinogenital system): *Labeo, Duttaphrynus, Calotes.*

Unit 3: Endotherms: Aves and Mammalia (15 Classes)

1. General characteristics and classification of Aves up to subclass;
2. Archaeopteryx - a connecting link;
3. Principles and aerodynamics of flight and migration in birds
4. Affinities of Prototheria,
5. Origin of Mammals- Special features of Monotremes and Marsupials.
6. Characteristics and classification of mammalian groups (up to orders)
7. Type Study: *Columba, Cavia*

Unit 4: Specialized systems (12 Classes)

2. Accessory respiratory organ, acoustico lateralis system, and swim bladder in fishes
3. Poison apparatus and biting mechanism in snakes
4. Echolocation in chiropterans and cetaceans
5. Ruminant stomach

Note: ***Classification from Young, J. Z. (1981) to be followed except for classification fishes. For Pisces classification scheme to be followed from Nelson, J. S. (2006).***

PRACTICAL (MJC-2)

1. Identification of animals through slides and museum specimens/photographs with their classification and diagnostic features **(record book)**. Animals to be included for the study are as follows:

Chordates :
i. **Protochordata:** *Balanoglossus, Branchiostoma, Ascidia.*
ii. **Fishes:** *Scoliodon, Torpedo, Mystus vitattatus, Catla, Labeo, Exocoetus, Hippocampus*
iii. **Amphibia:** *Ichthyophis, Necturus, Duttaphrynus, Rachophorous*
iv. **Reptiles:** *Chelone, Calotes, Chamaeleon, Draco, Bungarus, Vipera, Naja.*
v. **Birds:** *Psittacula, Pycnonotus.*
vi. **Mammals:** *Sorex, Pteropus, Funambulus.*

2. **Dissection: a)** Expose and display afferent Branchial system, weberian ossicles and IX-Xth cranial nerve of fish (carp).

b) Expose and display Vth and VIIth cranial nerve of Fowl.

3. **Mounting: a)** Temporary mount of external scales in fishes (cycloid, placoid, ganoid, ctenoid). **b)** Temporary mount of Pecten of Fowl.
4. **Comparison** of two species of birds belonging to the same genus (Interspecific difference).
5. **Demonstration** of Poisonous and non-poisonous snake by chart preparation.
6. Group discussion or Seminar presentation on following topics:

Pool of Topics for Group Discussion or Seminar presentation :		
1. Protochordates-the gateway of chordates	2. Evolution of terrestrial ectotherms	3. Affinities, and biology of cyclostomes
4. Origin of Chordata	5. Migration of Fishes	6. Affinities of lung fishes
7. Affinities of *Sphenodon*	8. Retrogressive metamorphosis	9. Biting mechanism in snakes
10. Aerodynamics of bird flight	11. Archaeopteryx - a connecting link	12. Venomous vs non-venomous snake
13. Affinities of Prototheria	14. Monotremes and Marsupials	15. Zoogeographical realms
16. Type study: anyone in your syllabus	17. Plate tectonic & Continental drift theory	18. Adaptive radiation of mammals

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	**1.** Identification (Sl no 1)- Sc. Name-0.5, Characters-1, Habit & habitat-0.5, (2x2=**4**) **2.** Dissection/mounting- Exposing and display/mounting-5, Drawing-2, Labelling-1. (**8**) **3.** Bird album-**2** **4.** LNB 2 **5.** Viva voce-**4**

NOTE :

- *Study of specimen should include-Scientific name, Habit and Habitat, Diagnostics feature, importance/values if any.*
- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Video should made on one or more animals on behavioral pattern/life cycle/feeding habit with sound commended by voice.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings

1. Young, J. Z. (1981). The Life of Vertebrates. 3rd Ed. Oxford university press.
2. Pough H. Vertebrate life, VIII Edition, Pearson International.
3. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
4. Hall B.K. and Hallgrimsson B. (2008), Strickberger's Evolution. 4th Edition. Jones and Bartlett Publishers Inc.
5. Chattopadhyay, S (2014) LIFE: Evolution, adaptation, ethology, 2nd Ed, Books & Allied.
6. Lomolino, M. V. et al (2010) Biogeography, 4th Edition, Sinauer Associates.

7. Simpson, G G (2012) Principles of animal taxonomy, Scientific publishers.
8. Mayr, E and Ashlock P D (2014) Principles of systematic zoology, 2nd, McGraw-Hill Education.
9. Verma, A (2017) Principles of animal taxonomy, 1st Ed, Narosa.
10. Ghosal, S (2020) Taxonomy Principle and Problems, 1st Ed, Techno world.
11. Quicke, Donald L (1993) Principles and Techniques of Contemporary Taxonomy (Tertiary Level Biology), 1st Ed, Springer
12. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. II. New Central Book Agency (p) Ltd.
13. Kapoor, V C (2019) Theory And Practice Of Animal Taxonomy And Biodiversity 8th Ed, Oxford & IBH Publishing
14. Miller S.A. & Harley J.P. (2015) Zoology. 10th Ed., McGraw-Hill Education
15. Hickman C., *et. al*. (2019) Integrated principles of zoology., 18th Ed., McGraw-Hill Education.

Course Name: Instrumentation and Clinical Diagnosis

Course Code: BSCZOOSE201

Course Type: **SEC (Theoretical)**	Course Details: **SEC-2**		L-T-P: 3-**0-0**
Credit: 3	Full Marks: **50**	CA Marks	ESE Marks
		Theoretical	Theoretical
		15	**35**

About the course :

This is the only laboratory course taught independently of lecture courses. It has full hands on approach to expose the students to modern techniques and methodologies. The diverse techniques from microscopy to spectroscopy, calorimetry, chromatography ELISA, tissue culture to cloning, medical diagonosis etc. are included to make the student well versed with these protocols and methods.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Understand the purpose of the technique, its proper use and possible modifications/improvement.
- Learn the theoretical basis of technique, its principle of working and its correct application.
- Learn the construction repair and adjustment of any equipment required for a technique.
- Learn the accuracy of technique.
- Understand the application of medical diagonosis.
- Learn the maintenance laboratory equipments / tools, safety hazards and precautions.
- Understand the technique of cell and tissue culture. Learn the preparation of solution of given percentage and molarity.
- Understand the process of preparation of buffer. Learn the techniques of separation of amino acids, proteins and nucleic acids.

UNIT I : Principles of Microscopy (13 Lectures)

1. Microscopy: Introduction to Microscopy (Discovery, General structure).
2. Definitions-Resolving Power, Limit of Resolution and Magnification, Numerical Aperture.
3. Types of Light microscopes; bright field, dark-field, phase contrast.
4. Basic principles and applications of Light, Electron (SEM, TEM), Fluorescence.

UNIT II : Tools and techniques in Biochemistry and Physiology (15 Lectures)

1. Biochemistry and Physiology: Physiological Salines, Concept of Normality and Molarity. Buffers and the use of pH meter.
2. Principles and types of Centrifugation, Differential centrifugation.
3. Basic Principle and Application of Colorimetry and Spectrophotometry, Beer-Lambert's Law.

4. Principle and applications of Agarose gel Electrophoresis and PAGE.
5. Principle and Applications of Paper chromatography, Thin layer chromatography

UNIT III : Tools and Techniques in Endocrinology and immunology (12 Lectures)

1. Principle and applications of Western Blotting, ELISA, RIA.
2. Application of Immunological techniques (EIA, Coombs test and Widal test) in disease diagnosis.
3. Tracer techniques: Principle and Applications, Unit of radioactivity, half-life and measurement of radioactivity. Adverse effect of radioisotopes.

UNIT IV: Cell culture and clinical diagonosis (18 Lectures)

1. Introduction to Cell Culture**:** Cell culture (in vitro, in vivo, ex vivo) and its basic requirements (laboratory facility), application and limitation of animal cell culture.
2. Cell counting (haemocytometer, Flow cytometer) and cell viability testing (Trypan blue exclusion).
3. **C**ryopreservation (principle, cryopreservant, methodologies, cryoprotectant, revival/thawing, factors for good survivality, banking of cell lines, advantages, applications).
4. Medical applications of CT, MRI, EEG, ECG.
5. Haematology techniques: Glucometer, haemometer
6. Good laboratory practice (GLP) & Bioethics (General concept).

Recommended readings:

1. Pearse, A.G.E. (1980-1993) Histochemistry - Theoretical and applied, Volume I-III, Churchill-Livingstones.
2. Plummer, D. (2017) An Introduction to Practical Biochemistry (3rd edition) McGraw Hill.
3. Wilson, K. and Walker, J. (2010) Experimental Biochemistry, Cambridge.
4. Boyer, R. (2000). Modern Experimental Biology. Pearson Education. English Universities Cambridge Low-price Ed.
5. Cantor, C.R. & Schimmel, P.R. (2003). Biophysical chemistry (3 vol. set). W. H. Freeman & Co.
6. Bajpai, P.K. (2006). Biological Instrumentation and Methodology. 1st Ed. S. Chand & Company Ltd.
7. Ghoshal & Shrivastava (2009). Fundamentals of Bioanalytical Techniques and Instrumentation. PHI
8. Sharma, V. K. (1991). Techniques in Microscopy and Cell Biology. Tata-McGraw Hill.
9. Arya A & Kumar A, (2018) Methods in biology, 2nd Ed, Drawing Pin Publishing
10. Kumar, P.; (2016) Fundamentals and Techniques of Biophysics and Molecular Biology, 1st Ed, Pathfinder Publication
11. Roy, R.N. (2005). A Text Book of Biophysics. New Central Book Agency (P) Ltd. Kolkata..

Learning Outcome based Curriculum Framework (LOCF)

For

Choice Based Credit System (CBCS)

Syllabus

B.Sc. (Honours) in Zoology

w.e.f. Academic Session 2020-21

Kazi Nazrul University

Asansol, Paschim Bardhaman

West Bengal 713340

Preamble

In the evolving biological paradigm in modern times; subject Zoology is important to understand living beings at morphological, cellular, molecular, interactive and evolutionary levels. The syllabus has been customized to understand inner working of living beings by comparing various systems within invertebrates and vertebrates i.e., from a single cell protozoan to multicellular humans, and to develop a comprehensive understanding and appreciation of the differences through ICT tools and well-designed hands-on practical exposures along with the field work. Apart from this, syllabus on Zoology will enhance quality of critical thinking, analytical and scientific reasoning, reflective thinking, information and digital literacy, and problem-solving capacity of students.

SCHEME OF SYLLABUS

(As per Learning Outcomes-based Curriculum Framework)

SEMESTER	Core Course CC (14)	Ability Enhancement Compulsory Courses AEC (2)	Generic Elective Courses GE (4)	Skill Enhancement Courses SEC (2)	Discipline Specific Elective DSE (4)
I	CC-1: Systematics & Diversity of Life - Protists to Chordates CC-2: Ecology	Environmental Science	GEC-1- Th+Pr To be selected from Other than Zoology (like-Botany, Physiology, Chemistry, etc)		
II	CC-3: Comparative Anatomy & Physiology of Non-chordates CC-4: Cell Biology and Histology	English Communication	GEC-2- Th+Pr -DO-		
III	CC-5: Comparative Anatomy & Physiology of Chordates CC-6: Genetics CC-7: Biochemistry		GEC-3 - Th+Pr -DO-	SEC-1 (Th only) Beekeeping / Public Health and Hygiene	
IV	CC-8: Behaviour and Chronobiology CC-9: Developmental Biology & Evolution CC-10: Molecular Biology		GEC-4- Th+Pr -DO-	SEC-2 (Th only) Sericulture/ Insect Pest, Vector Biology and Management	
V	CC-11: Biotechniques CC-12: Microbiology, Parasitology & Immunology				DSEC-1 or 2:- Th+Pr Genetic Engineering and Biotechnology DSEC-1 or 2: Th+Pr Livestock Management and Animal Husbandry DSEC-1 or 2: Endocrinology
VI	CC-13: Biostatistics & Bioinformatics CC-14: Applied Zoology				DSEC-3 or 4: Th+Pr Wild Life Conservation and Management DSEC-3 or 4: Th+Pr Human Physiology DSEC-3 or 4: Aquatic biology

ASSIGNMENTS OF DIFFERENT SEMESTERS

Semester	COURSE DETAILS	PPT PRESTN.	PROJECT REPORT	FIELD REPORT	EXCURSION	LAB/FARM VISIT	ALBUM/VIDEO DOCUMENTARY
I	CC-1	√		√	√		√ (Album)
	CC-2	√		√	√		
II	CC-3	√					√ (Video)
	CC-4	√					
III	CC-5	√	√				
	CC-6	√	√				
	CC-7	√					
	SEC-1						
	CC-8	√		√		√	√ (Ethogram)

IV	**CC-9**	√					**√ (Video)**
	CC-10	√					
	SEC-2						
V	**CC-11**	√		√		√	
	CC-12	√					
	DSEC-1/2	√					
	DSEC-1/2	√					
	DSEC-1/2	√					
VI	**CC-13**	√					
	CC-14	√					
	DSEC-3/4	√		√	√		
	DSEC-3/4	√					
	DSEC-3/4	√		√	√		

Guidelines for Individual / Team Projects and Field Reports

The aim of the individual/ team project/s is to develop an aptitude for research in Zoology and to inculcate proficiency to identify appropriate research topic and presentation. The topics of biological interest and significance can be selected for the project. Project is to be done by a group not exceeding 5 students. The project report should be submitted on typed A4 paper, 12 Font, 1.5 Space in spirally bound form and duly attested by the supervising teacher and the Head of the Department on the day of practical examination before a board of two Examiners for End Semester. The viva-voce based on the project is conducted individually. Project topic once chosen shall not be repeated by any later batches of students. The project report may have the following sections: 1. Preliminary (Title page, declaration, certificate of the supervising teacher, content etc.) 2. Introduction with relevant literature review and objective 3. Materials and Methods 4. Result 5. Discussion 6. Conclusion / Summary 7. References.

Field Study / Study tour

Students have to visit one research institute and one wild life sanctuary / museum / zoo. Scientifically prepared hand-written study tour report along with photographs of candidate at the places of visit must be submitted by each student for End Semester on the day of the examination of project.

Video presentation

Students have to develop a short film (2-5 min duration) based on relevant animal/topic given solely by themselves along with voice command/floating comments. It will help them to be competent in video documentation of a matter also a career prospect too.

C O N T E N T S*

Sl.	Sem	COURSE	COURSE	COURSE NAME	Th/Pr

No.		DETAILS	CODE		
1.	I	CC-1	BSCHZOOC101	SYSTEMATICS & DIVERSITY OF LIFE : PROTISTS TO CHORDATES	Th
2.					Pr
3.		CC-2	BSCHZOOC102	ECOLOGY	TH
4.					PR
5.	II	CC-3	BSCHZOOC201	COMPARATIVE ANATOMY & PHYSIOLOGY OF NONCHORDATES	TH
6.					PR
7.		CC-4	BSCHZOOC202	CELL BIOLOGY & HISTOLOGY	TH
8.					PR
9.	III	CC-5	BSCHZOOC301	COMPARATIVE ANATOMY & PHYSIOLOGY OF CHORDATES	TH
10.					PR
11.		CC-6	BSCHZOOC302	GENETICS	TH
12.					PR
13.		CC-7	BSCHZOOC303	BIO-CHEMISTRY	TH
14.					PR
15.		SEC-1	BSCHZOOSE301	BEEKEEPING	TH
16.		SEC-1	BSCHZOOSE302	PUBLIC HEALTH & HYGIENE	TH
17.	IV	CC-8	BSCHZOOC401	BEHAVIOUR & CHRONO-BIOLOGY	TH
18.					PR
19.		CC-9	BSCHZOOC402	DEVELOPMENTAL BIOLOGY & EVOLUTION	TH
20.					PR
21.		CC-10	BSCHZOOC403	MOLECULAR BIOLOGY	TH
22.					PR
23.		SEC-2	BSCHZOOSE401	SERICULTURE	TH
24.		SEC-2	BSCHZOOSE402	INSECT PEST, VECTOR BIOLOGY & MANAGEMENT	TH
25.	V	CC-11	BSCHZOOC501	BIOTECHNIQUES	TH
26.					PR
27.		CC-12	BSCHZOOC502	MICROBIOLOGY, PARASITOLOGY & IMMUNOLOGY	TH
28.					PR
29.		DSEC-1/2	BSCHZOODSE501	GENETIC ENGINEERING & BIOTECHNOLOGY	TH
30.					PR
31.		DSEC-1/2	BSCHZOODSE502	LIVESTOCK MANAGEMENT & ANIMAL HUSBANDRY	TH
32.					PR
33.		DSEC-1/2	BSCHZOODSE503	ENDOCRINOLOGY	TH
34.					PR
35.	VI	CC-13	BSCHZOOC601	BIO-STATISTICS & BIO-INFORMATICS	TH
36.					PR
37.		CC-14	BSCHZOOC602	APPLIED ZOOLOGY	TH
38.					PR
39.		DSEC-3/4	BSCHZOODSE601	WILDLIFE CONSERVATION AND MANAGEMENT	TH
40.					PR
41.		DSEC-3/4	BSCHZOODSE602	MAMMALIAN PHYSIOLOGY	TH
42.					PR
43.		DSEC-3/4	BSCHZOODSE603	AQUATIC BIOLOGY	TH
44.					PR

For syllabus of generic elective (GEC-1 to 4) courses, check page nos. 75-86.

SEMESTER – I

Course Name: Systematics & Diversity of Life - Protists to Chordates

Course Code: BSCHZOOC101

Course Type: **Core (Theory & Practical)**	Course Details: **CC-1**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course is a walk for the Bachelor's entrant through the amazing diversity of living forms from simple to complex one. It enlightens how each group of organisms arose and how did they establish themselves in the environment with their special characteristics. It also deals with the differences and similarities between organisms on the basis of their morphology and anatomy which led to their grouping into taxa and clades.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Develop understanding on the diversity of life with regard to protists, non-chordates and chordates.**
- **Group animals on the basis of their morphological characteristics / structures.**
- **Develop critical understanding how animals changed from a primitive cell to a collection of simple cells to form a complex body plan.**
- **Examine the diversity and evolutionary history of a taxon through the construction of a basic phylogenetic/ cladistics tree.**
- **Understand how morphological change due to change in environment helps drive evolution over a long period of time.**
- **The project assignment will also give them a flavour of research to find the process involved in studying biodiversity and taxonomy besides improving their writing skills.**
- **It will further enable the students to think and interpret individually due to different animal species chosen**

THEORY (CC-1)

Unit I: Principles and practice of taxonomy (15 Lectures)

1. Multicellularity : from simple collections of poorly differentiated cells to complex body plans.
2. Species concept : Biological, evolutionary.
3. Definitions : Systematics, taxonomy, Hierarchy, taxonomic levels / types (alpha, beta, gamma, omega, cytotaxonomy, numerical taxonomy, chemotaxonomy).
4. Principles of codes of Zoological Nomenclature : Binomial nomenclature and utility of scientific names. Principle of priority; Principle of typification (Holotype, Syntype, Allotype, Paratype, Lectotype, Paralectotype, Neotype); Principle of Homonymy and synonymy.
5. Classification : morphological and evolutionary (molecular) : Artificial, Natural and phylogenetic concept.
6. Basic idea of Phenetics and Cladistics.
7. Types of clades- paraphyly, monophyly, polyphyly, holophyly, haplogroups.
8. Traits of Phylogeny (Basic idea)- apomorphy, plesiomorphy, symplesiomorphy, autapomorphy, synapomorphy.
9. Basic idea of Phylogenetic trees, Molecular phylogeny, multiple sequence alignment, construction of phylogenetic tree.

Unit II: Diversity in Protists and Acoelomate Metazoa (11 Lectures)

1. Structure and diversity in Protists (classification up to Phylum).
2. Origin of Metazoans: diploblastic and triploblastic organization; symmetries; body cavities; protostomes and deuterostomes.
3. Porifera : Classification up to classes ; Structural diversity of skeletal organization.
4. Cnidaria : Classification up to classes ; Polymorphism and division of labour ; coral reef forming cnidarians, coral reef: types, formation & significance.
5. Concept of Bilateria and acoelomate.
6. Basic organization and adaptive radiations in flatworms, classification of Platyhelminthes up to classes.

UNIT III: Diversity in Pseudocoelomate and Coelomate Non chordates (13 Lectures)

1. The Ecdysozoa: characteristics of the representative taxa.
2. Pseudocoelomates; Basic organization and Classification of Nematoda up to classes.
3. Adaptive radiations in roundworms.
4. The coelomates: Basic organization.
5. Classification of arthropods up to classes.
6. Adaptive radiations in Crustaceans, Myriapods, Chelicerates, Insects, Ancestors/fossil arthropods. etc.
7. Basic organization and diversity (classification up to classes) in Annelids.
8. Basic organization and diversity (classification up to classes) in Molluscs.
9. Disruption of bilateral symmetry and its significance.
10. Basic organization and classification (up to classes) of Echinoderms; their affinity to Chordates.

Note: ***Classification to be followed from Ruppert and Barnes Invertebrate Zoology VI edition, except for Protozoa (American Association of Protozoologist ref: Levine 1980) and Porifera (Brusca and Brusca 2002; IV edition. Invertebrate Zoology).***

UNIT IV: Diversity in Protochordates and Chordates (13 Lectures)

1. Chordates – Primitive Chordates and their affinities.
2. Characters and affinities of Hemichordates, Urochordates and Cephalochordates.
3. Advent of vertebrates: Cyclostomes, their evolutionary status and affinities.
4. Basic organization and diversity (classification up to sub-class) of fishes, their evolutionary transitions from Water to Land invasion- Early Tetrapodes.
5. Amphibians' diversity (classification up to living order) and adaptability to dual mode of life.
6. Adaptive radiations in reptiles, classification of reptiles up to living order ; the avian ancestors.
7. Birds : classification up to sub-class, Adaptation from terrestrial to aerial mode of life.
8. Origin of Mammals- Special features of Monotremes and Marsupials.
9. Characteristics and classification of mammalian groups (up to orders) with special reference to primates.

Note: ***Classification from Young, J. Z. (1981) to be followed except for classification fishes. For Pisces classification scheme to be followed from Nelson, J. S. (2006).***

PRACTICAL (CC-1)

1. **Study** of animals through slides and museum specimens/photographs in the laboratory with their classification, biogeography and diagnostic features **(record book)**. Animals to be included for the study are as follows:

a. **Non-chordates :**	b. **Chordates :**

i. **Protista:** *Euglena, Amoeba, Paramecium.* *ii.* **Porifera:** *Euspongia, Scypha.* *iii.* **Cnidaria:** *Obelia, Physalia, Porpita, Aurelia, Tubipora,* Sea Anemone, *Pennatula, Fungia.* *iv.* **Platyhelminthes:** *Fasciola hepatica, Taenia solium.* *v.* **Nematoda:** *Ascaris.* *vi.* **Annelida:** *Aphrodite, Sabella, Chaetopterus, Pheretima.* *vii.* **Arthropoda:** *Carcinoscorpius, Macrobrachium, Balanus, Julus, Periplaneta, Peripatus.* *viii.* **Mollusca:** *Chiton, Pila, Pinctada, Sepia.* *ix.* **Echinodermata:** *Astropecten, Cucumaria* and *Antedo*	*i.* **Protochordata:** *Balanoglossus, Branchiostoma, Ascidia.* *ii.* **Fishes:** *Scoliodon, Torpedo, Mystus vitattatus, Catla, Exocoetus, Hippocampus,* *iii.* **Amphibia:** *Ichthyophis, Necturus, Bufo, Rachophorous* *iv.* **Reptiles:** *Chelone, Calotes, Chamaeleon, Draco, Bungarus, Vipera, Naja.* *v.* **Birds:** *Psittacula, Pycnonotus.* *vi.* **Mammals:** *Sorex, Pteropus, Funambulus.*

2. **Excursion:** Study of animals in nature during a survey of a National Park or Forest area or any local biodiversity rich area.
3. **Collection** of **five species** or presentation through photographic plates (preferably invertebrates, insects) belonging to a clade. A project report to be submitted based on their generic identification, description and illustration with a note on their locality. Also, the assessment of their relationship by constructing a cladogram using characters and character states.
4. **Comparison** of two species of birds belonging to same genus (Interspecific difference).
5. **Comparison and weighting** of characters of two birds belonging to same family but dissimilar genera.
6. **Group discussion** or **Seminar presentation** on following topics:

Pool of Topics for Group discussion or Seminar presentation :		
1. Tree of Life.	5. Molecular systematics vs Traditional taxonomy.	8. Coral reefs and their role in ecosystem generation.
2. Polymorphism.	6. Phenoplasticity and its relevance.	9. Molluscs of industrial value.
3. Freshwater sponges.	7. Reliability of taxonomic characters.	10. Molecular system of classification.
4. Parasitic adaptations.		

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	**1.** Identification - 4 items (2 non-chordate, 2 chordate)- [Sc. Name, systematic position (3 taxa), generic characters, habit & habitat,] 0.5+0.5+1+0.5=2.5 **(2.5x4=10)** **2.** Cladogram construction based on provided data (Item no 3) -**3** **3.** Field Report (Item no 2) -**3** **3.** LNB (Laboratory Note Book) -**2** **4.** Viva -**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- ***Study** of specimen should include-Scientific name, common name, Taxa as per theory syllabus, Habit (Nutritional, ecological, Reproductive, special habit if any) and Habitat (Distribution, endemic / cosmopolitan/sporadic, climatic type), Conservation status (if available), Generic character only, economic importance (if any).*
- *LNB should be prepared (item 1 & 3) in inter-leaf practical note book with date & Teacher's sign.*
- *Album should be prepared on item 4 & 5.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VII Edition. Thompson Brooks Cole (International Edition)
2. Barnes, R.S.K., Callow, P., Olive, P. J. W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science
3. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition.
4. Young, J. Z. (1981). The Life of Vertebrates. 3rd Ed. Oxford university press.
5. Pough H. Vertebrate life, VIII Edition, Pearson International.

6. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
7. Hall B.K. and Hallgrimsson B. (2008), Strickberger's Evolution. 4th Edition. Jones and Bartlett Publishers Inc.
8. Nelson, J. S. (2006). Fishes of the World, Wily.
9. Chattopadhyay, S (2014) LIFE: Evolution, adaptation, ethology, 2nd Ed, Books & Allied.
10. Lomolino, M. V. et al (2010) Biogeography, 4th Edition, Sinauer Associates.
11. Simpson, G G (2012) Principles of animal taxonomy, Scientific publishers.
12. Mayr, E and Ashlock P D (2014) Principles of systematic zoology, 2nd, McGraw-Hill Education.
13. Verma, A (2017) Principles of animal taxonomy, 1st Ed, Narosa.
14. Ghosal, S (2020) Taxonomy Principle and Problems, 1st Ed, Techno world.
15. Quicke, Donald L (1993) Principles and Techniques of Contemporary Taxonomy (Tertiary Level Biology), 1st Ed, Springer
16. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. I & II. New Central Book Agency (p) Ltd.
17. Kapoor, V C (2019) Theory And Practice Of Animal Taxonomy And Biodiversity 8th Ed, Oxford & IBH Publishing
18. Ruppert, E.E., Fox, R.S., Barnes, R. D. (2003). Invertebrate Zoology: A Functional Evolutionary Approach. VII Edition, Cengage Learning, India
19. Pechenik, J. A. (2015). Biology of the Invertebrates. VII Edition, McGraw-Hill Education
20. Miller S.A. & Harley J.P. (2015) Zoology. 10th Ed., McGraw-Hill Education
21. Hickman C., *et. al.* (2019) Integrated principles of zoology., 18th Ed., McGraw-Hill Education.

Course Name: Ecology

Course Code: BSCHZOOC102

Course Type: **Core (Theory & Practical)**	Course Details: **CC-2**			L-T-P: **4-0-4**	
		CA Marks		ESE Marks	
Credit: **6**	Full Marks:	Practical	Theoretical	Practical	Theoretical

	100	**30**	**10**	**20**	**40**

About the course :

This course will take students on a journey through the physical workings of the Earth, the interactions between species and their environments. The course highlights on some of the important aspects *viz*. growth and survival of populations and communities in different habitats, energy flow in the ecosystems, interactions between the communities, exclusion of niches and consequences of changing environment on the biodiversity.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Know the evolutionary and functional basis of animal ecology.**
- **Understand what makes the scientific study of animal ecology a crucial and exciting endeavour.**
- **Engage in field-based research activities to understand well the theoretical aspects taught besides learning techniques for gathering data in the field.**
- **Analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice.**
- **Solve the environmental problems involving interaction of humans and natural systems at local or global level.**

THEORY (CC-2)

UNIT I: An overview of Ecology, Ecosystems and Biomes (13 Lectures)

1. Introduction and scope of Ecology. Multidisciplinary relevance in current perspective.
2. Structure and function of ecosystem;
3. Abiotic factors affecting survival and sustenance of organisms e.g., water, temperature, light, pH and salinity.
4. Role of limiting factors in survival of biotic components.
5. Major ecosystems of the world: Ecological features, limiting factors, zonation and classification of organisms of fresh water and marine ecosystems.
6. Introduction to Biome: Ecological features of Tundra, Desert, Savannah and Tropical Rain Forest Biomes.
7. Energy flow in ecosystem, food chain and food web.
8. Productivity and ecological efficiencies.
9. Mineralization and recycling of nutrients: C, N, P & S.

UNIT II: Population ecology (13 Lectures)

1. Ecology of populations: Unitary and Modular populations.
2. Unique and group attributes of population: Density, natality, mortality, life tables, fecundity tables, survivorship curves.
3. Unique and group attributes of population: mortality, age ratio, sex ratio, dispersal.
4. Concept of carrying capacity, Factors regulating population dispersal and growth: Exponential and logistic growth.
5. Population regulation: density-dependent and independent factors; r and K strategies.

UNIT III: Biotic community, characteristics and attributes (13 Lectures)

1. Community characteristics: stratification; Dominance, diversity, species richness, abundance, Evenness, Similarity.

2. Diversity and food-web indices.
3. Ecotone and edge effect.
4. Positive interactions: commensalism, proto-cooperation, and mutualism.
5. Negative interactions: parasitism and allelopathy; predation and predator-prey dynamics; herbivory.
6. Interspecific competition and coexistence, Inter and intra-specific; abundance.
7. Niche concept, types, Niche overlap and Resource partitioning.
8. Gause's Principle with laboratory and field examples.
9. Ecological succession: Definition, Process, types, theories of succession.

UNIT IV: Environmental degradation; Biodiversity, Environmental movement etc. (13 Lectures)

1. Environmental degradation : Environmental ethics; Pollution: Air, water and noise pollution and their control; Solid Waste management and EIA ; Natural resources: Mineral, water and forest, their significance and conservation.
2. Biodiversity : Types and Hotspots of biodiversity. Threat and Major drivers of biodiversity. Conservation strategies ; Biodiversity status in India, monitoring and documentation; Biodiversity mapping using GPS, GIS and remote sensing. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value. Application of ecology in management and Conservation programmes.
3. Environmental movement : Role of gender and cultures in environmental conservation. Environmental movements: Bishnois. Chipko, Silent valley, Big dam movements. Environmental education and public awareness, Green bench.

PRACTICAL (CC2)

1. To **measure microclimatic variables** *viz.*, temperature, humidity and light conditions in a microhabitat.
2. **Making an ecosystem** in a wide-mouthed bottle.
3. **Constructing a food web** by observing organisms from a given area.
4. Preparing **an essay (write up)** based on few ecology related publications.
5. **Studying the impact of herbivore** on plant species (planted in pots under specific conditions).
6. **Constructing distribution map of species** of a genus through **GPS** by estimating the coordinates (virtual demonstration).
7. Estimation of the ratio of the producers and consumers.
8. Determination of **pH**, and Dissolved $\mathbf{0_2}$ (Winkler's Method) and Free $\mathbf{CO_2}$ in water.
9. Preparation of **nested quadrate and estimation** of effective quadrate size.
10. **Study of an aquatic ecosystem**: Major Phytoplankton (Up to Family) and zooplankton (Up to Genus).
11. Group discussion or **Seminar presentation** on one or two related topics (Given Below).
12. **Excursion/Field study** in a biodiversity rich area like national park, biosphere reserve, sea shore or nearby places.

Pool of Topics for Group discussion or Seminar presentation		
1. Biodiversity Hotspots.	2. Marine zooplanktons and their ecological importance including oxygen evolution.	3. Negative interactions in Ecosystem

4. Biodiversity mapping.	5. Biodiversity under climate changing scenario.	6. Ecological indices.
7. Niche segregation.	8. Air pollution and climate change.	9. Bioprospecting and Biopiracy.
10. Population explosion.	11. Climate change: threat to food security.	12. Water regulation in marine animals.
13. Carrying capacity.	14. Stratospheric Ozone depletion and marine productivity.	15. Good ozone vs. bad ozone.

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment : (Sl no 8); Principle-1, Method-2, Result and inference-2, Precaution-1 (6) 2. Nested Quadrat : Preparation-2 and estimation-2 (4) OR Estimation of ratio of producers and consumers based on provided data. (4) 3. Identification (one zooplankton & one phytoplankton)- Sc. Name-0.5, systematic position-0.5, Habit & habitat-0.5, characters-0.5 (2 x 2=4) 4. LNB & Excursion Report-2+2 5. Viva-2

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Krebs, C. J. (2001) Ecology (6th edition) Benjamin Cummings.
2. Odum, E.P., (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.
3. Ricklefs, R.E. (2000) Ecology (5th edition) Chiron Press.
4. Southwood, T.R.E. and Henderson, P.A. (2000) Ecologial Methods (3rd edition) Blackwell Sci.
5. Stiling, P. D. (2012) Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.
6. Basu, R.N. (2004). A Compendium of Terms in Ecology and Environment. Naya Udyog.
7. Begon, M., Harper, J. L. & Townsend, C. R. (2006). Ecology: Individuals, Populations and communities. 4th Ed. Blackwell science.
8. Chapman, R. L. and Reiss, M. J. (2000). Ecology - Principles & Application. Cambridge University Press.
9. Dash, M. C., (2001). Fundamental of Ecology. 2nd Ed. Tata McGraw-Hill Company.
10. Enger, E. D. & Smith, B. F. (2008). Environmental Science: A study of Interrelationships. 11th Ed. McGraw-Hill Higher Education.
11. Faurie, C., Ferra, C., Medori, P. & Devaux, J. (2001). Ecology-Science and Practice. Oxford & IBH Publishing Company.
12. Joshi, P.C. & Joshi, N. (2009). A Text Book of Ecology and Environment. Himalaya Publishing House.
13. mith, T. M & Smith, R. L. (2006). Elements of Ecology. 6th Ed. Pearson Education.
14. Van Dyke, F. (2008). Conservation Biology: Foundations, Concepts, Application. 2nd Ed. Springer Science and Business Media.
15. Sharma, P.D. (2017). Ecology and Environment.13th Ed Rastogi Publications.
16. Saha, T.K. (2013) Ecology and Environmental biology, Books & allied.
17. Molles, Jr. M.C. (2005). Ecology: Concepts and Applications. 3rd Ed. McGraw- Hill.
18. Santra, S.C (2005). Environmental Science. New Central Book Agency (P) Ltd. Kolkata.
19. Timbrell, J. (2002). Introduction to Toxicology, 3rd Ed. Taylor & Francis, London.
20. Raven, P. H. & Berg, L.R. (2004). Environment. 4th Ed. John Wiley & Sons, Inc.
21. Mathur, R. (2018) Wildlife conservation and management, 1st Ed, Rastogi Pub.
22. Saha, G.K. and Mazumdar, S.; (2017) Wildlife Biology: An Indian Perspective, PHI Learning.

SEMESTER – II

Course Name: Comparative Anatomy & Physiology of Nonchordates

Course Code: BSCHZOOC201

Course Type: **Core (Theory & Practical)**	Course Details: **CC-3**		L-T-P: **4-0-4**
		CA Marks	ESE Marks

Credit: **6**	Full Marks: **100**	Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course makes a detailed comparison of the anatomy of the different taxa of non-chordates. It also highlights how in the taxonomic hierarchy, there is an increase in-the complexity of structure and function. The course thus gives an overview of the intricate life processes and adaptive radiations in non-chordates.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Develop an understanding of the characters used to classify besides being able to differentiate the organisms belonging to different taxa.
- Acquire knowledge of the coordinated functioning of complex human body machine.
- Have hands on experience of materials demonstrating the diversity of protists and non-chordates.
- Understand the relative position of individual organs and associated structures through dissection of the invertebrate representatives.
- Realize that very similar physiological mechanisms are used in very diverse organisms.
- Get a flavor of research by working on project besides improving their writing skills. It will further enable the students to think and interpret individually.
- Undertake research in any aspect of animal physiology in future.

THEORY (CC-3)

Unit I: Diversity of Tegument and Digestive system (13 Lectures)

1. Cell membrane in protists.
2. Tegument in non-chordates (Helminthes, Annelida, Arthropoda, Echinodermata) and its derivatives (Cuticular appendages in Arthropoda, Byssus thread, shell in Mollusca).
3. Nutrition and feeding modes in protists.
4. Evolutionary changes in digestive system, feeding mechanism and physiology of digestion (from food vacuoles to complex digestive organs) in major phyla of non-chordates.

Unit II: Diversity of Locomotory, Respiratory, Circulatory and Excretory systems (13 Lectures)

1. Diversity of locomotory organs in protists and non-chordates [Cilia & Flagella, Pseudopodia, tentacle, epitheliomuscular cell, seta, parapodia, wing, tube feet].
2. Muscle (annelids, arthropods, mollusca) and modes of locomotion [swimming, looping, gliding, creeping, flying].
3. Structure and diversity of skeletal elements in protists and major non-chordate phyla (Spicule, Spongin, Coral, Exoskeleton, Shell, ossicle/pedicellariae).
4. Diversity of respiratory organs (skin, trachea, gill, book lung, book gill, ctenidia, pulmonary sac, papullae).
5. Modes of respiration and Respiratory pigments in major non-chordate phyla.
6. Circulation and the diversity of circulatory system in major non-chordate phyla
7. Excretion (protists): endocytosis, exocytosis.
8. Excretion and diversity of excretory organs in major non-chordate phyla.

UNIT III: Diversity of Nervous and Reproductive systems (13 Lectures)

1. Nervous system with special reference to diversity in brain and nerve chord in major non-chordate phyla.
2. Neuroendocrine systems, pheromones in different classes of arthropods.
3. Sense organs: mechanoreceptors: photoreceptors, chemoreceptors, thigmoreceptors, rheoreceptors and proprioceptors in major non-chordate phyla.
4. Diversity of the reproductive organs and accessory sex organs (in different classes of annelids and arthropods).
5. Modes of reproduction- asexual and sexual reproduction in major non-chordate phyla.
6. Diversity of larval forms in non-chordates (Trochophore, Zoea, Veliger, Bipinnaria, Brachiolaria).

UNIT IV: Evolution and characteristics of important Non-Chordate taxa (13 Lectures)

1. Affinities of living fossils: *Limulus* and *Peripatus.*
2. Evolutionary significance of Polymorphism and colony formation (Termite).
3. Evolution of Parasitism, Parasitic adaptations and life cycle patterns in parasites belonging to different taxa- A generalized study
4. Invertebrate model organisms (*Planaria, Ascaris, Pheretima, Palaemon, Pila, Asterias*) and their importance.
5. Types of canal systems in sponges and their significance.
6. Torsion and detorsion in Mollusca.
7. Components and functions of water vascular system in echinoderms.

PRACTICAL (CC-3)

1. Study of **slides or models or photographs** of specimens of
   a) Protozoans of agricultural importance (*Bodo, Naegleria, Hyalosphenia, Oxytricha, Vampyrella).*
   b) Coral-reef forming Cnidarians (*Gorgonia, Fungia, Tubipora, Heliopora, Alcyonium*)
   c) Plant parasitic nematodes (*Meloidogyne, Radopholus*)
   d) Nematodes used as models in experimental biological research-*Caenorhabditis elegans*
2. Dissection of ***Periplaneta*** to expose- (a) Digestive, (b) Nervous and (c) Reproductive system.
3. Dissection of ***Palaemon*** to expose- Appendages and Statocyst (mount).
4. Dissection of ***Pila*** to expose the Digestive system and mount Radula.
5. Study of **larval forms**: *Ephyra*, *Planula*, *Trochophore*, *Zoea*, Metazoea, *Veliger*, Bipinnaria, *Echinopluteus*.
6. Some **videos to develop** understanding on the animals of different taxa.
7. Group discussion or **Seminar presentation** on following related topics :

Pool of Topics for Group discussion or Seminar presentation :	
1. Tree of Life.	7. Living fossils.
2. Connecting links	8. Polymorphism.
3. Parthenogenesis in animals.	9. Water regulation in marine animals
4. Helminth infection in human.	10. Parasitic adaptations.
5. Zoonotic diseases	11. Evolution of terrestrial animals.
6. Locomotory organs in non-chordates	12. Respiratory organs in non-chordates

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)

5. Assessment based on practical topics (class test)-**10** **6.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **7.** Attendance and Participation in class-**5** **8.** Practical skills, laboratory reports, etc-**5**	1. Dissection- (Sl no 2, 3, 4); Dissection-4, Display-1, Drawing-1.5, Labelling-1.5. (**8**) 2. Mounting (Sl no 2 and 3)- Preparation-2, Drawing-1, Labelling-1. (**4**) 3. Identification (Sl no 1 and 5, 1 item from each gr)- Sc. Name-0.5, Characters-1, Habit & habitat-0.5, (2x2=**4**) **4.** LNB -**2** **5.** Viva-**2**

NOTE :

- *Study of specimen should include-Scientific name, Habit and Habitat, Diagnostics feature, importance/values if any.*
- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Barrington, E J W. (1967) Invertebrate structure and function, Nelson, London.
2. Barnes, R. D. (1968) Invertebrate Zoology, 2nd Ed. Saunders, Philadelphia.
3. Hyman, L H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.
4. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002) The Invertebrates: A New Synthesis. III Edition. Blackwell Science.
5. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. I . New Central Book Agency (p) Ltd.
6. Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
7. Marshall, A.J and Williams, W.D. (1995) Text book of Zoology-Invertebrates. VII Ed., Vol. I, A.L.T.B.S. Publishers.
8. http://abacus.bates.edu/acad/depts/biobook/AnimPhyl.pdf
9. Miller S.A. & Harley J.P. (2015) Zoology. 10Ed., McGraw-Hill Education
10. Ruppert, E.E., Fox, R.S., Barnes, R. D. (2003). Invertebrate Zoology: A Functional Evolutionary Approach. VII Edition, Cengage Learning, India
11. Pechenik, J. A. (2015). Biology of the Invertebrates. VII Edition, McGraw-Hill Education
12. Nigam, H C (2020) Biology of Non-chordates, Vishal publication
13. Hickman C., *et. al.* (2019) Integrated principles of zoology., 18Ed., McGraw-Hill Education.

Course Name: Cell Biology and Histology

Course Code: BSCHZOOC202

Course Type: **Core (Theoretical & Practical)**	Course Details: **CC-4**		L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides a detailed insight into basic concepts of cellular structure and function. It also gives an account of the complex regulatory mechanisms that control cell function.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Understand the functioning of nucleus and extra nuclear organelles and understand the intricate cellular mechanisms involved.
- Acquire the detailed knowledge of different pathways related to cell signalling and apoptosis thus enabling them to understand the anomalies in cancer.
- Develop an understanding how cells work in healthy and diseased states and to give a 'health forecast' by analyzing the genetic database and cell information.
- Get new avenues of joining research in areas such as genetic engineering of cells, cloning, vaccines development, human fertility programme, organ transplant, etc.
- Understand how tissues are produced from cells in a normal course and about any malfunctioning which may lead to benign or malignant tumor.

THEORY (CC-4)

UNIT I: The structure and organelles of prokaryotic and eukaryotic cells (13 Lectures)

1. Cell biology, its scope in modern perspective.
2. Cell theory and its modern version and interpretation.
3. General structure of prokaryotes, bacteria, archaea and eukaryotes.
4. Extra-nuclear cell organelles: Ultrastructure and functions of Endoplasmic reticulum, Ribosome, Golgi apparatus, Lysosome, Peroxisomes.
5. Semi-autonomous organalle: Mitochondria: Origin, structure, composition, and function.
6. Cytoskeleton : Composition, assembly and functions; Microtubules, Intermediate Filament and microfilaments; MT *vs* Actin filament ; Cytoskeletal organization-centrosome cycle.
7. Nucleus: size, shape, structure and functions of interphase nucleus ; Ultrastructure of nuclear membrane and pore complex ; Nucleolus: general organization.

UNIT II: Cell membrane and transport mechanism (12 Lectures)

1. Cell membrane organization: origin, structure, composition, models and function.
2. Fluid mosaic model : Architecture and significance; Lipid Composition, inner and outer leaflets ; Structure and functions of membrane proteins : Integral, peripheral and lipid-anchored membrane proteins.
3. Cell junction : Junctional complexes, microvilli, desmosomes and plasmodesmata.
4. Transport across membrane : Diffusion and osmosis, Active and passive transport, Endocytosis and exocytosis.

UNIT III: Cell cycle, cell signalling and cell culturing (12 Lectures)

1. Cell cycle : cell division- mitosis and meiosis ; Cell division check points and their regulation ; Mutations in the genes (p53, pRB) that regulate cell cycle and division and their role in causing cancer ; Programmed cell death (Apoptosis).
2. Cell signalling through GPCR.
3. Cell culture : Types of cell culture- monolayer and suspension culture ; Basic Types and characteristics of tissue culture media ; Subcellular fractionation by differential centrifugation.

UNIT IV: Structural and functional significance of animal tissues (15 Lectures)

1. Introduction to tissues.
2. Epithelial tissue : Types, structure and characteristics, Surface modifications (cilia, villi, micro-villi) ; Basement membrane: structure and characteristics ; Exocrine and endocrine glands: types and structure.
3. Connective tissue : Structure and function of loose, dense and adipose tissue ; Cartilage and bone: classification, and ultra-structure ; Blood: plasma, blood cells, lymph– their structural and functional details ; Structure and function of spleen.
4. Muscular tissue : ultrastructure of smooth, skeletal and cardiac muscles ; Muscle-tendon attachment.
5. Nervous tissue : Structure and classification of neurons ; Types of supporting (glial) cells and their function ; Types of sensory nerve endings ; Membranes of the brain and spinal cord.

PRACTICAL (CC-4)

1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video.
2. Study of chromosome segregation in mitosis and meiosis through permanent slide.
3. **Preparation of chromosome squashes** from grasshopper/cockroach testes for the observation of stages of meiosis.
4. **Microscopic study:** Study of types of tissue through permanent slides-Epithelial tissue, Connective tissue, Muscular tissue, Nervous tissue, etc.
5. **Histological Slide Preparation through microtomy**: Study of histology of tissues by preparing permanent stained slides (mammalian) - Liver, Kidney, Pancreas, Intestine & Spleen.
6. **Experiment :** Isolation (Ethanol ppt) and estimation (Diphenylamine reaction) of DNA (blood/liver tissue).
7. **Group discussion** or **Seminar presentation** on following topics :

Pool of Topics for Group discussion or Seminar presentation :	
1. Bone marrow transplant. 2. Recent advances in tissue culture and engineering. 3. Somatic hybridization. 4. Neurodegenerative disorder. 5. Popular cell lines and their importance.	6. Apoptosis. 7. Mutations and cancer. 8. Epithelial tissue and its importance. 9. Stem cell technology. 10. Stem cell & IPS cells.

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Histological preparation- (Sl no 5); Tissue fixation-1, Block preparation-2, Sectioning-2, Slide preparation-1, Staining-2 (**8**) OR, Experiment-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) 2. Squash preparation (Sl no 3)- Preparation-2, Identification-1, characterization-1. (**4**) 3. Identification (Sl no 2 and 4, 1 item from each gr)- Identification-0.5, Characters-1.5 (2x2=**4**) **4.** LNB -**2,** **5.** Viva-**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings

1. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006) Cell and Molecular Biology (8th edition) Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. (5th edition) ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M.; Kleinsmith, L.J.; Hardin. J. and Bertoni, G. P. (2009) The World of the Cell. (7th edition) Pearson Benjamin Cummings Publishing, San Francisco.
5. Verma, P.S. and Agarwal, V.S.; (2016) Cell Biology, S.Chand Pub.
6. Rastogi, S.C. (2019) Cell biology, New Age Int. Pub.
7. Rastogi, V.B. (2021) Cell Biology, 1st Ed, MedTech.
8. Gupta, R. and Makhija, S. and Toteja, R. (2018) Cell biology: Practical Manual, Prestige Publishers.
9. Channarayappa (2010) Cell Biology, 1st Ed, Universities Press.
10. Alberts, B (2013) Essential cell biology, 4th Ed, Garland science.
11. Rej, S.K.; (2015) General concepts of Histology and endocrinology, NCBA.
12. Berry, A.K.; (2015) A textbook of Animal Histology, Emkay pub.
13. Gunasegaran J.P., (2016) Textbook of Histology: A practical guide, 3rd Ed, Elsevier India
14. Mescher, A., (2013) Junqueira's Basic Histology: Text and Atlas, 13th Ed, LANGE
15. Kiernan, J. A. (1999). Histology and Histochemical Methods: Theory & Practice. 3 rd Ed. Butter work Heinemann.

SEMESTER – III

Course Name: Comparative Anatomy & Physiology of Chordates

Course Code: BSCHZOOC301

Course Type: **Core (Theory & Practical)**	Course Details: **CC-5**		L-T-P: **4-0-4**
		CA Marks	ESE Marks

Credit: **6**	Full Marks: **100**	Practical **30**	Theoretical **10**	Practical **20**	Theoretical **40**

About the course :

The course offers insight into the physiology of chordates while giving an account of their anatomy. This course also explores vertebrate morphology with the aims of understanding major events in the history of vertebrate evolution and integrating the morphology of vertebrates with their ecology, behaviour and physiological adaptation in diverse habitats. Thermal relations encountered in endo- and ectothermic animals will be explained. Selective pressures that shape to different physiological phenotypes will also be addressed in the course.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Develop an understanding of the evolution of vertebrates thus integrating structure, function and development.
- Have an overview of the evolutionary concepts including homology and homoplasy, and detailed discussions of major organ systems.
- Understand how cells, tissues, and organisms function at different levels. The course content also provides the basis of understanding their abnormal function in animal and human diseases and new methods for treating those diseases.
- Develop an understanding of the related disciplines, such as cell biology, neurophysiology, pharmacology, biochemistry etc.
- Get a flavor of research besides improving their writing skills and making them well versed with the current trends. It will further enable the students to think and interpret individually due to different aspects chosen.
- Undertake research in any aspect of animal physiology in future.

THEORY (CC-5)

UNIT- I: Structure and function of integument, skeletal and muscular systems (11 Lectures)

1. **Integumentary system** (Comparative Anatomy and functional significance): Integument from fishes to mammals: Scales of fishes and reptiles, Feather of birds, Epidermal glands from fish to mammals. Horn, hoof, claw, nail, hair.
2. **Skeletal system (Comparative Anatomy and functional significance):** Axial and appendicular skeleton from fishes (bony) to mammals. Pelvic and pectoral girdles from fishes (bony) to mammals.
3. **Muscular system:** Types of muscles from fishes to mammals, Properties of skeletal muscle. Physiology of skeletal muscle contraction.

UNIT-II: Structure and function of digestive, circulatory and endocrine systems (13 Lectures)

1. **Digestive system**-Comparative anatomy of jaw suspension. Dentition in mammals. General Structure and diversity of alimentary canal and digestive glands in vertebrates. Physiology of ruminating stomach. Physiology of digestion with special reference to enzymes involved in vertebrates. Concept of BMR.
2. **Circulatory system:** Evolution of aortic arches and their significance. Visceral arches and their functional significance in vertebrates. Structure and evolution of heart in vertebrates. Functional anatomy of human heart w.r.t. junctional tissues and valves, cardiac cycle, cardiac output, neural Integration of cardiovascular function, electrocardiogram. Composition of blood, biochemistry of ABO blood groups, Rh and MN group, Mechanism of blood coagulation (intrinsic and extrinsic pathway).
3. **Endocrine glands:** Comparative structure & function of pituitary, thyroid gland in chordates. Mechanism of hormone action.

UNIT-III: Structure and function of respiratory and excretory systems (14 Lectures)

1. **Respiratory system**-Types and structure of fish gill. Accessory respiratory organs in fishes. Transitional respiration in Dipnoans. Transition from water to air breathing: w.r.t. comparative anatomy and functional significance of lungs in amphibians, reptiles, birds and mammals. Breathing and gas exchange, gas transport, Hb and O2 dissociation,
2. **Excretory system**: Types and development of kidneys and their ducts in anamniotes and amniotes. Nephron- structure, types and their function. Physiology of excretion (Ammonotelic, Uricotelic, Ureotelic) in vertebrates; Urine formation in mammal, counter current mechanism, Role of ADH and RAAS in excretion. Mechanisms of osmoregulation in fresh water and marine organisms (fishes, birds and mammals); stenohalinity and euryhalinity.

UNIT- IV: Structure and function of nervous and reproductive systems (14 Lectures)

1. **Nervous system**: Introduction to central and peripheral nervous (autonomic) systems. Structural and functional evolution of brain and spinal cord in various classes of vertebrates. Types of cranial nerves in major classes of vertebrates. Structure, type and functions of neuron, Ionic basis of resting and action potentials, Nerve impulse and its transmission (myelinated and non-myelinated). Synapse and synaptic transmission, Structure of reflex arc and mode of Reflex action. Types of sense organs- vision, hearing, taste, smell and touch in chordates. Mechanism of thermoregulation in homeotherms and poikilotherms.
2. **Reproductive system**: Comparative details of testes and ovaries from fishes to mammals; Reproductive strategies (ovipary, ovo-vivipary and vivipary) in vertebrates, Estrous and menstrual cycle, Gestation, parturition, lactation and Birth control (in mammals).

PRACTICAL (CC–5)

1. Temporary mount of external scales in fishes (cycloid, placoid, ganoid, ctenoid).
2. Comparative study of brain with the help of models and charts.
3. Comparative study of urinogenital system with the help of models and charts.
4. Comparative study of heart with the help of models and charts.
5. Study of axial and appendicular skeleton of vertebrates.
6. Expose and display afferent Branchial system, weberian ossicles and IX-X^{th} cranial nerve of fish (carp).
7. Quantitative determination of nutrients: Carbohydrate (Anthrone method), Proteins (Lowry's method), Cholesterol (Solkowski's test).
8. Estimation of haemoglobin.
9. Counting of different types of blood cells (RBC & WBC) using haemocytometer.
10. Submit a report based on-Effect of temperature on rate of opercular movement of fish.
11. Group discussion or Seminar presentation on topics given below :

Pool of Topics for Group discussion or Seminar presentation :		
1. Evolution of terrestrial animals	2. Thermoregulation in vertebrates	3. Osmoregulation in fish
4. Estrous and menstrual cycle	5. Blood groups and their importance	6. Scales in fishes and reptiles
7. Deep-sea Adaptation in mammals	8. Kidney development in vertebrates	9. Evolution of aortic arches
10.Cranial nerves in vertebrates	11. Integumentary derivatives in bird and	12. Jaw suspension in

	mammals	vertebrates

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment (Sl no 7, 8, 9)- Performance in experiment-3, Principle-1, Procedure-2 result and inference-2, (**8**) OR, Dissection (Sl no 6)- Exposing and display-5, Drawing-2, Labelling-1. (**8**) 2. Identification (Sl no 1 to 5)- Naming-0.5, Characters-1.5 (2x3=**6**) **3.** LNB and Project report -2+2 = **4** **4.** Viva-**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report should be done on specified topics and distributed among students.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Weichert, C.K. (1970) Anatomy of Chordates (4th edition).
2. Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition). S. Chand & Company Ltd. New Delhi.
3. Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
4. Vander, A.; Sherman, J. and Luciano, D. (2003) Human Physiology (9th edition).
5. Randall, D. *et al*. (2002) Eckert Animal Physiology (5th edition) Freeman.
6. Hill, R.W. *et al.* (2008) Animal Physiology (3rd edition) Sinaur Associates.
7. Guyton, A.C. *et al.* (2008) Textbook of Medical Physiology (12th Ed) W.B. Saunders Co.
8. Withers, P.C. *et al.* (1992) Comparative Animal Physiology (1st edition) Brooks Cole.
9. Kent, G. C. and Carr, R. K. (2018) Comparative anatomy of vertebrates (9Ed), Mc Graw Hill.
10. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. II. New Central Book Agency (p) Ltd.
11. Miller S.A. & Harley J.P. (2015) Zoology. 10Ed., McGraw-Hill Education
12. Hickman C., *et. al.* (2019) Integrated principles of zoology., 18th Ed., McGraw-Hill Education.
13. Hildebrand, M. (1995). Analysis of Vertebrate Structure. John Wiley & Sons.
14. Chaki, K.K. Kundu, G. & Sarkar, S. (2005). Introduction to General Zoology. Vol. 2. New Central Book Agency (P) Ltd. Kolkata.
15. Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.
16. Kent, G. C. & Carr, R. K. (2001). Comparative anatomy of the Vertebrates. 9th Ed. Mc Graw Hill.
17. Nelson, J.S., (2006) : Fishes of the World, 4th Edn., Wiley.
18. Romer, A. S. & Parsons, T. S. (1986). The vertebrate body. 6th Ed. Saunders College Publishing.
19. Pough, F.H., Heiser, J.B. & McFarland W. N. (1985). 3rd Ed. Vertebrate Life. Macmillan Publishing Company, New York.
20. Parker, T. J. & Haswell, W. (1972). Text Book of Zoology , Volume II: Marshall and Willam (Eds.) 7th Ed. Macmillan Press,London.
21. Young, J. Z. (1981). The Life of Vertebrates. 3rd Ed. ELBS.
22. Weichert, C. K. & Presch, W. (1984). Elements of Chordate Anatomy. Tata-McGraw Hill Pub. Comp.

Course Name: Genetics

Course Code: BSCHZOOC302

Course Type: **Core (Theory & Practical)**	Course Details: **CC-6**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course is designed to revise basic concepts of Genetics and then move on to advanced concepts. Some key aspects include the

mechanism of inheritance, gene structure and function, sex chromosomal and autosomal anomalies, aspects of human genetics, etc. will be covered. A strong emphasis will be laid on the modern tools and techniques used in genetics.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Understand how DNA encodes genetic information and the function of mRNA and tRNA.
- Apply the principles of Mendelian inheritance.
- Understand the cause and effect of alterations in chromosome number and structure.
- Relate the conventional and molecular methods for gene manipulation in other biological systems.
- Discuss and analyse the epigenetic modifications and imprinting and its role in diseases.
- Get new avenues of joining research in related areas such as genetic engineering of cells, cloning, genetic disorders, human fertility programme, genotoxicity, etc

THEORY (CC-6)

UNIT I: Concept of Genes and Genomics (13 Lectures)

1. Genetics: scope and importance.
2. Classical and Modern concept of Gene (Cistron, muton, recon), Alleles etc.
3. Mendel's laws of inheritance
4. Chromosomal basis of inheritance and its applications.
5. Mendelian traits in man: Sex linked, Sex limited, Sex influenced inheritance
6. Exceptions to Mendelian Inheritance: Incomplete dominance, Codominance, Multiple allelism, Lethal alleles, Pleiotropy, Epistasis - Recessive, Duplicate recessive, Dominant and Duplicate dominant. Phenocopy, Polygenic inheritance.

UNIT II: The recombination and interaction of Genes (13 Lectures)

1. Linkage crossing over & chromosomal mapping: Linkage and crossing over, Cytological basis of crossing over, Molecular mechanisms of crossing over including Holliday model of recombination, Recombination frequency as a measure of linkage intensity, Two factor and three factor crosses, Interference and coincidence, Somatic cell hybridization.
2. Extra chromosomal Inheritance: Criteria for extra-chromosomal inheritance, Mitochondrial mutations in *Saccharomyces*, Infective heredity in *Paramecium* and Maternal effects in snail.
3. Sex-Determination: Sex Chromosomes and sex-linkage: XX/XO, XX/XY, ZZ/ZW and haploidy/diploidy types, Dosage Compensation in *Drosophila* and Man.
4. Structural and numerical alterations of chromosomes.

UNIT III: Regulation of Gene expression, regulation and mapping (13 Lectures)

1. Gene Expressions and regulation**:** One gene-one enzyme hypothesis /one polypeptide hypothesis.
2. Concept of operon of bacteria (Lac & Trp).
3. Transposon in Bacteria, maize and human.
4. Transformation, Conjugation, and transduction.
5. Genetic complementation and mapping.
6. Basic idea of Genetic screens as a basis for functional genomics.
7. Mutagenesis (physical and chemical induced), mutation detection test (AMES, CLB, Attatched X),

Recombination assay (FLP-FRT & Cre-Lox System).

8. Utility (basic concept) of the model organisms as genetical research tool: *Arabidopsis thaliana*, *Caenorhabditis elegans*, *Drosophila melanogaster* & *Mus musculus*.

UNIT IV: Human Population Genetics and Genetic Counselling (13 Lectures)

1. Human Genetics: Pedigree analysis; Karyotype, banding (C, R and G) and nomenclature of chromosome subdivisions.
2. Genetic disorders: chromosomal aneuploidy (Down, Turner and Klinefelter syndromes).
3. Chromosome translocation (Chronic Myeloid Leukemia) and deletion ("cry du chat" syndrome).
4. Gene mutation (sickle cell anemia). Genetic counselling.
5. Modern techniques in Genetics: Principle and applications of: Polymerase Chain Reaction. DNA Sequencing, Southern, Western & Northern Blotting, *In situ* Hybridization, FISH, SNPs, RFLPs, ESTs, STS and Oligonucleotide arrays. Nuclear transplantation, stem cells and IPS cells.

PRACTICAL (CC-6)

1. Application of probability in the law of segregation with coin tossing method.
2. Study of Mendelian Inheritance using suitable examples. Verify the results using Chi-square test (Goodness of fit).
3. Pedigree analysis of some human inherited traits.
4. Prepare a **study/survey report** on-
   (a) Frequency of the following genetic traits in human: widow's peak, attached ear lobe, dimple in chin, hypertrichosis, colour blindness, PTC tasting and
   (b) Study of mode of inheritance of the following traits by pedigree charts – attached ear lobe, widow's peak
5. Familiarization with techniques of handling *Drosophila*, identifying males and females; observing wild type and mutant (white eye, wing less) flies, and setting up cultures
6. Demonstration of law of segregation (monohybrid and test cross) sex-linked inheritance in *Drosophila* making a cross between white eye dumpy winged or sepia eyed and wild type flies (criss-cross inheritance).
7. Demonstration of lethal alleles using Curly (Cy) mutant in *Drosophila.*
8. Demonstration of multiple allelism by showing mutants of white eye series in *Drosophila*
9. Study of structural chromosome aberrations (dicentric, ring chromosomes and inversions in polytene chromosomes) from prepared slides/photographs.
10. Study of human karyotypes and numerical alterations (Down syndrome, Klinefelter syndrome and Turner syndrome).
11. Extraction of Genomic DNA from bacteria (Demonstration).
12. Group discussion or Seminar presentation on topics given below.

Pool of Topics for Group discussion or Seminar presentation :		
1. Genome modification/ editing	2. Genetic control of sex determination.	3. Genetic Recombination

4. Mutagenesis	5. Diseases due to chromosomal anomalies	6. Stem cell technology
7. Complementation mapping	8. Recent advances in gene cloning	9. Genetic counseling
10.DNA markers and Genetic diversity	11. Epigenetic disorders in humans	12. Chromosome translocation

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Chi-Square test based on provided data-(Sl no 2)- Analysis-4, Inference-1 (**5**) 2. Pedigree analysis on provided chart-(Sl no 3)-Description-2, analysis-2 and mode of inheritance-1 (**5**) 3. Identification based on provided chart/slide (Sl no 4 to 10)- Naming-0.5, Characters-1.5 (2x2=**4**) **4.** LNB and Survey report -2+2 = **4** **5.** Viva-**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Survey report should be done on specified topics and distributed among students.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings :

1. Russell, P.J. (2010) Genetics (Benjamin Cummings).
2. Pierce B.A. (2012) Genetics:A conceptual approach, 4Ed, W. H. Freeman and Co. Ltd.
3. Singh B.D.(2018) Fundamentals of genetics, Kalyani Publishers.
4. Miglani G.S. (2008) Fundamentals of genetics, Narosa publication.
5. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. (VIII edition) Wiley India.
6. Snustad, D.P. and Simmons, M.J. (2009). Principles of Genetics. (V edition) John Wiley and Sons Inc.
7. Klug, W.S., Cummings, M.R. and Spencer, C.A. (2012). Concepts of Genetics. (X edition) Benjamin Cummings
8. Carroll S.B.; Doebley J.; Griffiths, A.J.F. and Wessler, S.R. (2018) An Introduction to Genetic Analysis. W. H. Freeman and Co. Ltd.
9. Banerjee P.K. (2011) Problems on genetics, molecular genetics and evolutionary genetics,2Ed, NCBA

Course Name: Biochemistry

Course Code: BSCHZOOC303

Course Type: **Core (Theory & Practical)**	Course Details: **CC-7**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides an introduction to the structure of biomolecules with emphasis on the techniques used for structure determination and analysis. The course covers basic aspects of sample preparation for analysis and aims to enlighten the students

how structural information can be utilized for better understanding of biological processes.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Understand about the importance and scope of biochemistry.
- Understand the structure and biological significance of carbohydrates, amino acids, proteins, lipids and nucleic acids.
- Understand the structure and function of immunoglobulins.
- Understand the concept of enzyme, its mechanism of action and regulation.
- Understand the process of DNA replication, transcription and translation.
- Learn the preparation of models of peptides and nucleotides.
- Learn biochemical tests for amino acids, carbohydrates, proteins and nucleic acids.
- Learn measurement of enzyme activity and its kinetics.

THEORY (CC-7)

UNIT I: Introduction to Biochemistry and biology of Carbohydrates (12 Lectures)

1. Introduction, scope and importance of Biochemistry.
2. Basic concept of Bioenergetics and redox system.
3. Water as biological solvent.
4. Carbohydrates: Structure (isomeric forms of hexose) and biological importance.
5. Classification - Reducing and non-reducing sugars, monosaccharides, Oligosaccharides (Disaccharides), Polysaccharides (glycogen, peptidoglycans and glycosaminoglycans).
6. Catabolism of carbohydrates and ATP production: Glycolysis, Krebs cycle, Functioning of Electron transport system and ATP synthesis (Paul Boyer's model), Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.

UNIT II: Lipids: Structure and Biological significance (13 Lectures)

1. Lipids: Structure and Biological significance.
2. Fatty acids- Types and nomenclature (saturated and unsaturated).
3. Classification- Triglycerides, Phospholipids, Sphingolipids, Cholesterol,
4. Metabolism: β- oxidation of saturated fatty acids with even and odd number of carbon atoms, ω-oxidation -significance, Biosynthesis of palmitic acid; Ketogenesis.

UNIT III: Biology of Proteins and Enzymes (16 Lectures)

1. Proteins: Composition and Biological significance.
2. Amino acids -Structure, classification and properties, Ionization, titration curve, pK and pI.
3. Physiological importance of essential and non-essential amino acids.
4. Catabolism of amino acids: Transamination, Deamination, Urea cycle.
5. Structural organization (primary, secondary, tertiary, quartarnary structure, Ramachandran plot, motif, domain).
6. Biological Bonds: H-bond, Di-sulphide bond,ionic bond, vander-waal interaction, hydrophilic and hydrophobic bonds, covalent bond.

7. Enzymes: Nomenclature and classification, general properties, specificity of enzyme action, cofactors, isozymes, clinical and industrial application.
8. Mechanism of enzyme action (ES complex and lowering of activation energy, chemical catalysis).
9. Kinetics (determination of Km and Vmax using Michaelis-Menten and Lineweaver-Burk plots).
10. Regulation of enzyme activity: substrate level, Feed-back, allosteric regulation, role of covalent modifications.
11. Enzyme inhibition-Competitive, Non-Competitive, Un-Competitive, Suicide.
12. Ribozymes and concept of abzymes.

UNIT IV: Nucleic acids and chromosome (11 Lectures)

1. Structure -Bases, nucleosides, nucleotides and sugar pucker.
2. DNA structure: Conformation (A, B and Z), Base pairing, Structural Determination using X-ray crystallography.
3. DNA double helix (Watson and Crick model).
4. Chromosomes, Chromatin, Organization of nucleosomes and higher order structure, Histones, Histone-modifications.
5. Structure and Function of RNA, Ribosomal RNA (rRNA), Transfer RNA (tRNA), Messenger RNA (mRNA), Noncoding RNAs.

PRACTICAL (CC-7)

1. Ninhydrin test for α-amino acids.
2. Determination of pK and pI values of glycine.
3. Benedict's test for reducing sugars (Qualitative).
4. Iodine test for starch.
5. Determination of acid value of oil.
6. Determination of the activity of enzyme (Urease/salivary amylase).
   - 6.1. Effect of [S] and determination of Km and Vmax.
   - 6.2. Effect of temperature.
   - 6.3. Effect of time.

7. **Group discussion or Seminar presentation** on topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Advances in DNA hybridization	2. Essential and non-essential amino acids	3. Important body lipids
4. Vital body enzymes	5. Proteins are the key regulators-Justify	6. Carbohydrate and life
7. Hormonal disorders	8. Structural prediction of DNA by XRD	9. Enzyme kinetics
10. Biological bonds	11. Chemiosmosis and redox potential and ATP production	12. Fatty acid oxidation

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)

1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment A (Sl no 2, 4,5,6)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) 2. Experiment B (Sl no 3, 8, 9)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) **3.** LNB -**2** **4.** VIVA-**2**

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings :

1. Nelson, D.L. & Cox, M.M. (2017) Lehninger's Principles of Biochemistry (7th Ed) Worth.
2. Berg, J.M.; Tymoczko, J.L. and Stryer, L. (2012) Biochemistry (7th edition) Freeman.
3. Zubay, G. (2017) Biochemistry (4th edition) McGraw-Hill.
4. Conn, E.E.; Stumpf, P.K.; Bruening, G. and Doi, R.H. (2006) Principles of Biochemistry (5th edition) Wiley
5. Chatterjea M.N & Shinde R. (2012) Textbook of Medical biochemistry, 8Ed, Jaypee
6. Satyanarayana U & Chakrapani U. (2020) Biochemistry, 5Ed, Elsevier/Books & allied.
7. Murray R.K. et al., (2012) Harper's illustrated biochemistry, 29Ed, Lange
8. Rao AVVSR (2009) Textbook of Biochemistry, UBS Publishers' Distributors Pvt. Ltd.
9. Voet, D., Voet, J. G. & Pratt C. W. (1999). Fundamentals of Biochemistry. Upgrade edition. John Wiley & Sons.
10. Hames, B.D. and Hooper, N.M. (2000). Instant Notes in Biochemistry. II Edition, BIOS Scientific Publishers Ltd., U.K.

Course Name: Beekeeping

Course Code: BSCHZOOSE301

Course Type: **SE (Theory)**	Course Details: **SEC-1**			L-T-P: **4-0-0**	
Credit: 4	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**10**	**-**	**40**

About the course :

This course tells the students what tools and equipment will be needed, the main activities in the beekeepers year, the laws and by laws governing keeping bees; discover the principles of sustainable beekeeping and how these principles can guide your Beekeeping into an enduring practice.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Explain what are the prerequisite to get started in beekeeping.
- Describe the laws around beekeeping in Vancouver.
- Discuss the responsibilities of urban beekeepers.
- Identify where to purchase equipment and demonstrate how to assemble it.
- Name and identify major parts of the honeybee such as the stinger or mandibular parts.
- Describe bee biology and anatomy from the perspective of managing bees.
- Describe the importance of wax and identify what to look for in comb during hive inspections.

THEORY (SEC-1)

Unit I: **Introduction to Apiculture** **(12 Lectures)**

1. History of Bees and Beekeeping,
2. Systematics, Bee species,
3. Bee morphology (*Apis indica*),
4. Colony organization and Polymorphism,
5. Caste system, Division of labour,
6. Bee pasturage
7. Foraging and Honey flow periods.

Unit II: **Bee keeping as an occupation** **(13 Lectures)**

1. Extent of Beekeeping in West Bengal and India,
2. Limitations on the development of beekeeping,
3. Advantages of extensive Beekeeping.
4. Beekeeping equipments: Bee box and tools and initiation into keeping a colony,
5. The future of beekeeping.

Unit III: **The first step in beekeeping** **(14 Lectures)**

1. Purchase of a colony,
2. the Apiary site, how to manage (Seasonal and Routine) a colony, the manipulation of a colony.
3. Bee products: Honey, Bee wax, Pollens, Royal Jelly, Propolis and Bee venom.
4. Taking care of bee (brood and adult) diseases and enemies.
5. Establishment of a colony.
6. Bee flora and planned pollination services (Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens)

Unit IV: **Entrepreneurship in Beekeeping industry** **(13 Lectures)**

1. Harvesting and marketing of bee products.
2. Bee Keeping Industry – Recent Efforts.
3. Important Institutions pertinent to Apiculture: National Bee keeping.

Recommended readings

1. Abrol , D. P. (1997) Bees and Beekeeping. Kalyani Publisher, New Delhi.
2. Abrol, D. P. (2010) A Comprehensive guide to Bees and Beekeeping. Scientific Publisher, New Delhi.
3. Withhead, S. B. (2010) Honey bees and their management Axis books Publisher, Jodhpur.
4. Nagaraja, N. and Rajagopal , D. (2013) Honey bees: Diseases, Parasites, Pests, Predator and their management. M.J.P Publisher, Chennai.
5. Dharamsing and Singh, D. P. A Handbook of Beekeeping, Agrobios India (Publisher),Jodhpur.

Course Name: Public Health and Hygiene

Course Code: BSCHZOOSE302

Course Type: **SE (Theory)**	Course Details: **SEC-1**			L-T-P: **4-0-0**	
Credit: 4	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**10**	**-**	**40**

About the course :

The course designed for public health and hygiene at graduation level will give understanding for health hygiene, dietary issues, diseases related to malnutrition, communicable and non-communicable diseases.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Identify current national and global public health problems.**
- **Aware about the issues of food safety, water safety, vaccination, exercise and obesity, exposure to toxins.**
- **Frame a public health plan during any epidemic or spread of infectious disease etc.**
- **Analyze case studies of infant mortality and obesity.**
- **Assess the health inequalities with regard to gender, race, ethnicity, income etc.**

THEORY (SEC-1)

Unit-I: Maintenance of personal and community hygiene (13 Lectures)

1. Introduction to public health and hygiene- determinants and factors.
2. Pollution and health hazards; water and air borne diseases.
3. Radiation hazards: Mobile Cell tower and electronic gadgets (recommended levels, effects and precaution).
4. Role of health education in environment improvement and prevention of diseases.
5. Personal hygiene, oral hygiene and sex hygiene.
6. Importance and maintenance Community Hygiene.

Unit-II: Nutrient deficiency diseases (13 Lectures)

1. Classification of food into micro and macro nutrients.
2. Balanced diet, dietary plan for an infant, normal adult, pregnant woman and old person.
3. Importance of dietary fibres.
4. Significance of breast feeding.
5. Malnutrition anomalies – Anaemia (Iron and B12 deficiency), Kwashiorkar, Marasmus, Rickets, Goiter (cause, symptoms, precaution and cure).
6. Substitution of diet with required nutrients to prevent malnutrition disorders.

Unit-III: Communicable and contagious diseases (13 Lectures)

1. Infectious agents responsible for diseases in humans.
2. Communicable viral diseases (causative agent, symptoms, precaution and remedy)- measles, chicken pox, poliomyelitis, swine flu, dengue, chickungunya, rabies, leprosy and hepatitis.
3. Communicable bacterial diseases (causative agent, symptoms, precaution and remedy)- tuberculosis, typhoid, cholera, tetanus, plague, whooping cough, diphtheria, leprosy.
4. sexually transmitted diseases (causative agent, symptoms, precaution and remedy)- AIDS, syphilis and gonorrhoea.
5. Health education and preventive measures for communicable diseases.

Unit-IV: Non-communicable diseases and cure (13 Lectures)

1. Non-communicable diseases such as hypertension, stroke, coronary heart disease, myocardial infarction. Osteoporosis, osteoarthritis and rheumatoid arthritis-cause, symptom, precautions.
2. Diabetes- types and their effect on human health.
3. Gastrointestinal disorders- acidity, peptic ulcer, constipation, piles (cause, symptoms, precaution and remedy) etc. Obesity (Definition and consequences).
4. Mental illness (depression and anxiety).
5. Oral and lung cancer and their preventive measures.

Recommended readings :

1. Mary Jane Schneider (2011) Introduction to Public Health.
2. Muthu, V.K. (2014) A Short Book of Public Health.
3. Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
4. Gibney, M.J. (2013) Public Health Nutrition.
5. Wong, K.V. (2017) Nutrition, Health and Disease.

SEMESTER-IV

Course Name: Behaviour and Chronobiology

Course Code: BSCHZOOC401

Course Type: **Core (Theory & Practical)**	Course Details: **CC-8**			L-T-P: **4-0-4**	
		CA Marks		ESE Marks	
Credit: **6**	Full Marks:	Practical	Theoretical	Practical	Theoretical

	100	**30**	**10**	**20**	**40**

About the course :

The course aims to explain the natural behaviour patterns, how the behaviour varies among individuals and species (wild, domestic, and captive), how current and past environments and ecology influence not only behaviour, but also the underlying gene environment interactions that shape it.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Learn a wide range of theoretical and practical techniques used to study animal behaviour.
- Develop skills, concepts and experience to understand all aspects of animal behaviour.
- Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives.
- Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild.
- Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment.

THEORY (CC-8)

UNIT I: Introduction and patterns of Behaviour (12 Lectures)

1. Animal behaviour. Scope and importance of study.
2. Proximate and ultimate causes of behavior and the evolutionary approach to studying behaviour.
3. Methods and recording of a behavior .
4. Types of stimuli invoking response: internal and external cues.
5. Patterns of behaviour: Stereotype (Spatial orientation, Reflexes, Instinct); Learning (Associative, Non-associative, Latent, Insight, Imprinting); Innate/ Instinct behaviour. vs. Learnt Behaviour.
6. Kinds of behaviour: Foraging behaviour, Territorial behaviour.
7. Allelomimetic and maladaptive (abnormal) behaviour.

UNIT II: Innate behaviour; Evolution of reproductive behavior (13 Lectures)

1. Innate behaviour: Communication (primates, bees and ants).Ritualization. Behaviour of solving ecological obstacles through Decision making.
2. Motor Output: leech swimming/crawling, escape behavior, cricket vocalizations.
3. Sensorimotor integration: electric fish, bird song instinct and motivation. territorial behaviour, schooling behaviour.
4. Displacement activities, Habitat selection, food selection and foraging behaviour in African ungulates.
5. Mimicry and colouration.
6. Migratory behaviour in birds and fishes.

Unit III: Reproductive behaviour and socio-biology (14 Lectures)

1. Reproductive behaviour: Mate selection and courtship behaviour. Parental care (Fish, Amphibia, Bird), defensive behaviour. Evolution of reproductive behavior, mating systems and parental care. Asymmetry in sex, sexual dimorphism.
2. Sociobiology: Social and cultural transmission of Behaviour; Aggregation, Group selection; Social organization (e.g., Honey bee, Naked Mole Rat and Monkey). Elements of Socio-biology: Selfishness, cooperation, altruism, kinship and inclusive fitness.

UNIT IV: Genetic, Neural, and Hormonal regulation of behavior (13 Lectures)

1. Genetic basis of behaviour.
2. Neural Regulation of behaviour: kineses, taxes, simple reflexes.
3. Sensory processing: toad prey capture, sound localization (owls), echolocation (bats).
4. Hormonal control in Biological clocks: Advantages of biological rhythms. Circadian and circannual rhythms. Photoperiodism, tidal, solar and lunar rhythms, Jet-lag, entrainments. Biological oscillation: the concept of Average, amplitude, phase and period, Role of melatonin.
5. Applications of Chronobiology : Chronopharmacology, Chronomedicine, Chronotherapy.

PRACTICAL (CC-8)

1. **Study of Orientation** of an Insect to light.
2. To study the behavioural responses of wood lice to dry and humid conditions.
3. To study **geotaxis behaviour** in earthworm.
4. To study the **phototaxis behaviour** in insect larvae.
5. **Constructing an ethogram** (Documentation and drawing by studying the following Canine's behaviour -movement, feeding, caring of child, foraging, vigilance, vocalization, afraid, anxious/nervous, mating, aggressive, alert, playful, submissive).
6. **Study of Chemical communication** in ants (Ancestral, perception, communication, etc).
7. **Selective predation** of coloured prey items (Demonstration through video).
   OR,
   Predatory behaviour of a carnivorous animal (Demonstration through video).
8. **Study of Nests and nesting habits of the birds** [Tailor bird (cup nest), Weaver bird (hanging/Pendant nest), Bustard/ostrich (Scrape nest), Kingfisher (Burrow nest), Bower bird (round nest), Parrot/owl (cavity nest), crow/osprey (flat/platform nest)] and social insects [Honey bee, Wasp, Termite].
9. **Study of circadian functions in humans** (daily eating, sleep and temperature patterns).
10. **Study of courtship behaviour** in birds and insects from short videos/films.
11. **Field Visit** to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.

12. **Group discussion or Seminar presentation** on topics (Given Below):

Pool of Topics for Group discussion or Seminar presentation :		
1. Parental care in animals	2. Instinctive behaviour invertebrates	3. Ethogram and its application
4. Learning in birds	5. Application of animal behaviour studies	6. Bee dance and Foraging
7. Circadian rhythm	8. Social behaviour in primates	9. Biological clock
10. Behaviour in captivity	11. altruism, kinship and inclusive fitness	12. Neural regulation of behaviour
13. Chronobiology	14. Mate selection and courtship behaviour.	15. Genetic basis of behaviour

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment (Sl no 1-4, any one)-Principle-1, procedure-2, Experiment-3, result and inference-2, (8) 2. Identification of behaviour (Sl no 5, 6, 8,10; one from each)-Naming-0.5 and features-1 (1.5 x 4=6) 3. LNB & Field report-4 4. VIVA-2

NOTE :

- *Identification of behaviour/nest/ethogram could be done by using card printed with photograph/drawing/data.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited,London, UK.
2. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Cambridge, University Press, UK
3. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
4. Sherman, P. W. and Alcock, J. (2013) Exploring Animal Behaviour (6th edition) Sinauer Associate Inc., assachusetts, USA.
5. Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009) Chronobiology Biological Timekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.
6. Danchin, E., Giraldeau, L. A., & Cezilly, F. (2008). Behavioural Ecology: An Evolutionary Perspective on Behaviour. Oxford University Press,
7. Drickamer LC , Vessey SH . (2001). Animal Behaviour. McGraw-Hill
8. Dugatkin LA. 2014. Principles of Animal Behaviour. 3rd Edn. W.W.Norton and Co.
9. Krebs J. R. & N. B. Davies – An introduction to Behavioural Ecology – Blackwell Scientific
10. Natarajan, P and Arumugam, N.; (2018) 1st ed, Saras publication
11. Chattopadhyay, S (2021) LIFE: Evolution, adaptation, ethology, 4nd Ed, Books & Allied.
12. Mathur, R.; (2018) Animal behaviour, 5th Ed Rastogi publication
13. Ruhela A, Sinha M. 2010. Recent Trends in Animal Behaviour. Oxford Book Co
14. Arora, M.P. (2014) Animal behaviour , 13th Ed, Himalaya Publishing House.
15. Shukla, J.P. (2021) Fundamentals of Animal Behaviour, 1st Ed, Atlantic
16. Agarwal V.K.; (2010) Animal behaviour, 1st Ed, S Chand & Company
17. Kumar, V. (2002). Biological Rhythms: Narosa Publishing House, Delhi/ Springer - Verlag, Germany.
18. Feature Article -- Types of Bird Nests and Nesting Schemes (utahbirds.org)

Course Name: Developmental Biology & Evolution

Course Code: BSCHZOOC402

Course Type: **Core (Theory & Practical)**	Course Details: **CC-9**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course explains the sequence of events starting with a single cell to the production of a very complex organism. The course not only describes how embryos develop (embryology), but also highlights how the processes of development are brought about by changing individual cells into specialized cells with specific functions (the cellular level), and how genes within the genome of the organism drive and guide these changes (the molecular level). It also deals with a comparative account of development in some select groups of animals.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Develop critical understanding how a single-celled fertilized egg becomes an embryo and then a fully formed adult by going through three important processes of cell division, cell differentiation and morphogenesis.
- Understand how developmental processes and gene functions within a particular tissue or organism can provide insight into functions of other tissues and organisms.
- Realize that very similar mechanisms are used in very diverse organisms; and development is controlled through molecular changes resulting in variation in the expression and function of gene networks.
- Understand how the field of developmental biology has changed since the beginning of the 19th century with different phases of developmental research predominating at different times.
- Examine the evolutionary history of the taxa based on developmental affinities.
- Understand the relevance of developmental biology in medicine or its role in development of diseases.

THEORY (CC-9)

UNIT I: **How does reproduction start, commence and modify in living system? (12 Lectures)**

1. **Basics of reproduction:** Reproduction: a basis of species sustenance; Asexual and sexual reproduction and their relevance in corresponding environments; How are germ cells "special"?
2. **Gametogenesis:** Gamete formation, types, their diversity and competence.
3. **Fertilization:** Merit and demerits of external and internal fertilization; Structural and biochemical changes in gametes during and after fertilization in Human, Block to polyspermy in sea urchin and Human.
4. **Early embryogenesis:** Establishment of the major embryonic axes (in *Drosophila*), polarity, morphogen gradients and their interpretation; Fate maps, their relevance (Toad, Chick).

UNIT II: How does development affect organization of phenotypes and their variation? (12 Lectures)

1. **Developmental commitments:** Mosaic and regulative development. Direct and indirect development. Cleavage: types and patterns. Body plan and symmetries. Germ layer differentiation. Tubulation. Morphogenesis: Epiboly, emboly/ invagination, involution and ingression.
2. Cell-cell interactions (cell signaling, cell adhesion etc.) during tissue organization, lateral inhibition, induction, and recruitment.
3. **Organogenesis:** formation of Eye, Brain and Heart, in Chick.
4. Concept of organizer and competence,
5. Determination and differentiation and growth, molecular mechanism involved.
6. Totipotency, Pleuropotency.
7. Stem cell biology and tissue repair.

UNIT III: Tracing the evolutionary biology of development (12 Lectures)

1. Role of extra embryonic membranes in development of amniota and anamniota,
2. Placenta: types, formation and functions.
3. Metamorphosis in insect and frog.
4. Regeneration: epimorphosis, morphollaxis and compensatory regeneration.
5. Development, Ageing and apoptosis.
6. Developmental mechanisms of evolutionary change (Evo-devo). *[Ref-Gilbert ch 23]*
7. Ecological Developmental Biology. *[Ref-Gilbert ch 22]*
8. Developmental biology in understanding of disorders: Teratogenic agents and their effects on embryonic development; Wound healing, Birth defects, Developmental brain disorders; Neurodegeneration; Endocrine disruptors & Cancer.

UNIT IV: Understanding evolution through natural selection, adaptation and optimal models trade offs (24 Lectures)

1. **Life's Beginning and animal evolution:** Direct and indirect evidences of early life (chemogeny, biogeny, major theories); Evolution and radiation of metazoan (fundamental idea), Major evolutionary transitions: mass extinction. Anthropocene and its uniqueness.
2. **Evidences of Evolution,** Molecular clock, Neutral theory.
3. **Theories of evolution:** Lamarckism, Darwinism, modern synthetic theory, Hardy-Weinberg Equilibrium (gene and genotype frequency, simple problems and implications),
4. **Mechanism of evolution: Variations (**mutation, recombination, epigenetic variation, Evolution of mutation rates); Genetic drift; Phenotypic plasticity, Selection (Natural & artificial), Migration, Linkage disequilibrium; Nonrandom mating, Cost/ benefit of sex, Sexual conflict, Evolution in asexual systems, Life-history adaptations, Trade-offs, Number and size of offspring; Parent-offspring conflict.
5. **Product of evolution: Speciation:** Micro-evolutionary changes (inter-population variations, clines, Ring species, races), Species concept, Isolating mechanisms, Modes of speciation, Adaptive radiation/macroevolution (Darwin finches, marsupials, Red Queen Hypothesis), Phyletic gradualism and punctuated equilibrium.
6. **Genome evolution:** Mobile genetic elements; gene duplication.
7. **Human evolution:** Trend, major hominids
8. **Evolution and Health:** Evolution of antibiotic Resistance, Virulence, Evolutionary medicine.

PRACTICAL (CC-9)

1. Types of eggs based on quantity and distribution of yolk: sea urchin, insect, frog, Chick.
2. Comparative study of cleavage patterns in Frog and Amphioxus models.
3. How do cells move, change shape and size during morphogenetic movement of Blastulation, Gastrulation in Frog, Amphioxus, Chick.
4. Study of development of chick embryo through incubated chick eggs at 24, 48, 72 & 96 h.
5. Extra embryonic membranes of chick through permanent slides/photograph.

6. Some videos to develop understanding on the process of development.
7. Study of adaptive radiations in feet of birds and mouth parts of insects.
8. Understanding embryological evidence of evolution (through charts and videos).
9. Study of types of fossils (through photograph/model/video).
10. Analogy and homology (wings of birds and insects, forelimbs of bat and rabbit).
11. Serial homology in appendages of *Palaemon.*
12. **Group discussion or Seminar presentation** on one or two related topics (Given Below).

Pool of Topics for Group discussion or Seminar presentation :		
1. Origin of life	2. Scope of evo-devo (Evolutionary developmental biology)	3. Animal connecting links
4. Living fossils	5. Latest trends in developmental biology	6. Mass extinction phenomenon
7. Metamorphosis	8. Evolution of major animal lineages	9. Pleuripotency and its relevance
10. Fate map	11.Relevance of Palaentology in current scenario	12. Were dinosauers warm blooded?

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Identification (Dev biol) based on provided chart/slide (Sl no 1 to 6)- Naming-0.5, Characters-1.5 (2x5=**10**) 2. Identification (Evolution) based on provided chart/slide (Sl no 7 to 11)- Naming-0.5, Characters-1.5 (2x3=**6**) **3.** LNB -**2** **4.** VIVA-**2**
NOTE : • *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.* • *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.* • *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.* • *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*	

Recommended readings:

1. Gerhart, J. *et al*. (1997) Cells, Embryos and Evolution. Blackwell Science.
2. Gilbert, S.F. (2006) Developmental Biology (8th edition). Sinauer.
3. Wolpert, L. (2007) Principles of Developmental Biology (3rd edition). Oxford University Press.
5. Campbell, N. and Reece, J. (2014) Biology (10th edition). Benjamin Cummings.
6. Chattopadhyay, S (2018) An introduction to Developmental biology, 1st Ed, Books & Allied
7. UK. Balinsky (2012). Embryology. 5th Ed, Thompson Brooks Cole (India) Pvt. Ltd.
8. Browder, L. W. (1984). Developmental Biology. 2nd Ed., CBS College Publishing.
9. Arumugam, N. (2014) An introduction to embryology (Developmental Zoology), Saras Publication.
10. Rastogi, V.B.; (2012) 1st Ed, Chordate Embryology, Kedar Nath Ram Nath
11. Carlson, B. M. (1999). Patten's Foundations in Embryology. 6th Ed. McGraw Hill.
12. Kalthoff, K., (2001). Analysis of Biological Development. 2nd Ed. McGraw Hill.
13. Moody, S.A. (Ed.) (2007). Principles of Developmental Genetics. Academic Press.
14. Shostak, S. (1991). Embryology - An Introduction to Developmental Biology. Harper Collins.
15. Slack, J. M. W. (2006). Essential Developmental Biology. 2nd Ed. Blackwell Publishing.
16. Twyman, R.W. (2001). Instant notes-Developmental Biology. Viva Books Private Ltd.
17. Verma, P.S. & Agarwal, V.K. (2005). Chordate Embryology. S. Chand & Company Ltd. New Delhi.
18. Das, N (2012) Fundamental concepts of developmental biology, Affiliated East-West Press pvt. Ltd.-new delhi
19. Wilt, F. H. & Hake, S. C. (2004). Principles of Developmental Biology. W. W. Norton Company.
20. Kardong K. (2004). An Introduction to Biological Evolution. McGraw Hill.
21. Page RDM, Holmes EC. (1998). Molecular Evolution: A Phylogenetic Approach. Blackwell Sc
22. Rauchfuss H. (2010). Chemical Evolution and the Origin of Life. Springer.
23. Ridley M. (1996). Evolution. 2nd Edn. Blackwell Science.
24. Smith JM. (1998). Evolutionary Genetics. 2nd Edn. Oxford Univ Press.
25. Volpe EP, Rossenbaum PA. (1999). Evolution. McGraw Hill.
26. Darlington PJ. The Geographical Distribution of Animals, R.E. Krieger Pub Co
27. Dobzhansky T, Ayala FJ, Stebbins JL, Valentine JW. 1977. Evolution. Surajeet Pub., N.Delhi

28. Freeman S, Herron JC. 2016. Evolutionary Analysis. Pearson Education Limited, Noida, India.
29. Futuyma DJ. 1997. Evolutionary Biology. SinauerAssociates.
30. Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing.
31. Barton, N.H., Briggs, D.E.G., Eisen, J.A., Goldstein, D.B. and Patel, N.H. (2007). *Evolution*. Cold Spring, Harbour Laboratory Press.
32. Hall, B. K. and Hallgrimsson, B. (2008). Strickberger's *Evolution*. IV Edition. Jones and Bartlett Publishers
33. Chattopadhyay, S (2014) LIFE: Evolution, adaptation, ethology, 3rd Ed, Books & Allied

Course Name: Molecular Biology

Course Code: BSCHZOOC403

Course Type: **Core (Theory & Practical)**	Course Details: **CC-10**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides an insight into the life processes at the subcellular and molecular levels. Other important aspects include DNA and molecular genetics including gene cloning, sequencing and gene mapping in addition to the powerful techniques that revolutionized the pharmaceutical, health and agricultural industries.

Learning outcomes :

After successfully completing this course, the students will be able to:

- Develop an understanding of concepts, mechanisms and evolutionary significance and relevance of molecular biology in the current scenario.
- Get well versed in recombinant DNA technology which holds application in biomedical & genomic science, agriculture, environment management, etc. Therefore, a fundamental understanding of Molecular Biology will help in career building in all these fields.
- Apply their knowledge in problem solving and future course of their career development in higher education and research.
- Get new avenues of joining research in related areas such as therapeutic strategies or related opportunities in industry.

THEORY (CC-10)

Unit -1: Central dogma; Genome and Nuclic acid properties (13 Lectures)

1. Central Dogma of Molecular Biology.
2. Origin and evolution of Prokaryotic and Eukaryotic Genes and Genomes. Model Genomes (*E. coli*, *Arabidopsis thaliana)*; Mitochondrial genome.
3. DNA forms: Plasmid DNA, Genomic DNA and Repetitive DNA.
4. Structure and Topology of DNA (triple helix, G-quadruplex, supercoiled forms, linking number),
5. Physical properties of DNA: Denaturation-renaturation, cot curve, Hyperchromic shift, C-value paradox.
6. DNA methylation; DNA-Protein interaction.
7. DNA polymorphisms (SNPs, SSLP, RAPD, RFLP, VNTR, RAPD, AFLP).
8. DNA and RNA as genetic material.

Unit –II: DNA replication, mismatch and repair (13 Lectures)

1. DNA Replication.
2. Meselson-Stahl Experiment.
3. Replication models (Cairn's/D-loop, theta, rolling circle and linear model).
4. DNA replication in Prokaryote and Eukaryotes.
5. DNA polymerases, other regulatory proteins.
6. Telomeric DNA replication and its significance,.
7. DNA repair, mismatch repair, single strand- and double strand DNA repair.
8. Inhibitors of DNA replication.

Unit –III: RNA transcription, processing, editing, splicing etc. (13 Lectures)

1. Transcription in Prokaryotes & Eukaryotes: Chromatin remodeling (Acetylation, methylation and phosphorylation). Enzymes and Factors, Transcription unit and mechanism of transcription, Inhibitors of Transcription.

2. RNA processing: 5'-capping and 3'-polyadenylation of mRNA, Splicing of hnRNA into mRNA (Spliceosome complex), rRNA and tRNA modifications and processing; RNA editing, alternative splicing.

Unit –IV: Genetic Code and Translation (13 Lectures)

1. Genetic Code and its features, Wobble hypothesis, Discovery of genetic code.
2. Mechanism of Translation in *E. coli* and eukaryotic cell *(*Aminoacylation of tRNA, initiation, elongation, peptide bond formation, translocation, termination, Recycling of ribosome, Inhibitors of translation).
3. Regulation of Translation and codon bias.
4. Post-translational modifications and processing of proteins, protein trafficking.

PRACTICAL (CC-10)

1. Preparation of ball and stick model for B-DNA molecule (A=T and G=C base pairs).
2. Isolation of genomic DNA by ethanol precipitation method.
3. Isolation of the plasmid DNA from the *E. coli* culture by alkaline lysis method (Chart demonstration).
4. Agarose gel electrophoresis of the plasmid DNA and the genomic DNA (Chart demonstration).
5. Staining of β-galactosidase activity in the DH5 alpha cells with pBlue script plasmid by IPTG+X-Gal as an example of induction of gene expression (Chart demonstration).
6. Qualitative and quantitative test for DNA (Diphenylamine method) & RNA (Orcinol method)
7. Study and interpretation of electron micrographs/ photograph showing- (a) DNA replication (b) Transcription (c) Split genes, (d) chromosomal bandings, (e) DNA types.
8. Group discussion or Seminar presentation on topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Eukaryotic genome	2. Regulation of gene expression	3. Genetic code
4. DNA damage and repair	5. Central dogma of molecular biology	6. Why Lagging strand?
7. RNA editing and splicing	8. Why Telomerase is crucial in eukaryote DNA replication?	9. DNA polymorphisms & significance
10. RNA interference	11. Chromatin remodeling	12. Splicing & its significance

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment (Sl no 2,6 / any one)-Principle-1, procedure-2, Experiment-3, result and inference-2, (**8**) 2. Identification (Sl no 7)-Naming-0.5 and features-1.5 (2 x 4=**8**) **3.** LNB -**2** **4.** Viva-**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*

- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Watson, J.D. *et al.* (2013) Molecular Biology of the Gene (7th edition) CSHL Press Pearson.
2. Green, M. R and Sambrook, J. (2012) Molecular Cloning: a Laboratory Protocol (4th edition) CSHL Press.
3. Walter, P. (2007) Molecular Biology of the Cell (5th edition) Garland Science.
4. Alberts B et al. (2008). Molecular Biology of the Cell. V Edition, Garland publishing Inc.
5. Allison LA. (2007). Fundamental Molecular Biology. Blackwell Publishing.
6. Karp G. (2008). Cell and Molecular biology: Concepts and Application. 5th Edn, John Wiley.
7. Lackie JM. (2013). Dictionary of Molecular Biology. Academic Press.
8. Lodish, B, Matsudaira, K B, Plough, A and Martin ;(2016). Molecular Cell Biology. W.H. Freeman
9. Meyers R.A. – Molecular Biology and Biotechnology; VCH Pub.
10. Pal A.(2011). Textbook of Cell and Molecular Biology 3rd Ed, Books and Allied, Kolkata.
11. Russel PJ. (2010). iGenetics: A Molecular Approach, Pearson Benjamin
12. Strachan T. & A. Read – Human Molecular Genetics; BIOS Scientific
13. Turner, McLennan, Bales & White ;(2005). Instant Notes in Molecular Biology. Taylor Francis
14. Twyman R.M. (2005) – Advanced Molecular Biology; Springer

Course Name: Sericulture

Course Code: BSCHZOOSE401

Course Type: **SE** **(Theory)**	Course Details: **SEC-2**			L-T-P: **4-0-0**	
Credit: 4	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		-	**10**	**-**	**40**

About the course :

The course gives insight into the principles of sustainable sericulture and how these principles can guide your silk moth rearing into an enduring practice. The students will know about the laws and by laws governing keeping silk moth.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Generation of skilled man power in the field of sericulture,
- To impart training in extension management and transfer of technology,
- To impart training in Post Cocoon Technology,
- To provide field exposure.

THEORY (SEC-2)

Unit I: Silkworm distribution and races (12 Lectures)

1. The silkworms. Its morphological characteristics.
2. Distribution and types of races. Exotic and indigenous races of silkworm.
3. World silk production World map and silk road, spread of Sericulture to China, Europe, South Korea, Japan, India and other countries.
4. Tasar practices in tropical and temperate climate.

Unit II: Biology of silkworm and rearing technology (13 Lectures)

1. Mulberry and non-mulberry Sericulture (Silk worm and respective host plants).
2. Biology of silkworm (Mulberry and Tasar).
3. Selection of mulberry variety and establishment of mulberry garden (emphasis on chawki garden),
4. Incubation- definition, requirement of environmental conditions, incubation devices; identification of stages of development; black boxing and its importance.
5. Model Rearing house and uses of rearing appliances.
6. Silkworm rearing technology: Early age and Late age rearing Selection of silkworm races/breeds for rearing.
7. Types of mountages, Spinning, harvesting and storage of cocoons.

Unit III: Diseases & pests of silk worm with prevention & control (14 Lectures)

1. Introduction; classification of silkworm diseases.
2. Protozoan disease: symptomatology due to *Nosema bombycis* infection, source, mode of infection and transmission, cross infectivity, prevention and control.
3. Bacterial, Viral, Fungal diseases: causative agents, symptoms, transmission prevention and control.
4. Pests of silk worms (Uzi fly, Dermestid beetle).
5. Disinfectants: Formalin, bleaching powder RKO.

Unit IV: Prospects of Sericulture in India **(13 Lectures)**

1. Importance of mulberry silk.
2. Forestry and non-mulberry sericulture.
3. Silk industry in different states, employment, potential in mulberry and non-mulberry sericulture.
4. Employment generation in sericulture: Role of women in sericulture.
5. Sericultural practices in rain-fed and irrigated conditions;
6. Sericulture organization in India; Role of state departments of Sericulture, Central Silk Board, Universities and NGOs in Sericulture development.

Recommended readings:

1. Manual on sericulture (1976). Rome : Food and Agriculture Organization of the United Nations, Agricultural Services Division.
2. Ullal, S.R. and . Narasimhanna, M.N. (1987) Handbook of Practical Sericulture: CSB, Bangalore.
3. Silkworm Rearing and Disease of Silkworm (1956) Ptd. By Director of Ptg., Stn. & Pub. Govt. Press, Bangalore
4. Jolly, M. S. (1986) Appropriate Sericultural Techniques; Ed., Director, CSR & TI, Mysore.
5. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1 (1972) Fuzi Pub. Co. Ltd., Tokyo, Japan.
6. Narasimhanna, M. N. (1988) Manual of Silkworm Egg Production;, CSB, Bangalore.
7. Sengupta, K. (1989) A Guide for Bivoltine Sericulture. CSR & TI, Mysore.

Course Name: Insect Pest, Vector Biology and Management

Course Code: BSCHZOOSE402

Course Type: **SE (Theory)**	Course Details: **SEC-2**		L-T-P: **4-0-0**
Credit: **4**	Full Marks: **50**	CA Marks	ESE Marks
		Theoretical	Theoretical
		10	**40**

About the course :

The course provides an insight into the types of insect pests and vectors and the factors driving their spread. It also enlightens about the methods used to bring down their population below the threshold for a better management.

Learning outcomes

Upon successful completion of this course, students should be able to:

- **Identify the types of insect pests particularly the most common one.**
- **Know the methods of sampling of the pests.**
- **Understand the mode of action of nematicides and the consequences of their use.**
- **Understand the effective way of insect pest management strategy.**

THEORY (SEC-2)

UNIT I : Background to Insect Pests and Vectors (13 Lectures)

1. Insect pests and vectors of plant and animal diseases.
2. Pest status: (major, minor, occasional, migrant).
3. Human practices and pest occurrence. Disease outbreaks.
4. Population dynamics of pest.
5. Density dependent and independent factors affecting pest and vector population.
6. Allocation of sampling units. Sampling and monitoring methods of arthropod pests.

UNIT II: Approaches to Insect Pest and Vector Management (13 Lectures)

1. Insecticides. Types of insecticides, Formulation; Toxicity and safety.
2. Application of insecticides: Droplet size.
3. Application equipment Problems associated with using insecticides.
4. Environmental and cultural control (Irrigation, Fertilizer, Sanitation, Alternate hosts, Multiple and intercropping, Separation in time and space, Crop geometry).
5. Host resistance: Basis for resistance, mechanisms of resistance.

UNIT III: Approaches to Insect Pest and Vector Management (14 Lectures)

1. Biocontrol agents: Predators, Parasitoids, Parasites.
2. Pathogens as biocontrol agent: fungi, viruses, bacteria, microsporidia, nematodes, arthropods.
3. Transmission of pathogens. Area-wise management of pest.
4. Techniques of biocontrol: constraints and reasons for failure of biocontrol.

5. Use of pheromones/ allelochemicals in pest management; Mating disruption/confusion, Alarm pheromones and oviposition deterrents; repellents.
6. Exclusion and barriers, Traps. Physical disturbance.
7. Use of Larvivorous Fish and plants in vector control.

UNIT IV: Legislation and other alternatives of pest control (12 Lectures)

1. Exclusion and routes of entry.
2. Risk assessment; Damage thresholds Forecasting.
3. Genetically modified organisms: pest control property and concerned issues.
4. Integrated vector management. The integrated control/ IPM; Constraints towards IPM adoption.
5. Eradication versus management concept.
6. Increasing agroecosystem resistance Legislation for Pesticide use; Effects of regulation.

Recommended readings:

1. Van Emden, H.F. and M.W. Service. (2004) Pest and Vector Control. Cambridge University Press.
2. Cameron, M. & Lorenz, L. (2013) Biological and Environmental Control of Disease Vectors. CABI, UK
3. Chaterjee, K.D. (1981) Parasitology : Protozoology and Helminththology : Introduction to Clinical Medicine.(12th .Edition) Chaterjee Medical Publishers
4. Mullen, G. and Durden L. (2009). Medical and veterinary entomology, Academic press, London.
5. Kochchar, S.K. (2009). A Text Book of Parasitology. Wisdom Press

SEMESTER-V

Course Name: Biotechniques

Course Code: BSCHZOOC501

Course Type: **Core (Theory & Practical)**	Course Details: **CC-11**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical

	100	**30**	**10**	**20**	**40**

About the course :
This is the only laboratory course taught independently of lecture courses. It has full hands on approach to expose the students to modern techniques and methodologies. The diverse techniques from microscopy to spectroscopy, calorimetry, chromatography ELISA, tissue culture to cloning etc. are included to make the student well versed with these protocols and methods.

Learning outcomes
Upon successful completion of this course, students should be able to:

- Understand the purpose of the technique, its proper use and possible modifications/improvement.
- Learn the theoretical basis of technique, its principle of working and its correct application.
- Learn the construction repair and adjustment of any equipment required for a technique.
- Learn the accuracy of technique.
- Learn the maintenance laboratory equipments / tools, safety hazards and precautions.
- Understand the technique of cell and tissue culture. Learn the preparation of solution of given percentage and molarity.
- Understand the process of preparation of buffer. Learn the techniques of separation of amino acids, proteins and nucleic acids.

THEORY (CC-11)

UNIT I : Microscopy (13 Lectures)

1. Microscopy: Introduction to Microscopy (Discovery, General structure).
2. Definitions-Resolving Power, Limit of Resolution and Magnification, Numerical Aperture.
3. Types of Light microscopes; bright field, dark-field, phase contrast.
4. Basic principles and applications of Light, Electron (SEM, TEM, STEM), Fluorescence and Confocal Microscopy.
5. Measurements (Micrometer), Drawings (Camera Lucida) and photomicrography [Imaging living cell and tissues (Wilson-walker,6Ed, p-151/Principle and Application)].
6. Tissue processing in SEM.

UNIT II : Tools and techniques in Biochemistry and Physiology (13 Lectures)

1. Biochemistry and Physiology: Physiological Salines, Concept of Normality and Molarity. Buffers and the use of pH meter.
2. Extraction of Tissue Glycogen, Proteins, Lipids and Nucleic Acids by Graaf's Method.
3. Principles and types of Centrifugation, Differential centrifugation.
4. Basic Principle and Application of Colorimetry and Spectrophotometry, Beer-Lambert's Law.
5. Principle and applications of Electrophoresis: Separation of Biomolecules by Native PAGE, 2D PAGE. Agarose gel electrophoresis.
6. Principle and Applications of Paper chromatography, Thin layer chromatography, Gel-filtration chromatography.

UNIT III : Tools and Techniques in Endocrinology and immunology (13 Lectures)

1. Immunology and Endocrinology: Introduction to Antigens, Antibodies, Adjuvants.
2. Raising Polyclonal and Monoclonal Antibodies.

3. Antigen-Antibody Interactions- Immunodiffusion, Ouchterlony's Double Immunodiffusion, Immuno-electrophoresis (Counter-Current, Rocket)
4. Principle and methodology: Western Blotting, ELISA, RIA.
5. Application of Immunological techniques (western blot, ELISA, RIA, EIA, Coombs test, Widal test, etc) in disease diagnosis.
6. Tracer techniques: Principle and Applications, Unit of radioactivity, half-life and measurement of radioactivity.

UNIT IV: Cell culture, maintenance of Laboratory animals (13 Lectures)

1. Introduction to Cell Culture**:** Cell culture (in vitro, in vivo, ex vivo) and its basic requirements (laboratory facility), application and limitation of animal cell culture.
2. Culture media Nutrient and Non-nutrient, commonly used media for human cell lines.
3. Sterilization of culture wares and Media, use of laminar flow.
4. Types of animal cell culture (primary and secondary).
5. Cell counting (Flow cytometer, haemocytometer) and cell viability testing (Trypan blue exclusion).
6. **C**ryopreservation (principle, cryopreservant, methodologies, cryoprotectant, revival/thawing, factors for good survivality, banking of cell lines, advantages, applications).
7. Cell harvesting and Storage Methods.
8. *In Vitro* culture of *Entamoeba histolytica, Coenorhabditis elegans.*
9. Maintenance and Handling of cell lines, laboratory rats and rabbits.
10. Good laboratory practice (GLP) & Bioethics.

PRACTICAL (CC-11)

1. Preparation of buffer and determination of pH by pH meter.
2. Identification of amino acids in the mixture using paper chromatography.
3. Verification of laws of spectrophotometry (using standard.
4. Separation of proteins using SDS-PAGE.
5. Testing of Cell viability (Trypan blue exclusion) from onion root tip/blood cell/peritoneal macrophage of mouse.
6. Preparation of permanent slides of microscopic organisms/ small insects.
7. Demonstration of bright field, phase contrast, fluorescence, confocal and electron microscopes.
8. Visit to a Research Laboratory/institute of repute and prepare a report on your learning/understanding/experience.
9. Group discussion or Seminar presentation on a related topics given below.

Pool of Topics for Group discussion or Seminar presentation :		
1. **C**ryopreservation	2. Immuno-technology & disease diagnosis	3. Animal cell culture
4. SEM vs TEM	5. Techniques involving separation of biomolecules.	6. Hybridoma technology
7. Tracer technique	8. Principles of Florescence and confocal microscopes	9. Light microscopy
10. ELISA & RIA	11. Applications of calorimetry and spectrophotometry	12. Cell fractionation

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment A (Sl no 1, 2)-Principle-1, procedure-1.5, Experiment-1.5, result and inference-2, (**6**) 2. Experiment B (Sl no 4,5,6)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) **3.** LNB & Field report-2+2=**4** **4.** Viva-**2**

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Report should be made after completion a visit to Research laboratory / reputed Institute..*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Pearse, A.G.E. (1980-1993) Histochemistry - Theoretical and applied, Volume I-III, Churchill-Livingstones.
2. Plummer, D. (2017) An Introduction to Practical Biochemistry (3rd edition) McGraw Hill.
3. Wilson, K. and Walker, J. (2010) Experimental Biochemistry, Cambridge.
4. Boyer, R. (2000). Modern Experimental Biology. Pearson Education. English Universities Cambridge Low-price Ed.
5. Cantor, C.R. & Schimmel, P.R. (2003). Biophysical chemistry (3 vol. set). W. H. Freeman & Co.
6. Bajpai, P.K. (2006). Biological Instrumentation and Methodology. 1st Ed. S. Chand & Company Ltd.
7. Ghoshal & Shrivastava (2009). Fundamentals of Bioanalytical Techniques and Instrumentation. PHI
8. Sharma, V. K. (1991). Techniques in Microscopy and Cell Biology. Tata-McGraw Hill.
9. Arya A & Kumar A, (2018) Methods in biology, 2nd Ed, Drawing Pin Publishing
10. Kumar, P.; (2016) Fundamentals and Techniques of Biophysics and Molecular Biology, 1st Ed, Pathfinder Publication
11. Roy, R.N. (2005). A Text Book of Biophysics. New Central Book Agency (P) Ltd. Kolkata.

Course Name: Microbiology, Parasitology & Immunology

Course Code: BSCHZOOC502

Course Type: **Core (Theory & Practical)**	Course Details: **CC-12**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

This is a composite course with remarkable utility and importance. Microbiology being the study of microorganisms such as viruses, bacteria etc., covers theoretical studies and practical proficiency training which may help in their placement at a clinical microbiological laboratory. Parasitology component takes care of the parasites and parasitism, emphasizing the influence of parasites on the ecology and evolution of free-living species, and the role of parasites in global, public, health. Immunology part provides the students with the fundamental knowledge of the immune system and its protective roles against diseases.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Carry out common procedures for culturing, purifying and diagnostics of micro-organisms understand the disease-causing potential of bacteria and viruses, and the responses of the immune system.
- Summarise and orally present current microbiological problem areas.
- Describe the mechanisms for transmission, virulence and pathogenicity in pathogenic micro-organisms.
- Diagnose the causative agents, describe pathogenesis and treatment for important diseases like malaria, leishmaniasis, trypanosomiasis, toxoplasmosis, schistosomiasis, cysticercosis, filariasis etc.
- Assess the importance of incidence, prevalence and epidemiology in microbiological diagnostic activities. Know how resistance development and resistance transfer occur.
- Identify the major cellular and tissue components which comprise the innate and adaptive immune system.
- Understand how are immune responses by CD4 and CD8 T cells, and B cells, initiated and regulated.
- Understand how does the immune system distinguish self from non-self.
- Gain experience at reading and evaluating the scientific literature in the area.

THEORY (CC-12)

UNIT-I: Microbiology: A brief account of pathogenic viruses, bacteria and fungi. (13 Lectures)

1. Brief history of microbiology- germ theory of disease, discovery of penicillin.
2. Diversity of microbes- viruses and bacteria.
3. Host pathogen interaction: invasion, antigenic heterogeneity, toxins and enzymes secretions.
4. Kinetics of bacterial growth and principles of staining techniques.
5. **Viral diseases:** polio, rabies, hepatitis, influenza, NIPA, COVID-19, chicken pox, swine flu, dengue, chikungunya with emphasis on their causative agents, pathogenesis, diagnosis, prophylaxis and chemotherapy.
6. **Bacterial diseases** caused by *Streptococcus pyogenes, Streptococcus pneumoniae, Salmonella typhi, Escherichia coli, Helicobacter pylori, Mycobacterium tuberculosis, Vibrio cholerae* with emphasis on pathogenesis, diagnosis, prophylaxis and chemotherapy.
7. **Fungal diseases:** Ringworm infection, aspergillosis, candidiasis with emphasis on pathogenesis, diagnosis, prophylaxis and chemotherapy.

UNIT-II: Parasitology: an overview of common parasitic infections. (13 Lectures)

1. Introduction to parasites and parasitic diseases.
2. Concept of zoonotic diseases.
3. Mode of transmission, portal of entry and implications (histological) of parasitism.
4. Parasitic adaptations in helminths.
8. Protozoan diseases of medical importance: amoebiasis, giardiasis, malaria, leshmaniasis (Life cycle, pathogenesis, prophylaxis and Treatment).
9. Helminthic diseases of medical importance: taeniasis, ascariasis, enterobiasis, and filariasis (Life cycle, pathogenesis, prophylaxis and Treatment).

UNIT-III: Immunology: Immune mechanism and related pathways. (13 Lectures)

1. Definition and classification.
2. Cells and organs of immune system- primary and secondary lymphoid organs.
3. Innate immunity: First and second lines of defense.
4. Characteristics of antigen- antigenicity and immunogenicity, epitopes, haptens, adjuvant. Factors influencing immunogenicity.
5. Classical and molecular structure of immunoglobulin.
6. Classification, properties and functions of immunoglobulins.
7. Antigenic determinants: isotype, allotype and idiotype.
8. Antigen and antibody interactions, affinity, avidity.
9. Complement system (Classical, alternative and lectin pathways).

UNIT-IV: Acquired immunity, Hypersensitivity and autoimmune disorders (13 Lectures)

1. Acquired immunity: Humoral and cell mediated immune response.
2. Role of B and T cell in immunity.
3. Receptors, activation and differentiation of B and T cells.
4. Cytokines: Properties and function.
5. MHC complex and molecules with classification and function. Graft rejection.
6. Antigen processing and their presentation; cross presentation of exogenous antigen.
7. Hypersensitivity: Gell and Coomb's classification with mechanism and examples. Concept of tolerance.
8. Autoimmune disorders (with ref to Pernicious anaemia, Rheumatoid arthritis, Hashimoto's disease, Myasthenia gravis).
9. Hybridoma technology, monoclonal antibodies and their applications (therapeutics and diagnosis),
10. Immunotoxins and their applications.

PRACTICAL (CC-12)

1. Study of permanent slides and specimens of parasitic protozoans and helminthes (as per theory syllabus).
2. Pathological study (chart photograph): sputum, blood, urine and stool.
3. Blood: Erythrocyte Sedimentation Rate (ESR), Haematocrit value; ABO Blood group antigen determination by heamagglutination.
4. Staining and identification of Gram positive and Gram negative bacteria.
5. Preparation of thin and thick blood films to diagnose *Plasmodium* infections.

6. Preparation of temporary and permanent slides of faecal matter (cockroach/Ungulate) by saline preparation and concentration techniques to identify cysts of parasitic protozoans and helminthes eggs.
7. Demonstration of antigen-antibody interaction in gel.
8. Separation of γ-globulin by salt precipitation (Demonstration only).
9. Group discussion / Seminar presentation on a related topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Autoimmune diseases	2. Hybridoma technology and its applications	3. Helminth infections in humans
4. Concept of Immunity	5. Immunological memory & Vaccination	6. Fungal infections in human
7. Zoonotic diseases	8. Host-parasite interaction	9. Common bacterial diseases
10. Hypersensitivity	11. Antigen-antibody interaction	12. Diseases caused by viruses

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Identification (Sl no 1, 2, 5)- Sc. Name-0.5, Character-1, Pathological importance-0.5 (2x4=**8**) 2. Experiment/slide preparation (Sl no 3 to 8)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) **3.** LNB -**2** **4.** Viva-**2**

NOTE :

- *Study includes identification, systematic position (major taxon), identifying character, pathological significance.*
- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings

1. Paniker CKJ, Ghosh S; (2013). Paniker's Text Book of Medical Parasitology. Jaypee
2. Kanungu R., (2020) Ananthanarayan and Paniker's Textbook of Microbiology, 11th Ed, Universities Press (India) Pvt. Ltd.
3. Jawetz, M. and Adelberg (2015) Medical Microbiology (27th edition).
4. Chatterjee, K.D (2015) Parasitology (13th edition). CBS Publishers
5. Ahmed N, Dawson M, Smith C, Wood Ed. (2007). Biology of Disease. Taylor and Francis Group.
6. Arora D R, Arora B. (2001). Medical Parasitology. II Edition. CBS Publications and Distributors
7. Bogitsch B J, Carter CE, Oeltmann TN. 2013. Human Parasitology. 4th Edn. Elsevier.
8. Bose M. (2017). Parasitoses and zoonoses. New Central Book Agency.
9. Chakraborty P. (2016).. Textbook of Medical parasitology, 3rd edition. New Central Book Agency.
10. Dailey MD. (1996). Meyer, Olsen & Schmidt's Essentials of Parasitology. W.C. Brown Publishers
11. John DT, Petri WA. 2006. Markell and Voge's Medical Parasitology. Elsevier.
12. Marr JJ, Nilsen TW, Komuniecki RW. 2003. Molecular Medical Parasiology. 2nd Edn. Academic Press.
13. Muller R, Wakelin D. 2002. Worms and Human Disease. CAB International Publication.
14. Noble ER, Noble GA. (1982). Parasitology: The biology of animal parasites. Lea & Febiger
15. Parija SC. (2013). Textbook of medical parasitology, protozoology & helminthology II Edition, All India Publishers and Distributers, Medical Books Publishers, Chennai, Delhi.
16. Baveja V. & Baveja C.P.; (2021) Parasitology, 5th Ed, Arya Publishing Company
17. Baveja C.P.; (2018) A textbook of Microbiology,6th Ed, Arya Publishing Company
18. Baker S., et al (2012) BIOS Instant Notes in Microbiology, 4th Ed, Taylor & Francis
19. Madigan M.T.; *et. al.* (2017) Brock Biology of Microorganisms, 4th Ed, Pearson Education
20. Prakash, G.; (2012). Lab Manual on Blood Analysis and MedicalDiagnostics, S. Chand and Co Ltd.
21. Gunn A, Pitt SJ. (2012). Parasitology: an Integrated Approach. Wiley Blackwell.
22. Roitt, I.; Brostoff, J. and Male, D. (2012) Immunology (8th edition).Elsevier
23. Abbas K A, Lechtman H Andrew. (2003). Cellular and Molecular Immunology. Saunders Publication.
24. Abbas KA, Andrew, LH. (2011). Basic Immunology: Functions and Disorders of Immune System. Saunders Elsevier
25. Delves PJ, Martin SJ, Burton DR, Roitt I M. (2010). Roitt's Essential Immunology.11th Ed, Blackwell Pub.

26. Kindt TJ, Goldsby RA, Osborne BA, Kuby J (2006). Immunology, W.H. Freeman and Company.
27. Mohanty SK , Leela KS. (2014). Text book of Immunology. 2nd Edn. Jaypee Pub. N. Delhi
28. Parija SC. (2012). Text book of Microbiology and Immunology. Elsevier.
29. Playfair, JHL, Chain BM (2001). Immunology at a glance. 7 th Edn. Blackwell Pub.
30. Shetty N. (2005). Immunology: Introductory Textbook, New Age International Pub.
31. Fatima D and Arumugam N, (2014)Immunology, Saras publication
32. Ramesh S.R. (2017)Immunology; 1st Ed, McGraw Hill Education India Private Limited
33. Khanna R.,(2011)Immunology; 1st Ed, Oxford University Press
34. Virella G. 2007. Medical Immunology, Informa Healthcare.
35. Chakraborty A.K., (2006) Immunology and Immunotechnology, 1st Ed, Oxford University Press
36. Annadurai B., (2010) A textbook of Immunology and Immunotechnology, 1st Ed, S.Chand Pub.
37. Ghosh S., (2017) Immunology and Immunotechnology, 1st Ed, Books & Allied.
38. Paul A., (2015) Textbook of Immunology : including Immunotechnology & Immunotherapy, 1st Ed, Books & Allied.
39. Pelczar: (1993) Microbiology, Tata McGraw Hill,
40. Dubey and Maheshwari; (2018) An Introduction to Microbiology,4th Ed; S Chand Publications, New Delhi

Course Name: Genetic Engineering and Biotechnology

Course Code: BSCHZOODSE501

Course Type: **DSE (Theory & Practical)**	Course Details: **DSEC-1 & DSEC-2**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

This course gives an insight into the direct manipulation of DNA to alter the characteristics of an organism in a particular way. It envisages concepts, mechanisms, biological designs, functions and evolutionary significance of genetic modification or manipulation in special organisms and also discusses the recent advance in recombinant DNA technology.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Develop an understanding of the fundamental molecular tools and their applications of DNA modification and cloning.
- Appreciate shifting their orientation of learning from a descriptive explanation of biology to a unique style of learning through graphic designs and quantitative parameters to realize how such research and innovations have made science interdisciplinary and applied.
- Develop future course of their career development in higher education and research with a sound base.
- Apply their knowledge with problem solving approach to recommend strategies of genetic engineering for possible applications in Biotechnology and allied industry.

THEORY (DSEC-1 or 2)

UNIT I: Introduction to genetic engineering (13 Lectures)

1. Scope of Genetic Engineering and Biotechnology.
2. Enzymes as Tools for Genetic Engineering (basic idea): Restriction Enzymes, Restriction-Modification System, DNA-modifying enzymes, T4 and *E. coli* DNA Polymerase (Klenow), DNA-methylase, Polynucleotide Kinase, Ribonuclease-H, DNA-ligase, Taq DNA polymerase, Reverse Transcriptase, T7 and T3 RNA polymerases.
3. Vehicles for DNA cloning: Features and classification of Plasmid DNA vectors; Structural features of pSC101, pBR322, pUC8 Shuttle vector-pEB10, Cosmid vector, bacteriophage lambda derived vectors (Phagemid, M13), YAC, Ti Plasmid, SV40, Expression vector.

UNIT II: Recombination and cloning (13 Lectures)

1. DNA (Gene) cloning, recombinant DNA.
2. cDNA library, genomic library. Isolation of gene from gene library. Screening and identification of recombinant DNA clone from gene library.
3. Expression of recombinant protein from a DNA clone in bacteria and purification of the protein.
4. Some examples of the useful recombinant proteins: Insulin, Streptokinase, enzymes, antibodies, vaccines.

UNIT III: Recent advances in gene technology (13 Lectures)

1. Transgenic animals: Principle and application; ethical issues.
2. Mechanism of gene technology: Restriction enzyme digestion. Ligation, Cloning, Transformation, Calculation of transformation efficiency.
3. Fundamendal idea on Recent trends in Gene technology: Gene Targeting: Knock-ins and Knock-outs. Targeted Genome Editing: ZFNs, TALENs, CRISPRs. RNAi technology.

UNIT IV: Genomic studies; ethical issues in genetic engineering (13 Lectures)

1. DNA Sequencing (Sanger method) and Genome Analysis,
2. Human Genome Project and Human Genome Sequences.

3. Applications of Genetic Engineering and Biotechnology in agriculture, medicine and its economic and social implications, Ethical precautions.

PRACTICAL (DSEC-1 or 2)

1. **Video-graphic demonstrations** on the following topics- Microinjection, selection of recombinant clone, preparation of cDNA library, Knock-out method, CRISPR, RNAi, transgenic animal (zebra fish).
2. Chart presentation of Restriction enzyme digestion.
3. Separation of molecules (protein/DNA) using electrophoresis,
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from calcium chloride method.
6. Identification of vectors mentioned in theory by model/photograph.
7. Models / PPT presentation on topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Growth hormone	2. Antibiotics from micro-organisms.	3. Streptokinase
4. Recombinant interferon	5. Microbial degradation of waste materials.	6. Insulin
7. Colony stimulating factors	8. Transgenic tomato & rice	9. Industrial enzymes
10.Expression vector	11. Knock-out mouse	12. cDNA Library
13.Genome Sequencing	14. Genetic engineering and Ethics	15. Replica plating

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment (Sl no 3 to 5)-Principle-2, procedure-2, Experiment/construction/calculation-4, result and inference-2, (**10**) 2. Identification (Sl no 6)- Sc. Name-0.5, Character-1, importance-0.5 (2x3=**6**) **3.** LNB -**2** **4.** Viva-**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Primrose, S.B. and Twyman, R. (2014) Principles of Gene manipulation and Genomics (7th edition) Wiley-Blackwell.
2. Nicholl, D.S.T. (2008) An introduction to Genetic Engineering (3rd edition) Cambridge University Press.
3. Watson, J.D. (2006) Recombinant DNA (3rd edition) Cold Spring Harbor Laboratory Press.
4. Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007) Recombinant DNA:Genes and Genomes- A Short Course. III Edition, Freeman and Co.
5. Brown, T.A. (2010) Gene Cloning and DNA Analysis: An Introduction.6th Ed, Wiley-Blackwell.
6. A PBS Documentary entitled, "Playing God" [History of Genetic Engineering].
7. Das, H.K.; (2020) Genetic Engineering: Replication, Expression, Cloning, Manipulation, Wiley India.
8. Singh, B.D.; (2015) Expanding Horizons, 4th Ed, Kalyani Publishers.
9. Kumaresan V. (2014) Biotechnology –Saras publications
10. Balasubramaniam. D. C.F. A. Bryce, Dharmalingam. K. J. Green, Kunthala Jayaraman (2005) Concepts in Biotechnology, University Press (India) Pvt. Ltd.
11. Biotechnology Class XI & XII, (2019) NCERT Publication

12. Ignacimuthu, S. (1995), Basic Biotechnology, Tata McGraw Hill Publishing Company Ltd, New Delhi.
13. Howe, C., (2015) Gene Cloning and Manipulation; Cambridge University Press
14. Satyanarayana, U. and Chakrapani, U.; (2020) Biotechnology, Books & Allied Ltd
15. Glick, B.R., Pasternak, J.J. and Patten, C.L. (2010). Molecular Biotechnology - Principles and Applications of Recombinant DNA. IV Edition, ASM press.
16. Clark, D. P. and Pazdernik, N.J. (2012) Biotechnology; Academic Press.

Course Name: Livestock Management and Animal Husbandry

Course Code: BSCHZOODSE502

Course Type: **DSE (Theory & Practical)**	Course Details: **DSEC-1 & DSEC-2**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides intensive study in livestock production, management, marketing, nutrition, breeding, production records,

selection, animal health, waste management, and conservation practices.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Understand skills and requirements necessary to find and maintain a job.
- Select and develop a breeding system for a livestock enterprise.
- Understand the importance of genetic improvement in animal production.
- Formulate feed rations for different classes of livestock.
- Identify common problems associated with livestock and horse herd health and solutions.
- Identify current and future issues relating to animal husbandry.
- Understand different marketing opportunities available for livestock production.

THEORY (DSEC-1 OR 2)

Unit I: Animal products and breeding systems (13 Lectures)

1. Scope of Livestock Industry; Livestock Enterprises; Issues in Animal Agriculture.
2. Animal Products: Importance of Animal Products; Beef; Pork; Lamb; Poultry Products.
3. Advanced Reproduction and Breeding: Reproductive Systems, Common Breeding Systems including cattle Breeding, and Goat Breeding.
4. Role of Hormones and environment on animal breeding. Reproductive Technologies (AI).

Unit II: Animal nutrition (13 Lectures)

1. Nutritional requirements: Energy requirements for maintenance, growth; Production of milk, egg, wool, and meat.
2. Carbohydrates & Fats, Protein, Minerals & Vitamins, Water etc. common Feedstuffs Systems for expressing energy value of foods in ruminants, pigs and poultry.
3. Application of Direct and indirect calorimetry. Advanced Ration Formulations.

Unit III: Maintenance of breeds (13 Lectures)

1. Common Breeds of Livestock: Breeds of Cattle, goat and poultry: Selecting live stocks.
2. Facilities and Equipment; Housing.
3. Maintenance and health care.
4. Management of breeding stocks and products.
5. Vaccination programmes and Deworming programmes.

Unit IV: Marketing and related issues. (13 Lectures)

1. Planning and Marketing; Culling, Forward Contracting, Backgrounding.
2. Quality control; Future prospects.
3. Basic principles of Genetics and tools for genetic improvement.
4. Current issues affecting the livestock industry

PRACTICAL (DSEC-1 OR 2)

1. Estimation (quantitative) of proteins in feed (Lowry).

2. Virtual demonstration of endocrine glands and their influence on growth of live stock.
3. Estimation of albumen and yolk quantity in eggs.
4. Estimation of calcium in egg shell (Back Titration method).
5. Estimation of cholesterol and peroxides in meat.
6. **Group discussion or Seminar** presentation on topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Dairy management	2. Breeding system and grading up	3. Livestock feed formulations
4. Poultry management	5. Pink revolution in India	6. Goat breeding and management
7. AI technology	8. White revolution in India	9. Scope of Livestock Industry in India

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment A (Sl no 1, 3)- Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) 2. Experiment B (Sl no 4,5)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) **3.** LNB -**2** **4.** Viva-**2**
NOTE : • *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.* • *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.* • *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*	

Recommended readings:

1. Taylor, R.E and Field, T.G. (2004).Scientific Farm Animal Production: An Induction to Animal Science. Prentice-Hall.
2. Acker, D. and Cunningham, M. (1998). Animal Science & Industry. Prentice-Hall.
3. Blakely, J. and Bade, D. (1985). The Science of Animal Husbandry. Prentice-Hall.
4. Cambell, J. and Lasley, J. (1975). The Science of Animals that Serve Mankind. McGraw-Hill.
5. Cooper, E. L. (1990). Agriscience: Fundamentals & Applications Delmer: Albany.
6. American Youth Horse Council (1999) Handbook: A Guide to Equine Care and Management.
7. Morrison, F. (1949). Feeds and Feeding (8th edition) Morrison: Ithaca
8. Handbook of Animal Husbandry, (2008) ICAR Publication, New Delhi.
9. Prasad, J.; (2016) Animal Husbandry and Dairy Science, Kalyani Publishers.
10. Banerjee, G.C.; (2019) A Textbook Of Animal Husbandry, 8Ed, Oxford & IBH publishing.
11. Banerjee, G.C.; (2019) Principles of animal nutrition and feeds, Revised Ed, Oxford & IBH publishing.
12. Reddy, D.V.; (2018) Principles Of Animal Nutrition And Feed Technology, 3Ed, Oxford & IBH publishing.

Course Name: Endocrinology

Course Code: BSCHZOODSE503

Course Type: **DSE (Theory & Practical)**	Course Details: **DSEC-1 & DSEC-2**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course envisages information on endocrine system with emphasis on the structure of hypothalamus and anterior pituitary. The associated hormones and the related disorders will be explained.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Understand neurohormones and neurosecretions.**
- **Learn about hypothalamo and hypapophysial axis.**
- **Understand about different endocrine glands and their disorders.**
- **Understand the mechanism of hormone action.**

THEORY (Endocrinology)

Unit-I: The chemical messangers **8 Lectures**

1. Definition and classification of hormores.
2. Endocrine, paracrine and autocrine modes of hormone delivery, Feedback mechanism.

Unit II: Hypothalamo-hypophysial Axis **20 Lectures**

1. Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction.
2. Structure of hypothalamus, Hypothalamic nuclei and their functions.
3. Regulation of neuroendocrine glands, Feedback mechanisms.
4. Structure of pituitary gland, Its hormones and their functions.
5. Hypothalamo-hypophysial portal system.
6. Disorders of pituitary gland.

Unit-III: Peripheral Endocrine Glands **20 Lectures**

1. Structure, Hormones, Functions and Regulation of Thyroid gland.
2. Parathyroid & Adrenal glands; Pancreas; Ovary and Testis.
3. Hormones in homeostasis.
4. Disorders of endocrine glands.

Unit-IV: Regulation of Hormone Action **12 Lectures**

1. Hormone action at Cellular level: Hormone receptors.
2. Transduction and regulation of Hormone action at Molecular level.
3. Molecular mediators; Genetic control of hormone action.

PRACTICAL (Endocrinology)

1. Identification of the permanent slides of endocrine glands (Ovary, Testes, Pancreas, Thyroid, Adrenal).
2. Dissection and demonstration of Endocrine glands in rat.
3. Compensatory ovarian/ adrenal hypertrophy in vivo bioassay in laboratory bred rat*.
4. Demonstration of Castration/ ovariectomy in laboratory bred rat*.
5. Estimation of plasma level of any hormone using ELISA(Demo.).
6. Designing of primers of any hormone (Demo.).

7. **Group discussion or Seminar presentation** on topics (Given Below):

*Optional

Pool of Topics for Group discussion or Seminar presentation :		
1. Feedback mechanism	2. Hormone -a chemical messenger	3. Exocrine vs Endocrine system
4. Neurohormone	5. Hypothalamus and biorhythm	6. Catecholamine hormone
7. Pituitary-the master gland	8. Thyroid gland and metabolism	9. Androgenic hormones
10. Hormones in homeostasis	11. Genetic control of hormone action.	12. Hormone action

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Dissection (Sl no 2, any one)-Dissection-4, Display-2, Drawing-2, Labelling -2, (10) 2. Identification (Sl no 1)-Naming-0.5 and features-1.5 (2 x 3=6) 3. LNB-2 4. VIVA-2

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Suggested readings:

1. Turner, C. D. (1971) General Endocrinology, Pub- Saunders Toppan.
2. Nussey, S.S.; and Whitehead, S.A. (2001) Endocrinology: An Integrated Approach, Oxford: BIOS Scientific Publishers.
3. 3. Hadley, M.E. and Levine J.E. (2007) Endocrinology (6th edition) Pearson Prentice-Hall, New Jersey.
4. David, O.N. (2013) Vertebrate Endocrinology.

SEMESTER-VI

Course Name: Biostatistics & Bioinformatics

Course Code: BSCHZOOC601

Course Type: **Core (Theory & Practical)**	Course Details: **CC-13**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course is aimed at introducing the application of bioinformatics and statistics in biology. The course gives an insight into the

key concepts and methods used in bioinformatics; and computer storage, retrieval, analysis, visualization and distribution of information data related to biological macromolecules like DNA, RNA and proteins. It provides foundation on statistical methods to enable students to compute and interpret basic statistical parameters. As an interdisciplinary field it integrates biology, computer science, chemistry and statistics together sequence analysis structure analysis and functional analysis of biological data.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Know the theory behind fundamental bioinformatics analysis methods/tool.
- Be familiar with widely used bioinformatics databases.
- Know basic concepts of probability and statistics.
- Describe statistical methods and probability distributions relevant for molecular biology data.
- Know the applications and limitations of different bioinformatics and statistical methods.
- Perform and interpret bioinformatics and statistical analyses with real molecular biology data.
- Acquire knowledge of various databases of proteins, nucleic acids. Primary, secondary and composite databases. BLAST, FASTA, DOT PLOT
- Make phylogenetic predictions or prediction of structure of proteins and nucleic acids
- Develop understanding in Primer designing
- Understand data mining tool and its practical application in a case study
- Apply the knowledge in future course of their career development in higher education and research.

THEORY (CC-13)

UNIT I: Data collection, distribution, presentation, authentication and analysis (13 Lectures)

1. Collection and classification of data.
2. Graphical representation of data: Pie chart, Bar diagram, Histogram, Frequency polygon.
3. Cumulative frequency curve (Ogive), Box plot.
4. Probability theory: Binomial distribution, Poisson distributions.
5. Measures of central tendency: Arithmetic Mean, Median, Mode.
6. Measures of dispersion: Variance, Standard deviation and Standard error, Concept of Coefficient of variation.

UNIT II: Correlation, regression, analysis of variance etc. (12 Lectures)

1. Correlation: Types of correlation, Calculation of correlation in continuous data and ordinal data.
2. Regression: Linear regression, regression coefficient.
3. Analysis of variance (ANOVA): One way, post-hoc tests.
4. Hypothesis testing: Parametric tests (Paired and unpaired t-test,) & Non-Parametric tests (Chi-square test).

UNIT III: Basics of IT; Data archiving systems etc (12 Lectures)

1. Introduction and scope of bioinformatics: concept of digital laboratory.
2. Basics of protocol (TCP/IP), hypertext, home-page, web-page and uniform resource locators information technology, computer, operating systems (Windows, Linux), network.
3. Concept of internet (URL).
4. Introduction to data archiving systems (FASTA format, Accession, and GI Number)

UNIT IV: Data base management: software, packages and tools (15 Lectures)

1. Basic features and management systems of following: Nucleic acid sequences databases (NCBI), Genome databases (NCBI), Protein sequence (PDB), structures and interacting proteins databases (RASMOL), Literature databases (NCBI/PDB), Biodiversity and ecosystem based databases.

2. Introduction to data retrieval systems, Search engines, Entrez, sequence retrieval system (SRS) and protein identification resource (PIR).
3. Introduction to molecular sequence analysis software packages and tools, Prediction of motifs, folds and domains, Sequence alignments (BLAST and Clustal W) and phylogenetic trees (Clustal W).
4. Comparative analysis of metabolomics databases (Genomics, proteomics and Transcriptomics)
5. Applications of bioinformatics: Clinical informatics (Data compilation and interpretation for community and new resource of pathogen), Cheminformatic resources (Structure and interaction with several different kinds of molecules) and pharmacoinformatics (Drug and vaccine designing).

PRACTICAL (CC-13)

1. Calculation of mean, standard deviation and standard error.
2. Calculation of correlation coefficient values and finding out the probability.
3. Student's t-test: Independent and dependent. Hand calculation and calculation using MS Excel.
4. ANOVA and Tukey's HSD: Hand calculation and calculation using MS Excel.
5. Handling, Sequence retrieval and interpretation of Nucleic acid and protein from respective databases.
6. Pair-wise alignment of sequences (BLAST) and interpretation of the output.
7. Sequence homology and Gene annotation.
8. Translation of a nucleotide sequence and selection of the correct reading frame of the polypeptide from the output sequences (Snap Gene).
9. Construction of phylogenetic tree (Clustal W).
10. Comparative analysis of different databases in Genomics and Proteomics.

11. Group discussion or Seminar presentation on following topic :

Pool of Topics for Group discussion or Seminar presentation :		
1. DNA barcoding	2. Application of metabolomics databases	3. Basics of informaion technology
4. Student -t test & utility	5. Graphical representation of biological results	6. Sequences alignment (BLAST)
7. Database management	8. Use of bioinformatics in biological research	9. MS-Excel and Histogram
10.Central Tendency	11.Information technology in data acquisition and retrieval	12. Bioprospecting and Biopiracy
13. Drug designing	14. Statistical methods of hypothesis testing	15. Phylogenetic tree (ClustalW)

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)

1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment A (Sl no 1-5)- Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) 2. Experiment B (Sl no 6-12)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (**8**) **3.** LNB -**2** **4.** Viva-**2**

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Daniel, W.W. & Cross C.L.; (2012) Biostatistics: A Foundation for Analysis in Health Sciences (10th edition) John Wiley.
2. Milton, J.S. & Tsokos, J.O. (1992) Statistical Methods in the Biological and Health Sciences (2nd edition) McGraw Hill.
3. Zar, J.H. (2013) Biostatistical Analysis (5th edition) Pearson.
4. Rastogi, V.B., (2015) Fundamentals of biostatistics. 3rd Ed, Medtech.
5. Arora P.N & Malhan, P.K.; (2016) Biostatistics, Himalaya Publishing House
6. Antonisamy B., et. al. (2017) Principles and Practice of Biostatistics, Elsevier India
7. Pezzullo, J., (2013) Biostatistics For Dummies, 1st Ed, For Dummies Pub. (Wiley)
8. Motulsky, H., (1996) Intuitive Biostatistics, 1st Ed, OUP USA
9. Motulsky, H., (2017) Intuitive Biostatistics: A Nonmathematical Guide to Statistical Thinking, 4th Ed, OUP USA
10. Barnes, M.R. and Gray, I.C. (2003) Bioinformatics for geneticists, Wiley.
11. Ghosh, J. and Mallick B.; (2008) Bioinformatics: Principles and Applications, OUP India
12. Rastogi, S.C. et. al.; (2013) Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery, 4th Ed, PHI Ltd.
13. Bosu, A. & Thukral, S.K.; (2007) Bioinformatics: Experiments, Tools, Databases, and Algorithms, 1st Ed, Oxford Univ. Press.
14. Mount, D.W. (2006) Bioinformatics (2nd edition) CBS

Course Name: Applied Zoology

Course Code: BSCHZOOC602

Course Type: **Core (Theory & Practical)**	Course Details: **CC-14**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course is unique in highlighting the commercial and industrial significance/value of animals. It discusses the techniques/ methods of rearing of animals for commercial usage and the prerequisites for their successful maintenance and sustenance.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Understand the culture techniques of prawn, pearl and fish.
- Understand silkworms rearing and their products.
- Understand the Bee keeping equipments and apiary management.
- Understand dairy animals management, the breeds and diseases of goats and learn the testing of egg and milk quality.
- Learn various concepts of lac cultivation.
- Be aware of a broad array of career options and activities in human medicine, biomedical research and allied health professions

THEORY (CC-14)

UNIT I: Aquaculture (13 Lectures)

1. **Prawn culture:**

   Fresh water prawn culture; Brackish water prawn culture; Preparation of farm. Induced breeding, eye stalk ablation, Disease management, Preservation and processing of prawn. Export of prawn.

2. **Pearl Culture:**

   Pearl formation process, Artificial pearl culture

3. **Fish Culture:**

   Various types of Pond management Induced breeding of common carp; Transport of fish fry to rearing ponds. Harvesting, preservation of fish. Composite fish farming. By products of fishing industry, Common fish diseases and management.

UNIT II: Apiculture, Lac culture and Sericulture (13 Lectures)

1. **Apiculture:**

   Species of honey bees in India. Life history of *Apis.* Indigenous and modern methods of Bee keeping and apiary management, Bee products and their uses. Natural enemies, disease and their control. Extraction and processing of honey.

2. **Lac culture:**

   Lac insect and its life cycle. Cultivation of lac insect, host plants, processing and uses of lac. Lac enemies.

3. **Sericulture:**

   Types of silk; Silkworms and their host plants; Mulberry silkworm culture; Life history of silkworm; Natural enemies and their control.

UNIT III: Dairy management and poultry farming (13 Lectures)

1. **Dairy:**

Introduction to common dairy animals. Techniques of dairy management. Milk and milk products.

Cattle Diseases and management.

2. Poultry:

Types of breeds. Housing and Equipment, Deep litter System, Laying cages, Methods of brooding and Rearing, Debeaking. Management of growers, Layers, Broilers; Feed formulations for chicks, Diseases of fowl and management. Nutritive value of egg and meet. Incubation and hatching of eggs.

UNIT IV: Vermiculture; (13 Lectures)

Biology of *Eisenia foetida*. Rearing of earthworms, Equipments , devices used in vermiculture, Vermicompost Technology. Methods and products, Vermiwash Collection, Composition and use.

PRACTICAL (CC-14)

1. Identification of *Pinctada*, Palaemon sp, *Bombyx mori, Eisenia foetida, Labeo rohita, Catla catla* and fowl breeds
2. Identification of spawn, fry, fingerling of rohu and catla.
3. Castes (through charts/specimens) study of bees,
4. **Mounting** of the sting apparatus and pollen basket of honey bee.
5. Worker honey bee with emphasis on leg modifications (through specimens/charts) and whole mount preparation of the 3 pairs of legs.
6. **Visit** to a pisciculture farm/ sericulture farm / apiary / poultry farm / cattle farm and submit a report.
7. **Group discussion or Seminar presentation** on following topic :

Pool of Topics for Group discussion or Seminar presentation :		
1. Deep litter Poultry farming	2. Apiculture & prospect in India	3. Pearl culture & prospect in India
4. Dairy management	5. Sericulture & prospect in India	6. Ornamental fishery in India
7. Composite Fish culture	8. Lac culture & prospect in India	9. Prawn culture & prospect in India
10. Poultry Diseases	11. Cattle diseases and their management	12. Vermicompost & organic farming

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Identification (Sl no 1-3)-Naming-0.5, character-1.5 (2X4=**8**) 2. Mounting (Sl no 4, 5)-Mounting-3, Drawing-2, labelling-1 (**6**) **3.** LNB -**2** **4.** Field report-**2** **5.** Viva-**2**
NOTE : • *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.* • *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*	

- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Shukla, G.S. and Upadhyaya, V.B. (1999-2000). Economic Zoology (Rastogi Publishers).
2. Mani, M.S. (2006). Insects, NBT, India.
3. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.
4. Banerjee, G. C. (2014) A textbook of animal husbandry, Oxford & IBH.
5. Arumugam, N. (2014) Aquaculture and Fisheries, Saras Publication
6. Sarkar, Kundu & Chaki, (2014) Introduction to Economic Zoology, 1st Ed, NCBA
7. Banerjee T.K., (2016) Applied Zoology, 1st Ed, NCBA
8. Handbook of Fisheries and Aquaculture, ICAR Pub.

Course Name: Wild Life Conservation and Management

Course Code: BSCHZOODSE601

Course Type: **DSE (Theory & Practical)**	Course Details: **DSEC-3 & DSEC-4**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course is an introduction to wildlife management and gives an account of the tools used by wildlife managers. Topics covered are to equip students with adequate knowledge of various biodiversity monitoring methodologies, conservation and management issues of vertebrate pests, wildlife conflict and over abundant species, wildlife health and diseases.

Learning outcomes

After successfully completing this course, the students will be able to:

- Develop an understanding of how animals interact with each other and their natural environment.
- Develop the ability to use the fundamental principles of wildlife ecology to solve local, regional and national conservation and management issues.
- Develop the ability to work collaboratively on team-based projects.
- Demonstrate proficiency in the writing, speaking, and critical thinking skills needed to become a wildlife technician.
- Gain an appreciation for the modern scope of scientific inquiry in the field of wildlife conservation management.
- Develop an ability to analyze, present and interpret wildlife conservation management information.

THEORY (DSEC-3 or 4)

Unit-I: Value of wildlife and need for its conservation (15 Lectures)

1. Definition, value and importance of wildlife.
2. Wildlife conservation, ethics and importance of conservation.
3. Ecosystem interaction, animal distribution in biome
4. Classification of wetland and animal inhabitants.
5. Population vulnerability analysis and its components;
6. Causes of depletion of wildlife w. r. t. extinction of animals.
7. Types of protected areas and the concept of zoning within the protected areas.
8. Wildlife Sanctuaries and National Parks in India: general strategies (policy) and issues.
9. Theories of population dispersal; Animal movement, concept of home range and territory.
10. Tracking movement by remote sensing and GIS.

Unit-II: Population and prey-predator dynamics (11 Lectures)

1. Impact of topography, geology, soil and water on wildlife population.
2. Impact of habitat destruction and fragmentation on wildlife population.
3. Biological parameters such as food, cover, forage and their impact on wild life population.
4. Population attributes; concepts of exponential and logistic growth rates of wildlife.
5. Density dependent and independent population regulation.
6. Impact of introduced species on preexisting flora and fauna of wildlife.
7. Identification and estimation of wild animals by fecal sample analysis, hair identification, pug marks and census methods.
8. Predator-prey models (Mathematical model-Lotka and Volterra) and impact of predation.

Unit-III: Wildlife Conservation (13 Lectures)

1. Wildlife conservation objectives- strategies and issues [Poaching, Forest fire, Mining, Hunting and illegal trading; Tourism; Wild life corridor; marine pollution]
2. Captive breeding techniques and translocation and reintroduction.

3. Inviolate area and critical habitats and their impact on wildlife.
4. Different terrestrial habitats of wildlife in India.
5. Restoration of degraded habitat.
6. Damage caused by wildlife in India and its mitigation.
7. Sick animal refuges in protected areas.

Unit-IV: Rehabilitation and management (13 Lectures)

1. Type of wildlife management- manipulative, custodial management of over abundant wild animal populations causing damages to nearby inhabitants and their crops and animals.
2. Use of Tools (Compass, Binoculars, Spotting scope, Range Finders, Drone, radio collar, Camera trap) and techniques to control the menace of wild animals.
3. Man-wildlife conflict resolution and mitigation.
4. Management of exotic and invasive wetland species in India.
5. Habitat manipulation– control and regulation of grazing. Weed eradication.
6. Major diseases of domestic and wild animals and their control and impact of wild life tourism.

PRACTICAL (DSEC-3 or 4)

1. Identification, ecotype with conservation status and preparation of colour album of flora (***Ginkgo biloba***, Red sandalwood), mammalian fauna (Himalayan musk deer, Gangetic dolphin, Golden langur, Pangolin, Fishing cat), avian fauna (Great Indian bustard, Pink headed duck), herpeto-fauna (Gharial, Rock python, King cobra, Indian star tortoise).
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses).
3. Familiarization and study by photographic plate of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
4. Demonstration of different field techniques (wild life census: Jolly-Seber method) for flora and fauna.
7. Determination of population density in a natural/ hypothetical community by quadrat method and calculation of Sorenson's Similarity & Shannon-Weiner diversity indices for the same community.
8. **Visit to Forest**/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report
9. **Group discussion or Seminar presentation** on topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Project Tiger	2. Rhino vision in India	3. Crocodile conservation
4. Elephant project	5. Green corridor	6. Red data book
7. Ecotourism	8. GIS-Remote sensing & GPS	9. Wild life protection act
10. Invasive species	11. Man-wildlife conflict	12. Wetland management

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Estimation of Species abundance/richness from provided data (Sl no 7)-principle-1, Result & discussion-2+2 (**5**) 2. Identification (Sl no 1)- Naming-0.5, Conservation status-0.5, Ecotype-1, characters-1 (3x2=**6**) 3. Spotting (Sl no 3)- Naming-0.5, importance-0.5 (1x3=**3**) **4.** LNB & Field report : (2 + 2) = **4** **5.** Viva-**2**

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Field report should be submitted after completion the field visit.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Caughley, G., and Sinclair, A.R.E. (1994) Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe, R., Thirgood, S. and Rabinowitz, A. (2005) People and Wildlife, Conflict or Co-existence? Cambridge University.
3. Bookhout, T.A. (1996) Research and Management Techniques for Wildlife and Habitats (5th Ed) The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000) The Conservation Handbook: Research, Management and Policy. Blackwell Sciences.
5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008) Problem solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing
6. Mathur, R. (2018) Wildlife conservation and management, 1st Ed, Rastogi Pub.
7. Saha, G.K. and Mazumdar, S.; (2017) Wildlife Biology: An Indian Perspective, PHI Learning.
8. Paul R. Krausman & James W. Cain; (2013) Wildlife Management and Conservation – Contemporary Principles and Practices, Johns Hopkins University Press.
9. Fryxell, J.M., Sinclair, A.R.E and Caughley, G.; (2014) Wildlife Ecology, Conservation, and Management, 3rd Edition, Wiley-Blackwell

Course Name: Mammalian Physiology

Course Code: BSCHZOODSE602

Course Type: **DSE (Theory & Practical)**	Course Details: **DSEC-3 & DSEC-4**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course deals with various physiological functions in mammals. It also gives an account of the metabolic/ biochemical pathways and the probable impact of environment on them.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Understand the physiology at cellular and system levels.**
- **Understand the mechanism and regulation of breathing, oxygen consumption and determination of respiratory quotient.**
- **Understand how mammalian body gets nutrition from different biomolecules.**
- **Understand the process of digestion and excretion.**
- **Understand the organization of nervous system and process of nerve conduction.**
- **Understand the process of vision and hearing.**
- **Understand the process of muscle contraction.**
- **Learn the determination of haemoglobin content, blood groups and blood pressure.**

THEORY (Mammalian Physiology)

Unit-I: An overview of respiration and circulation in mammals 12 Lectures

1. Respiration: Mechanism and regulation of breathing; Transport of oxygen and carbon dioxide; Respiratory quotient.
2. Circulation: Blood buffers, blood groups, blood cells, cardiac cycle, Haemopoiesis, homeostasis.

Unit-II: An overview of digestion and excretion in mammals 10 Lectures

1. Nutrition and Digestion: Balanced diet; Digestion and absorption of carbohydrates, proteins and fats; Gastrointestinal hormones: role in digestion.
2. Excretion: Nephron; urine formation; Regulation of urine formation: role of renin, ADH, aldosterone.

Unit-III: An overview of nervous system and coordination in mammals 16 Lectures

1. Nervous System: Organization, neuron and glial cells- types and structure.
2. Synapses – types and transmission, resting membrane potential: genesis.
3. Action potential: initiation and conduction.
4. Vision: Structure of eye, retinal components, and photoreceptors: ionic basis of potential generation.
5. Hearing: Structure of ear, Mechanoreceptor: ionic basis of potential generation.

Unit-IV: An overview of Muscular system and muscle contraction in mammals 11 Lectures

1. Muscles: Types, Ultra structure of skeletal, smooth and cardiac muscles, muscle proteins.
2. Neuromuscular junction.
3. Molecular and chemical basis of muscle contraction.
4. Characteristics of muscle twitch, tetanus and fatigue, isotonic and isometric contractions.

PRACTICAL(Mammalian Physiology)

1. Preparation of temporary mounts: Blood film, Squamous epithelium, Striated muscle fibres and nerve cells.
2. Counting of white blood corpuscles and red blood corpuscles
3. Preparation of haemin crystals.
4. Estimation of haemoglobin content
5. Determination of blood groups
6. Measurement of blood pressure using sphygmomanometer
7. Recording of simple muscle twitch with electrical stimulation (or Virtual)
8. Demonstration of reflex action.
9. Study of permanent histological sections of mammalian oesophagus, stomach, duodenum, rectum, lung, kidney and brain cells.
10. **Group discussion or Seminar presentation** on topics (Given Below):

Pool of Topics for Group discussion or Seminar presentation :		
1. Physiology of Lung	2. CO_2 transport & Chloride shift	3. Oxygen dissociation curve
4. Cardiac cycle	5. Buffer systems in human	6. Gastrointestinal hormone
7. Hemopoiesis	8. Heart valves & its dysfunction	9. Neural regulation of digestion
10. Countercurrent & RAAS	11. Absorption of biomolecules in gut	12. Synaptic transmission
13. Action potential	14. Mechanism of hearing and seeing	15. Muscle physiology

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
5. Assessment based on practical topics (class test)-**10** **6.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **7.** Attendance and Participation in class-**5** **8.** Practical skills, laboratory reports, etc-**5**	5. Experiment (Sl no 2-8, any one)-Principle-1, procedure-2, Experiment-2, result -1, (6) 6. Mounting (sl no 1)- Mounting-2, Drawing-1 & labelling-1 (4) 7. Identification (Sl no 9)-Naming-0.5 and features-1.5 (2 x 3=6) 8. LNB-2 9. VIVA-2

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Barret, K.; Brooks, H.; Boitano, S. And Barman, S. (2010) Ganong's Review of Medical Physiology (23rd edition) Lange Medical.
2. Guyton, A.C. and Hall, J.E. (2006) A text book of Medical Physiology (11th edition) Saunders.
3. Keele, C.A. & Neil, E. (1989) Samson Wright's Applied Physiology (13th edition) Oxford.
4. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology. XII Edition, John Wiley and Sons, Inc.
5. Chatterjee C.C. (2020) Human physiology: VOL 1 & 2, 13ED, CBS publishers.

Course Name: Aquatic Biology

Course Code: BSCHZOODSE603

Course Type: **DSE (Theory & Practical)**	Course Details: **DSEC-3 & DSEC-4**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The program of study aims to provide students with a broad-based foundation in science together with extensive subject knowledge in the discipline of aquatic biology. It also aims to develop a range of transferable research, analytical and communication skills.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Understand and apply relevant scientific principles in the area of aquatic biology.**
- **Employ scientific methodologies such as experimentation and data analysis in the area of aquatic biology.**
- **Critically analyse, interpret and evaluate information relevant to aquatic biology.**
- **Appreciate the multidisciplinary nature of the study of aquatic biology and engage positively with people and ideas beyond their own discipline.**
- **Explore some of the unique environmental problems dealing with aquatic environments.**
- **Develop employable skills in freshwater biological water quality analysis.**

THEORY (Aquatic biology)

UNIT – I Abiotic conditions of Freshwater ecosystems 14 Lectures

1. Physical & chemical properties of water.
2. Brief introduction of the aquatic ecosystems.
3. Freshwater ecosystems (lakes, wetlands, streams and rivers).
4. Physico-chemical Characteristics of fresh water bodies: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity: dissolved gases (Oxygen, Carbon dioxide).
5. Origin and classification of lakes.
6. Streams: Different stages of stream development.

UNIT II Aquatic organisms 10 Lectures

1. Feeding in aquatic organisms.
2. Respiration in aquatic organisms.
3. Osmoregulation in freshwater and marine organisms.
4. Adaptation of hill-stream fishes.
5. Adaptation of deep-sea organisms.

UNIT – III Abiotic conditions of marine ecosystems 14 Lectures

1. Classification of marine ecosystem: Estuaries, intertidal zones, Oceanic pelagic zone, marine benthic zone.
2. Coral reefs (types, formation).
3. Physico-chemical environment, Salinity and density of sea water and Continental shelf; other factors viz., Light, Temperature, Thermal stratification, Dissolved Solids, Turbidity: dissolved gases (Oxygen, Carbon dioxide).

UNIT – IV Management of Aquatic Resources **14 Lectures**

1. Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation.
2. Water pollution acts of India.
3. Sewage treatment and water quality assessment - BOD and COD.

PRACTICAL (Aquatic biology)

Practical

1. Physico-Chemical analysis of water - O_2, CO_2, BOD, COD.
2. Biological– Zooplanktons –population density of Zooplanktons of a lake.
3. Determination of Turbidity / transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body.
4. Instruments used in limnology (Sacchi disc, van Dorn bottle, conductivity meter, Turbidity meter) and their utility.
5. Identification of Zooplankton- *Cyclops, Daphnia, Paramecium, Cypris*
6. **Excursion:** Study the topography of a natural lake in nearby area or Ramsar lake and submit a report.
7. **Group discussion or Seminar presentation** on topics (Given Below):

Pool of Topics for Group discussion or Seminar presentation :		
1. Pond Ecosystem	2. Physio-chemical properties of lake	3. Coral-a marine hotspot
4. Riverian Ecosystem	5. Osmoregulation in marine organisms	6. Eutrophication
7. Estuarian Ecosystem	8. Stages of stream development	9. Sewage treatment
10. Classification of lakes;	11. Osmoregulation in freshwater organisms	12. Stratification of ocean.

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment (Sl no 1-3, any one)-Principle-2, procedure-2, Experiment-3, result -2, (9) 2. Identification (Sl no 4,5)-Naming-0.5, features-1.5 (2 x 2=4) 3. LNB-2 4. Field report-3 5. VIVA-2

NOTE :

- *Identification could be done by using card printed with photograph/drawing/data/preserved specimen/permanent slide.*
- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Goldman, C. (1994) Limnology (2nd edition).
2. Ananthakrishnan, T.N. (1989) Bioresources Ecology (3rd edition).
3. Odum, E.P. and Barrett, G.W. (2004) Fundamentals of Ecology (5th edition).
4. Pawlowski, L. (1980) Physicochemical Methods for water and Wastewater Treatment.
5. Wetzel, R. (2001) Limnology (3rd edition) Elsevier.
6. Trivedi, R.K. and Goyal, P.K. (1986) Chemical and biological methods for water pollution studies.
7. Welch, P.S. (2014) Limnology Vol. I-II.

ZOOLOGY GENERIC (GE) SYLLABUS

C O N T E N T S

Sl. No.	Semesters	COURSE DETAILS	COURSE CODE	COURSE NAME	Th/Pr
1.	I	GEC-1	BSCHZOOGE101	BASICS OF SYSTEMATICS & CLASSIFICATION	TH
2.					PR
3.	II	GEC-2	BSCHZOOGE201	VECTORS, DISEASES AND CONTROL	TH
4.					PR
5.	III	GEC-3	BSCHZOOGE301	BIODIVERSITY CONSERVATION AND SUSTAINABLE DEVELOPMENT	TH
6.					PR
7.	IV	GEC-4	BSCHZOOGE401	HUMAN PHYSIOLOGY	TH
8.					PR

SEMESTER-I

Course Name: Basics of Systematics and Classification

Course Code: BSCHZOOGE101

Course Type: **Generic Elective (Theory & Practical)**	Course Details: **GEC-1**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks:	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical

	100	**30**	**10**	**20**	**40**

About the course :

The course will provides a comprehensive survey of the theory and methodology of systematics as they are applied today to all groups of organisms. The course is directed at those students interested in studies of evolutionary biology, biodiversity, conservation biology, and/or systematics.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Comprehend the basic concepts of animal taxonomy and zoological nomenclature**
- **Evaluate the significance of museum specimens**
- **Analyze the implications of biometrics, numerical taxonomy and cladistics.**
- **Understand the historical development of systematic biology from the 18th century to the present.**
- **Gain a basic grasp on the rules and philosophy of nomenclature.**
- **Question what you know, and need to know, to do systematic.**
- **Develop the capacity to critically evaluate the primary literature.**

THEORY (GEC-1)

Unit I: Introduction to systematic, classification and nomenclature 13 Lectures

1. Systematics and taxonomy (Def, Scope and types).
2. Importance of classification. Concept of Key.
3. Hierarchy of classification and types of classification-artificial, natural and phylogenetic.
4. Principles and rules of International Code of Zoological Nomenclature (ICZN), binominal system, type material, author citation, criteria for publication, types of names, principle of priority and its limitations.

Unit II: Taxonomic treatment and Molecular phylogenetics 14 Lectures

1. Characters and character states, Taxonomic characters, OTUs, character weighting, cluster analysis;
2. Phenetics, Evolutionary taxonomy, Cladistics.
3. Constructing trees/ dendrograms: Phenogram, phylogram and cladogram and turning them into classifications.
4. Molecular phylogenetics: Scope and importance, "Molecular clock" hypothesis.
5. Phylogeny estimation methods: Distance data, Maximum-parsimony, Maximum-likelihood.

Unit III: Basis of classification of non-chordates 12 Lectures

1. Level of organisation, symmetry, coelom, metamerism, number of germ layers.
2. Development of protostomes and deuterostomes.
3. Origin and phylogeny of annelids and echinoderms.
4. Outline classification* and diagnostic characters of protists, major invertebrate phyla (up to classes).

Unit IV: Basis of classification of chordates 13 Lectures

1. Development of aortic arch, heart and kidney.
2. Evolutionary significance of cyclostomes and dipnoans.

3. Origin and evolution of tetrapods.
4. Evolutionary significance of reptilian clade.
5. Outline classification* and diagnostic characters in Chordates (up to classes-lower chordates, up to subclasses-fishes, birds and mammals; up to living orders-amphibia and reptilia).

****NOTE:** Classification to be followed from Ruppert and Barnes Invertebrate Zoology VI edition, except for Protista (American Association of Protozoologist ref: Levine 1980) and Porifera (Brusca and Brusca 2002; IV edition. Invertebrate Zoology) and Vertebrate classification as per J. Z. Young, 1981 except Fish-Nelson,2006.*

PRACTICAL (GEC-1)

1. General discussion, distinguishing characters and classification of common animals.

Invertebrates:	**Chordates:**
1. Protista: *Amoeba, Paramecium.* *2.* Porifera: *Scypha.* *3.* Cnidaria: *Obelia,* Sea Anemone. *4.* Platyhelminthes: *Fasciola hepatica.* *5.* Nemathelminths: *Ascaris.* *6.* Annelida*: Aphrodite, Hirudinaria.* *7.* Arthropoda*: Carcinoscorpius, Macrobrachium,* *8.* Mollusca: *Pila, Sepia.* *9.* Echinodermata: *Astropecten.*	*10.* Protochordata*: Balanoglossus, Branchiostoma, Ascidia* *11.* Fish: *Scoliodon, Torpedo, Clarias, Exocoetus, Hippocampus,* *12.* Amphibia*: Ichthyophis, Necturus, Rachophorous* *13.* Reptile: *Chelone, Chamaeleon, Draco, Vipera, Naja.* *14. Bird: Psittacula, Pycnonotus.* *15. Mammals: Pteropus, Funambulus.*

2. Preparation of identification keys for select specimens of non-chordate (e.g., insects) and chordates (e.g., birds)
3. Generation of a character-state matrix by selecting and scoring diagnostic taxonomic characters.
4. Collection of five species or presentation through photographic plates (preferably invertebrates, insects) belonging to a clade. A project report to be submitted based on their generic identification, description and illustration with a note on their locality. Also, the assessment of their relationship by constructing a cladogram using characters and character states.
5. Interactive software for exploring phylogeny and analyzing character state to construct dendrogram (Theoretical basis and demonstration).
6. Construction of phylogenetic tree (Clustal W).
7. Distance-based methods of phylogenetic reconstruction using manual and computer methods (Theoretical basis and demonstration).
8. Molecular data analysis by aligning sequences and constructing trees using PAUP (Theoretical basis and demonstration).
9. Group discussion or Seminar presentation on one or two related topics

Pool of Topics for Group discussion or Seminar presentation :		
1. Tree of Life. 2. Metamerism 3. Evolution of Aortic arch	4. Molecular systematics vs Traditional taxonomy. 5. Phenoplasticity and its relevance. 6. Reliability of taxonomic characters. 7. Phenetis & Cladistics	8. Molluscs of industrial value. 9. Molecular system of classification. 10.Codes of nomenclature 11.Evolution of tetrapods

Format for conducting CA and ESE practical examination :

CA (30 marks)	**ESE (20 marks)**

1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	6. Construction of cladogram on provided data either manual/software based-6 7. Identification (Sl no 1)- Sc. Name-0.5, character-1.5, habit & habitat-0.5, (2.5x4=10) 8. LNB -2 9. VIVA-2

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *Study of specimen should include-Scientific name, Habit and Habitat, Conservation status (if available), Diagonostic feature, importance/values if any.*
- *LNB should be prepared (item 1 & 3) in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Mayr, E. and Ashlock, P.D. (1991). Principles of Systematic Zoology. (2nd edition) New York: McGraw Hill, Inc.
2. Quicke, D. L. J. (1993). Principles and Techniques of Contemporary Taxonomy. New York: Chapman and Hall
3. Simpson, G G (2012) Principles of animal taxonomy, Scientific publishers.
4. Mayr, E and Ashlock P D (2014) Principles of systematic zoology, 2nd, McGraw-Hill Education.
5. Verma, A (2017) Principles of animal taxonomy, 1st Ed, Narosa.
6. Ghosal, S (2020) Taxonomy Principle and Problems, 1st Ed, Techno world.

SEMESTER-II

Course Name: Vectors, Diseases and Control

Course Code: BSCHZOOGE201

Course Type: **Generic Elective (Theory & Practical)**	Course Details: **GEC-2**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides an insight into the common vector-borne diseases, their etiology, role of vectors in their spread, host-parasite relationship and finally the strategies to manage these vectors.

Learning outcomes :

After successfully completing this course, the students will be able to:

- **Develop awareness about the causative agents and control measures of many commonly occurring diseases.**
- **Develop understanding about the favourable breeding conditions for the vectors.**
- **Devise strategies to manage the vectors population below threshold levels, public health importance.**
- **Undertake measures or start awareness programmes for maintenance of hygienic conditions, avoidance of contact from vector, destruction of breeding spots in the vicinity of houses and cattle shed by public health education campaign.**

THEORY (GEC-2)

Unit I: Vector and vector bionomics (13 Lectures)

1. Brief introduction, types and morphological peculiarities of vectors such as mosquitoes, flies, fleas, lice, bugs, ticks and mites.
2. Host-vector relationship. Primary and secondary vector concept. Vectorial capacity.
3. Vector bionomics-larval habitats and host biting preferences in human and animal biting indices.
4. Evolution of vector bionomics and its effect on disease transmission. Vector incrimination.
5. Human practices and the occurrence of pests.

Unit II: Disease vectors and the causes of disease outbreaks (13 Lectures)

1. Salient features of the vectors belonging to Diptera, Siphonaptera, Siphunculata,
2. Role of non-blood sucking flies in myiasis; of blood sucking flies in transmission of plague and typhus; of lice (body, head, pubic) in transmission of typhus, relapsing and trench fevers, Vagabond's disease and Phthiriasis.
3. Brief account of mites and the associated diseases.

Unit III: Vector management strategies (13 Lectures)

1. Control of vector flies by screening, fly traps, electrocution, poison baits and outdoor residual sprays.
2. Biological control by natural parasites and predators.
3. Chemical control. Efficacy of synthetic pyrethroids, residual spray of insecticides, treated bed nets/curtains and fumigations.
4. Biological control of mosquitoes by the use of viruses, bacteria, fungi, synthetic pyrethroids, residual spray of insecticides, treated bed nets/curtains and parasites, approaches.
5. Pheromones/allelochemicals, Attract-and –kill, Mating disruptors, alarm pheromones and oviposition disruptors.

Unit IV: Emerging concepts and approaches to vector management (13 Lectures)

1. Legislation and regulation.
2. Methods of sampling and monitoring, sampling plan, Allocation of sampling units.
3. Exclusion and routes of entry.
4. Controlled atmosphere.
5. Risk assessment.
6. Fundamental concept of the integrated control/ IPM approach.

PRACTICAL (GEC-2)

1. Study of mouth parts of different insects (Mosquito, Locust, beetle, louse, tick).
2. Study of permanent slides/photographs of the following insect vectors and state the diseases transmitted by them: Aedes, Culex, Anopheles, Pediculus humanus corporis, Pediculus humanus capitis, Phithirus pubis, Xenopsylla cheopis, Musca domestica, Cimex lectularius, Phlebotomus argentipes.
3. **Project report submission** followed by Group discussion or **Seminar presentation** on any one of the insect vectors and the disease transmitted.

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Mounting (Sl no 1)-mounting-2, Drawing-2, labelling-1, importance-1 (6) 2. Identification (Sl no 2)- Naming-0.5, character-1.5 (2x5=10) 3. LNB -2 4. VIVA-2

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared (item 1 & 3) in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Imms, A.D. (1977). A General Text Book of Entomology. Chapman & Hall, UK.
2. Chapman, R.F. (1998). The Insects: Structure and Function.IV Edition, Cambridge University Press, UK.
3. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and other Insect Vector borne Diseass.Wiley Blackwell.
4. Belding, D.L. (1942). Textbook of Clinical Parasitology. Appleton-Century Co., Inc., New York.
5. Roy, D.N. and Brown, A.W.A. (2004). Entomology. Biotech Books, Delhi
6. Mullen & Durden (3Ed) - Medical and Veterinary Entomology (2019)

SEMESTER-III

Course Name: Biodiversity Conservation and Sustainable Development

Course Code: BSCHZOOGE301

Course Type: **GE** **(Theory & Practical)**	Course Details: **GEC-3**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides information regarding the status of environment, the depletion of its resources, the loss of biodiversity and the remedial efforts undertaken by various agencies. The course is also focused to creating environmental awareness among learners.

Learning outcomes

Upon successful completion of this course, students should be able to:

- **Develop understanding for the environment which is largely degraded in the current scenario.**
- **Understand the importance of bio diversity and the consequences of bio diversity loss**
- **Learn about the judicious utilisation of natural resources**
- **Follow the concept of green technology and the eco-friendly practises and other prospects of environment protection.**
- **Understand and practice appropriate legal/regulatory and ethical issues in the context of the work environment.**
- **Design research projects to collect information to assess the effectiveness of current practices, and interpret the results of a statistical analysis of data, and use this to make informed decisions.**

THEORY (GEC-3)

Unit I: Anthropogenic impact on environment (13 Lectures)

1. Man as an animal species in the ecosystem.
2. Population explosion. carrying capacity, exploitation of resources due to urbanization, industrialization and agricultural practices.
3. Generation of agricultural, municipal, industrial waste and their impact on environment.
4. Pollution of air, water, soil and noise; radioactive pollution (causes and impact on human health).
5. Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath.
6. Causes and environmental impact of Eutrophication, Deforestation.
7. Threats to biodiversity, Extinction of species.

Unit II: Depletion and contamination of resources (10 Lectures)

1. Natural resources: Land resources. Air and water resources. Bioresources.
2. Conventional Fuel, wood, fossil fuels.
3. Non-conventional sources of energy: sun, wind, bio energy, geothermal, ocean, nuclear etc.
4. Greenhouse effect and global warming; climate change; Shrinking of glaciers.
5. Threats to sustainable development.

Unit III: Biodiversity and resource conservation programmes (14 Lectures)

1. Management of wastes and disposal (Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants).
2. Concepts of three R's ("waste hierarchy"): reduce, reuse and recycle.
3. Methods of prevention and control of Eutrophication.
4. Bioremediation.
5. Biodiversity conservation– In-situ e.g., Sanctuaries, National Parks, Biosphere Reserves, World Heritage Sites; Ex-situ e.g., Zoo, botanical gardens, gene banks, cryopreservation.
6. Contour farming, reforestation; Rainwater harvesting, groundwater water recharge.
7. Green technologies, Eco-cities, Social and Joint forestry.

Unit IV: Sustainable development and green technology (15 Lectures)

1. Sustainable Development; Brundtland Report.
2. Biosafety of GMOs and LMOs.
3. Environmental movements (Chipko, Narmada Bachao, Silent valley, Appiko, Tehri dam, Bishnoi).
4. Public awareness of Environmental problems: Role of Government, NGO's,
5. Ecological footprint,
6. General idea and objectives of international efforts: Vienna Convention, Montreal Protocol, UNFCCC, Kyoto Protocol, Copenhagen Summit, etc.; IPCC.
7. Environmental laws and acts. National Environmental Policy.
8. Organizational role: NBPGR, BSI, ZSI, WWF, IUCN, Convention on Biological diversity; Ramsar Convention, other conservation efforts.

PRACTICAL (GEC-3)

1. Visit to an area to document environmental assets including natural resources/flora/fauna, etc.
   OR, Visit to a local polluted site (Urban/Rural/Industrial/Agricultural).
2. Identification and study of common insects, fish, birds, mammals of a particular area in their natural habitat.
3. To determine the physical conditions of water: Depth, Viscosity, Density, Buoyancy, pH.
4. To study acidity and alkalinity of sample water by methyl orange and phenolphthalein
5. To determine the chemical conditions of water: dissolved oxygen (Winkler's method) and carbon-dioxide (titration method), hardness.
6. To determine Cl, SO_4, NO_3 in soil and water samples from different locations.
7. Group discussion or Seminar presentation on one or two related topics listed below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Kyoto Protocol	2. Conventional vs Non-conventional energy	3. Chernobyl disaster
4. Montreal Protocol	5. Environmental movements	6. Ecological footprint
7. Bhopal gas disaster	8. Bioremediation	9. Concepts of three R's
10. Cryopreservation	11. Biodiversity and endemism	12.Social forestry

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
5. Assessment based on practical topics (class test)-**10** **6.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **7.** Attendance and Participation in class-**5** **8.** Practical skills, laboratory reports, etc-**5**	1. Experiment A (Sl no 3,4)-Principle-1, procedure-1.5, Experiment-1.5, result and inference-2, (6) 2. Experiment B (Sl no 5, 6)-Principle-1, procedure-1.5, Experiment-3, result and inference-2, precaution-0.5 (8) 3. LNB & Field report -2+2=4 4. VIVA-2

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Joseph, B. (2008) Environmental studies, Tata McGraw Hill.
2. Miller, G.T. (2002). Sustaining the earth, an integrated approach. (5th edition)Books/Cole, Thompson Learning, Inc.
3. Chapman, J.L. and Reiss, M.J. (1999). Ecology: Principles and applications (2nd edition) Cambridge University Press.
4. Ghosh, S.K. and Singh, R. (2003). Social forestry and Forest Management. Global Vision Pub.
5. Wilson, E.O. (1986) Biodiversity, Academic press Washington
6. Wagher, R.H. (1974) Environment and Man. (Second Edition), Norton, New York.

SEMESTER-IV

Course Name: Human Physiology

Course Code: BSCHZOOGE401

Course Type: **GE** **(Theory & Practical)**	Course Details: **GEC-4**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

About the course :

The course provides an insight into the structure and function of organ systems in humans and their involvement in body

metabolism towards maintenance of homeostasis.

Learning outcomes

Upon successful completion of this course, students should be able to:

- Understand the process of digestion and its control
- Develop understanding in muscle structure and contraction mechanism
- Learn the process of respiration and transport of gases
- Understand kidney structure and regulation of urine formation
- Understand heart structure and functioning
- Understand functioning of nervous system.
- Understand function of endocrine glands and formation of gametes.

THEORY (GEC-4)

UNIT I: How are processes of digestion and excretion accomplished in man ? (13 Lectures)

1. Digestive glands: Structure and function.
2. Digestion and absorption of nutrients: carbohydrates, fats and proteins.
3. Neural and hormonal control of digestion.
4. Excretory system: Functional anatomy of kidney.
5. Mechanism of excretion and regulation of urine formation.

UNIT II: An overview of muscular function and respiration in man (13 Lectures)

1. Structure of smooth, skeletal and cardiac muscles.
2. Neuromuscular junction.
3. Mechanism of muscle contraction.
4. Respiration: Ventilation, External and internal respiration.
5. Transport of carbon dioxide and oxygen in blood and tissues. Factors affecting gaseous transport.

UNIT III: Cardiovascular functions in man (10 Lectures)

1. Structure of heart.
2. Coordination of heartbeat; control of heart beat (neural and hormonal); Cardiac cycle, ECG.
3. Blood cells and blood vessels.
4. Lymph and lymph vessels.

UNIT IV: Nervous, Endocrine and reproductive physiology (16 Lectures)

1. Introduction to central and peripheral nervous systems.
2. Structure and functions of neuron and brain.
3. Nerve impulse and its transmission, synapse and synaptic transmission, Reflex action.
4. Structure and function of endocrine glands *viz*., pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries and testes.
5. Processes of spermatogenesis and oogenesis.
6. Fertilization and implantation.
7. Menstrual cycle. Pregnancy and Parturition.

PRACTICAL (GEC-4)

1. Temporary mount reparation of Neurons and Blood film.
2. Preparation of haemin and haemochromogen crystals.
3. Haemoglobin estimation using Sahli's haemoglobinometer.
4. Study of permanent histological sections of mammalian oesophagus, stomach, duodenum, rectum, lung, adrenal, kidney, thyroid, pancreas, testis, ovary
5. Group discussion or Seminar presentation on a related topics given below:

Pool of Topics for Group discussion or Seminar presentation :		
1. Gametogenesis	2. Absorption of nutrients in gut	3. Implantation of early embryo.
4. Muscle functioning	5. Filtration by kidney	6. Tropic hormone
7. Cardiac cycle	8. Mammalian lungs & gas transport	9. Synaptic transmission
10. Reflex action	11. Pregnancy and Parturition	. In vitro fertilization techniques

Format for conducting CA and ESE practical examination :

CA (30 marks)	ESE (20 marks)
1. Assessment based on practical topics (class test)-**10** **2.** PPT/Poster preparation, presentation and write up submission-3+4+3=**10** **3.** Attendance and Participation in class-**5** **4.** Practical skills, laboratory reports, etc-**5**	1. Experiment (Sl no 1, 2, 3)-Principle-1, procedure-1.5, Experiment-1.5, result and inference-2, (8) 2. Identification (Sl no 4)-name-0.5, character-1.5 (2x4=8) 3. LNB-2 4. VIVA-2

NOTE :

- *CA can be done multiple times even by more than one teacher. An average will be taken for marks capturing.*
- *LNB should be prepared in inter-leaf practical note book with date & Teacher's sign.*
- *Project report (Presentation mandatory), Field report, Write-up, etc to be prepared separately.*
- *A maximum of 4 students can present same topic of GD/seminar presentation, as a group or solo.*

Recommended readings:

1. Tortora, G.J. and Derrickson, B.H. (2009) Principles of Anatomy and Physiology(12th edition) John Wiley and Sons, Inc.
2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology (9th edition) McGraw Hill.
3. Guyton, A.C. and Hall, J.E. (2011) Textbook of Medical Physiology (12th Ed) Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.
4. Marieb, E. (1998) Human Anatomy and Physiology (4th edition) Addison-Wesley.
5. Kesar, S. and Vashisht, N. (2007) Experimental Physiology, Heritage Publishers.

MASTER ROUTINE SCIENCE EVEN SEMESTER 2024

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MONDAY	SEM II		MAJOR	MINOR	MD	MAJOR(PRACTICAL)		
	SEM IV		CORE	GE	CORE	CORE	HONS (PRACTICAL)	
	SEM VI		DSE	DSE	CORE	CORE	HONS (PRACTICAL)	
TUESDAY	SEM II		MAJOR	MINOR	MD	MINOR PRACTICAL		
	SEM IV	SEC	CORE	GE	CORE	CORE	GE (PRACTICAL)	
	SEM VI			DSE	DSE	CORE	CORE	T/R/S
WEDNESDAY	SEM II		MAJOR	MINOR	MD	MAJOR(PRACTICAL)		
	SEM IV		CORE	GE	CORE	CORE	HONS (PRACTICAL)/T/R/S	
	SEM VI		DSE	DSE	CORE	CORE	HONS (PRACTICAL)	
THURSDAY	SEM II		MAJOR	MINOR	SEC	MINOR PRACTICAL		
	SEM IV	SEC	CORE	GE	CORE	CORE	GE(PRACTICAL)	
	SEM VI			DSE	DSE	CORE	CORE	T/R/S
FRIDAY	SEM II		MAJOR	MINOR	SEC	VAC R-107	MAJOR(PRACTICAL)	
	SEM IV		CORE	GE	CORE	CORE	HONS (PRACTICAL)/T/R/S	
	SEM VI		DSE	DSE	CORE	CORE	HONS(PRACTICAL)	
SATURDAY	SEM II		T/R/S	T/R/S	MINOR PRACTICAL			
	SEM IV	SEC	CORE	GE	CORE	CORE	GE(PRACTICAL)	
	SEM VI		DSE	DSE	CORE	CORE	T/R/S	

Signature of HOD Convener Principal

Please provide the following information also.

1) Name of Teacher –

2) P Day-

3) Total allotted classes of individual Teacher's SemII- Sem IV- Sem-VI

DEPARTMENT OF BUSINESS ADMINISTRATION
B.B. COLLEGE, ASANSOL
PROVISIONAL ROUTINE

DAY	Semester	11AM-12NOON	12NOON 1PM	1PM-2PM	2PM-3PM	3PM – 4PM
MONDAY	II		OB (SD)	ACCOUNTS (GH)	BCOM (BPG)	
	IV		FIN MKT/OR (GH/BPG)	HRM (SD)	PMM (PG)	
	VI		ED (PG)	MS/PROJECT (BPG/PG)	CMA/PROJECT (GH/SD)	
TUESDAY	II			OB (SD)	BCOM (BPG)	
	IV		HRM (SD)	BENV (BPG)	PMM (PG)	
	VI		ED (PG)	PROJECT (PG)	HRD (SD)	MS(BPG)
WEDNESDAY	II		OB (PG)	BCOM (BPG)	ACCOUNTS(GH)	
	IV	BR (PG)	FIN MKT (GH)	PMM (PG)	BENV (BPG)	
	VI		MS(BPG)	CMA (GH)		
THURSDAY	II		MIL (PG)	OB (SD)	ACCOUNTS(GH)	
	IV		OR (GH)	PMM (PG)	HRM (SD)	
	VI		HRD (SD)	CMA (GH)	ED (PG)	
FRIDAY	II			ACCOUNTS(GH)	OB (SD)	
	IV		FIN MKT/OR (GH/BPG)	HRM (SD)	BENV (BPG)	
	VI	PROJECT(GH)	HRD (SD)	MS(BPG)		
SATURDAY	II		ACCOUNTS (GH)	OB (PG)	BCOM (BPG)	
	IV	OR (GH)	HRM (SD)	QUANT/BR (BPG/SD)	PMM (PG)	BENV (BPG)
	VI	HRD (SD)	ED (PG)	CMA (GH)		

GH – MR. GUNAMOY HAZRA
SD- DR. SOUVIK DUTTA
BPG – MR. BUDDHA PRASAD GHATAK
PG – MR. PARTHA GHOSH

DEPARTMENT OF BUSINESS ADMINISTRATION
B.B. COLLEGE, ASANSOL
PROVISIONAL ROUTINE

DAY	Semester	11AM-12NOON	12NOON 1PM	1PM-2PM	2PM-3PM	3PM – 4PM
MONDAY	I		BSTAT (GH)	ECO (BPG)	PMOB (SD)	
	III	FM (GH)	RETAIL (PG)	CFA (SD)	MM (BPG)	
	V		IR (SD)	TAX/SCM (GH/PG)	IB (PG)	SDM (BPG)
TUESDAY	I		ECOMMERCE (BPG)	PMOB (PG)		
	III		CFA (SD)	MM (BPG)	RETAIL (PG)	
	V	IR (SD)	IB (PG)	BLAW (SD)	SDM (BPG)	
WEDNESDAY	I		ECOMMERCE (PG)	ECO (BPG)		
	III		FM (GH)	RETAIL (BPG)	BMATH (GH)	
	V		SDM (BPG)	TAX/SCM (GH/PG)	IB (PG)	
THURSDAY	I			PMOB (PG)	BSTAT (GH)	
	III		CFA (SD)	FM (GH)	MM (PG)	
	V	IR (SD)	TAX(GH)	BLAW (SD)		SDM (PG)
FRIDAY	I		PMOB (SD)	BSTAT (GH)	ECO (BPG)	
	III		FM (GH)	RETAIL (BPG)	CFA (SD)	
	V	TAX (GH)	SCM (BPG)	BLAW (SD)		
SATURDAY	I		PMOB (PG)	Tutorial (GH)	ECO (BPG)	
	III	CE (SD)	BMATH (GH)	CA (BPG)		MM (BPG)
	V	TAX (GH)	BLAW (SD)	IR/SCM (SD/PG)	IB (PG)	

GH – MR. GUNAMOY HAZRA BPG – MR. BUDDHA PRASAD GHATAK SD- DR. SOUVIK DUTTA PG – MR. PARTHA GHOSH

DEPARTMENT OF BUSINESS ADMINISTRATION
B.B. COLLEGE, ASANSOL
PROVISIONAL ROUTINE

DAY	Semester	11AM-12NOON	12NOON 1PM	1PM-2PM	2PM-3PM	3PM – 4PM
MONDAY	I		BSTAT (GH)	ECO (BPG)	PMOB (SD)	
	III	FM (GH)	RETAIL (PG)	CFA (SD)	MM (BPG)	
	V		IR (SD)	TAX/SCM (GH/PG)	IB (PG)	SDM (BPG)
TUESDAY	I		ECOMMERCE (BPG)	PMOB (PG)		
	III		CFA (SD)	MM (BPG)	RETAIL (PG)	
	V	IR (SD)	IB (PG)	BLAW (SD)	SDM (BPG)	
WEDNESDAY	I		ECOMMERCE (PG)	ECO (BPG)		
	III		FM (GH)	RETAIL (BPG)	BMATH (GH)	
	V		SDM (BPG)	TAX/SCM (GH/PG)	IB (PG)	
THURSDAY	I			PMOB (PG)	BSTAT (GH)	
	III		CFA (SD)	FM (GH)	MM (PG)	
	V	IR (SD)	TAX(GH)	BLAW (SD)		SDM (PG)
FRIDAY	I		PMOB (SD)	BSTAT (GH)	ECO (BPG)	
	III		FM (GH)	RETAIL (BPG)	CFA (SD)	
	V	TAX (GH)	SCM (BPG)	BLAW (SD)		
SATURDAY	I		PMOB (PG)	Tutorial (GH)	ECO (BPG)	
	III	CE (SD)	BMATH (GH)	CA (BPG)		MM (BPG)
	V	TAX (GH)	BLAW (SD)	IR/SCM (SD/PG)	IB (PG)	

GH – MR. GUNAMOY HAZRA BPG – MR. BUDDHA PRASAD GHATAK SD- DR. SOUVIK DUTTA PG – MR. PARTHA GHOSH

DEPARTMENT OF BUSINESS ADMINISTRATION
B.B. COLLEGE, ASANSOL
PROVISIONAL ROUTINE

DAY	Semester	11AM-12NOON	12NOON 1PM	1PM-2PM	2PM-3PM	3PM – 4PM
MONDAY	II		OB (SD)	ACCOUNTS (GH)	BCOM (BPG)	
	IV		FIN MKT/OR (GH/BPG)	HRM (SD)	PMM (PG)	
	VI		ED (PG)	MS/PROJECT (BPG/PG)	CMA/PROJECT (GH/SD)	
TUESDAY	II			OB (SD)	BCOM (BPG)	
	IV		HRM (SD)	BENV (BPG)	PMM (PG)	
	VI		ED (PG)	PROJECT (PG)	HRD (SD)	MS(BPG)
WEDNESDAY	II		OB (PG)	BCOM (BPG)	ACCOUNTS(GH)	
	IV	BR (PG)	FIN MKT (GH)	PMM (PG)	BENV (BPG)	
	VI		MS(BPG)	CMA (GH)		
THURSDAY	II		ACCOUNTS (GH)	OB (SD)	MIL (PG)	
	IV		HRM(SD)	PMM (PG)	OR (GH)	
	VI		ED (PG)	CMA (GH)	HRD (SD)	
FRIDAY	II		OB (SD)	ACCOUNTS(GH)		
	IV		FIN MKT/OR (GH/BPG)	HRM (SD)	BENV (BPG)	
	VI	PROJECT(GH) / HRD (SD)		MS(BPG)		
SATURDAY	II		ACCOUNTS (GH)	OB (PG)	BCOM (BPG)	
	IV	OR (GH)	HRM (SD)	QUANT/BR (BPG/SD)	PMM (PG)	BENV (BPG)
	VI	HRD (SD)	ED (PG)	CMA (GH)		

GH – MR. GUNAMOY HAZRA
SD- DR. SOUVIK DUTTA
BPG – MR. BUDDHA PRASAD GHATAK
PG – MR. PARTHA GHOSH

Master Routine for EvenSemester, Day Section (Arts) 2024
Bengali Department
বাংলা বিভাগ

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MON P.Day B.M & L.M	II R.No. 303		MAJOR S.C	MINOR B.K	*MD*			
	IV R.No. 301		C-8 B.K	GE S.C	C-10 S.C	C-8 B.K		
	VI R.No. 302			*CORE*	*CORE*	DSE-3 S.C	DSE-5 B.K	T/R/S S.C
TUE	II R.No. 303		MAJOR L.M	MINOR S.C	MD B.M	VAC R.No. 107		
	IV R.No. 301		C-10 S.C	GE L.M	C-8 B.K	C-8 B.M	SEC S.C	T/R/S B.M
	VI R.No. 302			C-14 B.M	C-14 L.M	DSE-3 S.C	DSE-5 B.K	
WED P.Day B.K	II R.No. 303		MAJOR B.M	MINOR B.M	MD L.M			
	IV R.No. 301		C-9 L.M	GE S.C	C-10 S.C	C-9 L.M		
	VI R.No. 302			C-14 L.M	C-13 B.M	DSE-3 S.C	DSE-5 B.K	T/R/S L.M
THU P.Day S.C	II R.No. 303		MAJOR B.K	MINOR L.M	SEC B.K			
	IV R.No. 301		C-8 B.M	GE B.K	C-9 B.M	C-9 B.M	SEC B.K	T/R/S B.K
	VI R.No. 302			C-13 B.M	C-14 L.M	DSE-5 B.K	DSE	
FRI	II R.No. 303		MAJOR S.C	MINOR B.K	SEC S.C			
	IV R.No. 301		C-9 L.M	GE B.M	C-10 L.M	C-9 B.M		
	VI R.No. 302			C-13 L.M	C-13 B.M	DSE-5 B.K	DSE-3 S.C	
SAT	II R.No. 303			T/R/S B.M	T/R/S S.C	T/R/S B.K		
	IV R.No. 301		C-8 B.M	GE B.K	C-10 L.M	C-10 L.M		
	VI R.No. 302			C-13 L.M	C-14 B.M	DSE-3 S.C	DSE-5 B.K	

Signature of HOD Convener Principal

Routine for Odd Semester, Day Section (Arts) 2023

BENGALI DEPARTMENT

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
+MON P Day L.M & B.M	I R.No-303	MAJOR S.C	MINOR B.K	MD S.C	MIL(Sci&Com) S.C			
	III R.No-301			GE-4 B.K		C-7 B.K	SEC-1 B.K	
	V R.No-302		C-11 S.C		DSE-5 B.K		T/R/S S.C	
TUE	I R.No-303	MAJOR L.M	MINOR S.C	MD B.M	MIL(Sci&Com) B.M			
	III R.No-301			GE-4 L.M	C-7 S.C	C-7 B.K	C-6 B.M	T/R/S B.M
	V R.No-302		C-11 L.M		DSE-5 B.K	DSE-3 B.M		
WED P Day B.K	I R.No-303	MAJOR B.M	MINOR L.M	MD L.M	MIL (Arts) L.M	R/S		
	III R.No-301	SEC-1 S.C	C-6 B.M	GE-4 S.C		C-7 S.C	C-5 L.M	
	V R.No-302				C-12 B.M	DSE-3 B.M	DSE-5 S.C	
THU P Day S.C	I R.No-303	MAJOR B.K	MINOR B.M	SEC B.K		R/S		
	III R.No-301		C-5 L.M	GE-4 B.M		C-6 B.M		T/R/S L.M
	V	DSE-3			C-11	C-12	DSE-5	

	R.No-302	B.M			L.M	B.K	B.K	
FRI	I R.No-303	MAJOR(T) L.M	MINOR(T) B.K	SEC S.C	MIL(Arts) B.K	R/S		
	III R.No-301		C-6 B.M	GE-4 B.M	C-5 L.M	C-5 B.K		
	V R.No-302	C-12 B.M	C-11 S.C	DSE-3 L.M				T/R/S B.K
SAT	I R.No-303			ABB	ABB	SEC(T) B.K	R/S	
	III R.No-301		C-7 S.C		C-5 L.M		ABB	
	V R.No-302	C-12 B.M	C-12 B.K	DSE-3 L.M	DSE-5 S.C	ABB		

Principal

Signature of HOD

Conve

PROVISIONAL ROUTINE (*Day Section*) 2023-2024

DEPARTMENT OF CHEMISTRY, BANWARILAL BHALOTIA COLLEGE, ASANSOL

(EVEN SEMESTERS: January to June, 2024)

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MONDAY	SEM II		MAJOR SR (R-108)	MINOR (R-108) SR	MD (R-108) SKM	MAJOR (PRACTICAL) KL (Mr. Arup Mondal)		
	SEM IV		CORE MCM (R-110)	GE SKM (R-110)	CORE MCM (R-110)	CORE SR (R-110)	HONS (PRACTICAL)/T/R/S SKM (Mr. Arup Chatterjee)	
	SEM VI		HONS (PRACTICAL) T/R/S SM (Mr. Arup Mondal)		DSE KL (R-121)	CORE SM (R-121)	CORE SM (R-121)	CORE MCM (R-121)
TUESDAY	SEM II		MAJOR SM (R-108)	MINOR MCM (R-108)	MD JG (R-108)	MINOR (PRACTICAL) SKM (Mr. Arup Chatterjee)		
	SEM IV	SEC SR (R-110)	CORE SH (R-110)	GE AKD (R-110)	CORE SR (R-110)	CORE SM (R-110)	GE (PRACTICAL) BD (Mr. Arup Mondal)	
	SEM VI			DSE BD (R-121)	DSE MCM (R-121)	CORE KL (R-121)	CORE KL (R-121)	T/R/S SR/JG
WEDNESDAY	SEM II		MAJOR KL (R-108)	MINOR BD (R-108)	MD MCM (R-108)	MAJOR (PRACTICAL) PPM (Mr. Arup Mondal)		
	SEM IV		CORE AKD/JG (R-110)	GE KL (R-110)	CORE JG (R-110)	CORE JG (R-110)	HONS (PRACTICAL)/T/R/S JG (Mr. Arup Chatterjee)	
	SEM VI		HONS (PRACTICAL)/T/R/S SR (Mr. Arup Chatterjee)		CORE SR (R-121)	CORE SR (R-121)	DSE SH (R-121)	DSE AKD (R-121)
THURSDAY	SEM II		MAJOR SKM (R-108)	MINOR SH (R-108)	SEC SR (R-108)	MINOR (PRACTICAL) BD (Mr. Arup Chatterjee)		
	SEM IV	SEC SM (R-110)	CORE SH (R-110)	GE MCM (R-110)	CORE BD (R-110)	CORE AKD/SR (R-110)	GE(PRACTICAL) SH (Mr. Arup Mondal)	
	SEM VI			DSE SKM (R-121)	DSE AKD/SM (R-121)	CORE JG (R-121)	CORE JG (R-121)	T/R/S KL/MCM
FRIDAY	SEM II		MAJOR PPM (R-108)	MINOR JG (R-108)	SEC JG (R-108)	VAC (R-107)	MAJOR (PRACTICAL) SH (Mr. Arup Mondal)	
	SEM IV		CORE SM (R-110)	GE SM (R-110)	CORE KL (R-110)	CORE KL (R-110)	HONS (PRACTICAL)/T/R/S KL (Mr. Arup Chatterjee)	
	SEM VI		HONS(PRACTICAL)/T/R/S BD (Mr. Arup Mondal)		CORE BD (R-121)	CORE BD (R-121)	DSE SKM (R-121)	DSE SR (R-121)
SATURDAY	SEM II		T/R/S PPM/SH	T/R/S SM/BD	MINOR (PRACTICAL) MCM (Mr. Arup Chatterjee)			
	SEM IV	SEC BD (R-110)	CORE SH (R-110)	GE SH (R-110)	CORE BD (R-110)	CORE SKM (R-110)	GE(PRACTICAL) SKM (Mr. Pradip)	
	SEM VI		DSE JG (R-121)	DSE MCM (R-121)	CORE SM (R-121)	CORE SH (R-121)	T/R/S MCM/SH	

- Tutorial, Remedial and Special classes will be taken by any of the mentioned Teacher depending on the requirement.
- 75% Attendance both in Theory and Practical Classes is mandatory to be eligible for appearing in the CIE.

AKD: Dr. Ashis Kumar Dutta
JG: Dr. Jyotirmoy Ghosh
SKM: Dr. Sudip Kumar Mukhopadhay
SM: Dr. Sutanuva Mandal
SH: Mr. Sagen Hansda
PPM: Mr. Patit Paban Malik
BD: Dr. Binita Dutta
MCM: Dr. Mithun Chandra Majee
SR: Dr. Snigdha Roy
KL: Dr. Keya Layek

Snigdha Roy
HOD
12/03/24

12/3/24
Convener

Principal

ROUTINE (*Day and Morning Section*) 2023-2024

DEPARTMENT OF CHEMISTRY, BANWARILAL BHALOTIA COLLEGE, ASANSOL

(For 1st, 3rd and 5th Semester: July to December)

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
MONDAY	SEM I	MAJOR MCM (R-108)	MINOR SR (R-108)	MD	MIL	R/S KL (R-111)	
	SEM III		CORE MCM (R-110)	GE SM (R-110)	CORE SR (R-110)	CORE SR (R-110)	HONS (PRACTICAL)/T/R/S SKM
	SEM V		DSE SKM (R-121)	DSE SR (R-121) / PROG-KL (R-108)	CORE SM (R-121)	CORE SM (R-121)	HONS (PRACTICAL)/T/R/S SM
TUESDAY	SEM I	MAJOR SR (R-108)	MINOR SH (R-108)	MD	MIL	R/S AKD (R-111)	
	SEM III	SEC KL (R-110) / PROG-MCM (R-121)	CORE SM (R-110)	GE SKM (R-110)	CORE SH (R-110)	CORE SH (R-110)	GE (PRACTICAL) BD
	SEM V		DSE KL (R-121)	DSE KL (R-121)	CORE MCM (R-121)	CORE BD (R-121)	T/R/S AKD SKM JG
WEDNESDAY	SEM I	MAJOR BD (R-108)	MINOR KL (R-108)	MD	MINOR (PRACTICAL) AKD		
	SEM III		CORE AKD (R-110) / PROG-PPM (R-318)	GE KL (R-110)	CORE JG (R-110)	CORE JG (R-110)	HONS (PRACTICAL)/T/R/S JG
	SEM V		DSE MCM (R-121)	DSE SH (R-121) / PROG-PPM (R-108)	CORE SR (R-121)	CORE SR (R-121)	HONS (PRACTICAL)/T/R/S SR
THURSDAY	SEM I	MAJOR JG (R-108)	MINOR JG (R-108)	SEC SKM (R-111)	MAJOR (PRACTICAL) SR		
	SEM III	SEC SH (R-110) / PROG-PPM (R-121)	CORE MCM (R-110) / PROG-KL (R-318)	GE MCM (R-110) / PROG-PPM (R-108)	CORE AKD (R-110)	CORE BD (R-110)	GE(PRACTICAL) SH
	SEM V	PROG-MCM (R-318)	DSE SM (R-121)	DSE AKD (R-121)	CORE JG (R-121)	CORE JG (R-121)	T/R/S SR BD KL
FRIDAY	SEM I	MAJOR SM (R-108)	MINOR (T) AKD (R-108)	SEC SH (R-111)	MINOR (PRACTICAL) JG		
	SEM III	PROG-PPM (R-110)	CORE SM (R-110)	GE AKD (R-110)	CORE KL (R-110)	CORE KL (R-110)	HONS (PRACTICAL)/T/R/S KL
	SEM V		DSE SH (R-121)	DSE SKM (R-121)	CORE BD (R-121)	CORE BD (R-121)	HONS(PRACTICAL)/T/R/S BD
SATURDAY	SEM I	MAJOR (T) PPM (R-108)	SEC(T) SH (R-108)	MAJOR (PRACTICAL) MCM			
	SEM III		CORE BD (R-110)	GE SH (R-110)	CORE SKM (R-110)	CORE SKM (R-110)	GE(PRACTICAL) SKM
	SEM V		DSE JG (R-121) / PROG-PPM	DSE AKD (R-121)	CORE SM (R-121)	CORE SM (R-121)	T/R/S SM MCM SH

- Tutorial, Remedial and Special classes will be taken by any of the mentioned Teacher depending on the requirement.
- 75% Attendance both in Theory and Practical Classes is mandatory to be eligible for appearing in the CIE.
- Regarding MD (Multidisciplinary) and MIL (Modern Indian Language) courses, necessary information will be circulated later.

AKD: Dr. Ashis Kumar Dutta
JG: Dr. Jyotirmoy Ghosh
SKM: Dr. Sudip Kumar Mukhopadhay
SM: Dr. Sutanuva Mandal
SH: Mr. Sagen Hansda
PPM: Mr. Patit Paban Malik
BD: Dr. Binita Dutta
MCM: Dr. Mithun Chandra Majee
SR: Dr. Snigdha Roy
KL: Dr. Keya Layek

Signature of

HOD

Head
Department of Chemistry
Banwarilal Bhalotia College, Asansol
Ushagram, Asansol-713303

26/8/23
Convener

Principal
DR. AMITAVA BASU
Principal, B. B. College
Ushagram, Asansol, P Bardhaman
West Bengal - 713303

Monday	9-10 AM Morning Shift VAC (SD) Room No: 107	10-11 PM	11-12 Noon BBA and BCA VAC(SD) BBA/BCA Hall	12-1 PM	1-2 PM	2-3 PM
Tuesday						2-3 PM Arts Hons of Day Shift Group 1 language group, including English, Bengali, Hindi, Sanskrit and Urdu VAC (RM) Room No: 107
Wednesday						
Thursday					1-2 PM Hindi Shift Program (All) VAC (SD) Hindi Shift hall	2-3 PM Arts Hons of Day Shift Group-2 social science and humanities group including political science, history, education and philosophy VAC (PD) Room No: 107
Friday		10-11 PM Hindi Shift B.Com (Hons and Program) VAC (DS) Hindi shift hall	11-12 noon Evening Shift B.Com (Hons and Program) VAC (DS) Room No: 201		1-2 PM Hindi Shift (All Hons) VAC (DS) Hindi Shift hall	2-3 PM All science hons including Geography and economics VAC (DS) Room No: 107

2nd Semester- VAC routine for 2024
SD - Sayantan Dutta RM- Raja Mukherjee
PD - Pankaj Dutta. DS- Debdyuti Sengupta

Class Routine (w.e.f. 09/04/2024)

2nd Semester (Honours)

Days	10 am – 11 am	11 am – 12 pm	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3pm	3 pm - 4 pm	4 pm - 5 pm
Monday	Cost Accounting SM/219	Principles of Marketing SRM/219	Macro Economics AS/219			Tu/R/S SM/219	
Tuesday	Cost Accounting AS/219	Principles of Marketing AA/219	Computer Application in Business SRM/Lab				
Wednesday	Cost Accounting SM/219	Computer Application in Business SM/Lab		Principles of Marketing AA/219	Macro Economics AA/219		
Thursday		Macro Economics SM/219		Cost Accounting AS/219	Tu/R/S AS/219		
Friday	ENVS	Computer Application in Business AS/219	Principles of Marketing VA/219				
Saturday		Principles of Marketing AA/219		Cost Accounting AS/219			

Signature
Head of the Department
Head
Department of Commerce
Hindi Shift
B. B. College

Signature
Routine Committee Convenor

Signature
Principal, B. B. College
Principal
Banwarilal Bhalotia College
Asansol - 713303

BANWARILAL BHALOTIA COLLEGE ASANSOL

Class Routine (w.e.f. 19/02/2024)

4th Semester (Honours)

Days	10 am – 11 am	11 am – 12 pm	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3pm	3 pm - 4 pm	4 pm - 5 pm
Monday			Cost Accounting **SM/220**	Cost Accounting **AS/220**	Indian Economy **AS/220**		
Tuesday	Computer Application in Business **SRM/Lab**	Business Mathematics **/220**		Entrepreneurship Development **VA/220**	Cost Accounting **AS/220**	Indian Economy **AA/220**	Tu/R/S **AS/220**
Wednesday		Business Mathematics **SRM/220**	Computer Application in Business **SM/220**	Entrepreneurship Development **SRM/220**	Computer Applicationin Business **VA/Lab**	Indian Economy **SRM/220**	
Thursday		Business Mathematics **/220**	Computer Application in Business **SRM/Lab**	Computer Application in Business **VA/220**	Indian Economy **AA/220**	Entrepreneurship Development **SRM/220**	
Friday	Computer Application in Business **SM/Lab**	Business Mathematics **/220**		Cost Accounting **SM/220**	Cost Accounting **AS/220**	Entrepreneurship Development **AA/220**	Tu/R/S **AA/220**
Saturday		Business Mathematics **/220**	Cost Accounting **AS/220**	Indian Economy **AA/220**	Indian Economy **AA/220**		

Signature
Head of the Department
Head
Department of Commerce
Hindi Shift
B. B. College

Signature
Routine Committee Convenor

Signature
Principal, B. B. College
Principal
Banwarilal Bhalotia College
Asansol - 713303

BANWARILAL BHALOTIA COLLEGE ASANSOL - 713303

Class Routine (w.e.f. 19/02/2024)

4th Semester (Program)

Days	10 am – 11 am	11 am – 12 pm	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3pm	3 pm - 4 pm	4 pm - 5 pm
Monday				Indirect Tax Law & Practices **SRM/220**	Corporate Accounting **SBM/301**		
Tuesday				Corporate Accounting **AS/219**	Indirect Tax Law & Practices **SM/220**		E -Commerce **DH/201**
Wednesday						Corporate Accounting **BS/219**	Indirect Tax **TM/218**
Thursday				E-Commerce **SRM/221**	Corporate Accounting **SM/221**		
Friday			Indirect TaxLaw & Practices **DH/218**	E-Commerce **AS/221**			
Saturday			E -Commerce **TM/220**				

Signature
Head of the Department
Head
Department of Commerce
Hindi Shift
B. B. College

Signature
Routine Committee Convenor

Signature
Principal, B. B. College
Principal
Banwarilal Bhalotia College
Asansol - 713303

BANWARILAL BHALOTIA COLLEGE ASANSOL

Class Routine (w.e.f. 19/02/2024)

6th Semester (Honours)

Days	10 am – 11 am	11 am – 12 pm	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3pm	3 pm - 4 pm	4 pm - 5 pm
Monday		Advanced Cost Accounting **SM/221**	Computerized Accounting **SRM/Lab**		Indirect Tax **SRM/221**	Auditing & Corporate **AS/221**	
Tuesday			Advanced Cost Accounting **AS/221**	Computerized Accounting **SM/Lab**	Auditing & Corporate **SRM/221**	Indirect Tax **SM/221**	
Wednesday			Computerized Accounting **SRM/Lab**	Advanced Cost **Accounting** **SM/221**	Auditing & Corporate **AA/221**	Tu/R/S **SM/221**	
Thursday			Advanced Cost Accounting **AS/221**	Computerized Accounting **SM/Lab**		Indirect Tax **AA/221**	
Friday			Computerized Accounting **SM/Lab**			Auditing & Corporate **AS/221**	
Saturday		Indirect Tax **AS/221**	Auditing & Corporate **AA/221**			Tu/R/S **AA/220**	

Signature
Head of the Department
Head
Department of Commerce
Hindi Shift
B. B. College

Signature
Routine Committee Convenor

Signature
Principal, B. B. College
Principal
Banwarilal Bhalotia College
Asansol - 713303

BANWARILAL BHALOTIA COLLEGE • ASANSOL • 713303

Class Routine (w.e.f. 19/02/2024)

6th Semester (Program)

Days	10 am – 11 am	11 am – 12 pm	12 pm - 1 pm	1 pm - 2 pm	2 pm - 3pm	3 pm - 4 pm	4 pm - 5 pm
Monday		Advanced Cost Accounting **SM/221**	Computerized Accounting **SRM/Lab**			Indian Economy **SRM/221**	Personal Selling & Salesmanship **SR/201**
Tuesday			Advanced Cost Accounting **AS/221**	Computerized Accounting **SM/Lab**	Indian Economy **AA/220**		Personal Selling & Salesmanship **AA/221**
Wednesday			Computerized Accounting **SRM/Lab**	Advanced Cost **Accounting** **SM/221**		Personal Selling & Salesmanship **AA/201**	
Thursday			Advanced Cost Accounting **AS/221**	Computerized Accounting **SM/Lab**		Indian Economy **SBM/201**	Personal Selling & Salesmanship **AA/221**
Friday			Computerized Accounting **SM/Lab**			Personal Selling & Salesmanship **BS/201**	
Saturday			Indian Economy **BS/219**				

Signature
Head of the Department
Head
Department of Commerce
Hindi Shift
B. B. College

Signature
Routine Committee Convenor

Signature
Principal, B. B. College
Principal
Banwarilal Bhalotia College
Asansol - 713303

BANWARILAL BHALOTIA COLLEGE ASANSOL

Department of Commerce [Evening Shift], BB College, Asansol

Class-Routine for the Session 2023-24 (January to June)-2nd, 4th & 6thSemester

Monday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
2nd Sem	B.Com (H) Gr-I		Cost Accounting TM/201	Prin. of Mkt. VA/201	~~Prin. of Mkt. VA/201~~	---	Personal Finance [MD for Other Disciplines] ***/***	Tutorial/Remedial
	B.Com (H) Gr-II		Cost Accounting SR/301	Prin. of Mkt. VA/301	Comp. App in Bus TM/Lab	---		Tutorial/Remedial
	B.Com (P)		Cost Accounting SR/301	Prin. of Mkt. VA/301	Comp. App in Bus TM/Lab	---		Tutorial/Remedial
4th Sem	B.Com (H) Gr-I		Cost Accounting SM/218	Bus. Math TKM/218	---	Comp. Appl. in Bus TM/Lab(A-M)	---	
	B.Com (H) Gr-II		Cost Accounting SM/218	Bus. Math TKM/218	---	Comp. Appl. in Bus TM/Lab(A-M)	----	
	B.Com (P)	English-II [AE] SN/301	---	Indirect Tax Saroj Mahato /220	Corp. Acct SM/301	---	----	
6th Sem	B.Com (H) Gr-I-Acct		Computerised Acct S.Mahato /Lab	---	Auditing & Corp. G. SR/218	Indirect Tax SM/218	----	
	B.Com (H) Gr-II-Fin			---	Auditing & Corp. G. SR/218	Indirect Tax SM/218	----	
	B.Com (P)		Computerised Acct S.Mahato /Lab	---	---	Indian Eco. Saroj Mahato /220	PS & Salesmanship SR/201	

Tuesday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
2nd Sem	B.Com (H) Gr-I		----	Cost Accounting DH/201	Prin. of Mkt. VA/201	Comp. App in Bus TM/Lab	---	
	B.Com (H) Gr-II		Prin. of Mkt. SM/301	Prin. of Mkt. BS/301	----	----	----	
	B.Com (P)		Prin. of Mkt. SM/301	Prin. of Mkt. BS/301	-----	-----	---	
4th Sem	B.Com (H) Gr-I		Cost Accounting TM/218	Entp. Development SM/218	Indian Eco. BS/301	Bus. Math SS/301	----	Tutorial/Remedial
	B.Com (H) Gr-II		Cost Accounting TM/218	Entp. Development SM/218	Indian Eco. BS/301	Bus. Math SS/301	----	Tutorial/Remedial
	B.Com (P)		---	Corp. Acct AS/220	Indirect Tax S.Mallik /220	---	E-Commerce DH/201	Tutorial/Remedial
6th Sem	B.Com (H) Gr-I-Acct		---	Computerised Acct S.Mallik /Lab	Adv. Cost Acct. TM/218	Indirect Tax DH/218	Auditing & Corp. G. BS/218	
	B.Com (H) Gr-II-Fin		----		Investment Analysis SM/219	Indirect Tax DH/218	Auditing & Corp. G. BS/218	
	B.Com (P)		---	Computerised Acct S.Mallik /Lab	Adv. Cost Acct. TM/218	Indian Eco. AA/219	PS & Salesmanship AA/221	

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Department of Commerce [Evening Shift], BB College, Asansol

Class-Routine for the Session 2023-24 (January to June) -2nd, 4th & 6th Semester

Wednesday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
2nd Sem	B.Com (H) Gr-I		Cost Accounting **BS/201**	**Prin. of Mkt. SR/201**	----	----	**Personal Finance [MD for Other Disciplines]** ***/***	
	B.Com (H) Gr-II		**Cost Accounting TM/301**	**Macro Eco.[MD] VA/301**	Cost Accounting **DH/301**	----		
	B.Com (P)		**Cost Accounting TM/301**	**Macro Eco.[MD] VA/301**	Cost Accounting **DH/301**	----		
4th Sem	B.Com (H) Gr-I		Cost Accounting **DH/218**	**Comp. Appl. in Bus TM /Lab(N-Z)**	----	Indian Eco. **DH/301**	Entp. Development **SR/301**	
	B.Com (H) Gr-II		Cost Accounting **DH/218**	**Comp. Appl. in Bus TM /Lab(N-Z)**	----	Indian Eco. **DH/301**	Entp. Development **SR/301**	
	B.Com (P)				----	**Corp. Acct BS/219**	**Indirect Tax TM/219**	
6th Sem	B.Com (H) Gr-I-Acct		Computerised Acct S.Mahato /Lab	**Adv. Cost Acct. BS/218**	**Indirect Tax SR/218**	----	---	Tutorial/Remedial
	B.Com(H) Gr-II-Fin		----	----	**Indirect Tax SR/218**	Cap. Mkt. Ope. **TM/Lab/218**	Investment Analysis **DH/218**	Tutorial/Remedial
	B.Com(P)		Computerised Acct S.Mahato /Lab	**Adv. Cost Acct. BS/218**	Indian Eco. **/**	**PS & Salesmanship AA/221**	----	Tutorial/Remedial

Thursday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
2nd Sem	B.Com (H) Gr-I	**Comp. App in Bus DH/Lab**	Cost Accounting **SM/201**	**Macro Eco.[MD] VA/201**	---		---	Tutorial/Remedial
	B.Com (H) Gr-II		**Cost Accounting BS/301**	**Macro Eco.[MD] SM/301**	---	----	----	Tutorial/Remedial
	B.Com (P)		**Cost Accounting BS/301**	**Macro Eco.[MD] SM/301**	---	----	---	Tutorial/Remedial
4th Sem	B.Com (H) Gr-I		---	**Cost Accounting SR/218**	Entp. Development **BS/218**	**Entp. Development SR/218**	----	
	B.Com (H) Gr-II		----	**Cost Accounting SR/218**	Entp. Development **BS/218**	**Entp. Development SR/218**	----	
	B.Com (P)		----	**E-Commerce Saroj Mahato /221**	Corp. Acct **S.Mallik/221**	----	---	
6th Sem	B.Com (H) Gr-I-Acct			Computerised Acct **S.Mallik /Lab**	Adv. Cost Acct. **DH/301**	Indirect Tax **BS/301**	----	
	B.Com(H) Gr-II-Fin		Cap. Mkt. Ope. **DH/218**	---	Cap. Mkt. Ope. **SR/201**	Indirect Tax **BS/301**	Investment Analysis **BS/218**	
	B.Com(P)			Computerised Acct **S.Mallik /Lab**	Adv. Cost Acct. **DH/301**	**Indian Eco. SM/201**	**PS & Salesmanship AA/221**	

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Department of Commerce [Evening Shift], BB College, Asansol

Class-Routine for the Session 2023-24 (January to June) -2nd, 4th & 6th Semester

Friday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
2nd Sem	B.Com (H) Gr-I	V.A.C-Env-Studies **/107	Prin. of Mkt. BS/201	Prin. of Mkt. SM/201	----	---	Personal Finance [MD for Other Disciplines]	
	B.Com (H) Gr-II	V.A.C-Env-Studies **/107	Cost Accounting SM/301	Prin. of Mkt. VA/301	Comp. App in Bus DH/Lab	----		
	B.Com (P)	V.A.C-Env-Studies **/107	Cost Accounting SM/301	Prin. of Mkt. VA/301	Comp. App in Bus DH/Lab	----	***/***	
4th Sem	B.Com (H) Gr-I		Bus. Math PP/218	Indian Eco. TM/218	Cost Accounting BS/201	Entp. Development DH/201	---	Tutorial/Remedial
	B.Com (H) Gr-II		Bus. Math PP/218	Indian Eco. TM/218	Cost Accounting BS/201	Entp. Development DH/201	----	Tutorial/Remedial
	B.Com (P)		Indirect Tax DH/219	E-Commerce AS/219	Indirect Tax **/**	----	----	Tutorial/Remedial
6th Sem	B.Com (H) Gr-I-Acct		Computerised Acct S.Mallik /Lab	----	Adv. Cost Acct. SM/218	Indirect Tax TM/218	Auditing & Corp. G. DH/218	
	B.Com(H) Gr-II-Fin		----	----	----	Indirect Tax TM/218	Auditing & Corp. G. DH/218	
	B.Com(P)		Computerised Acct S.Mallik /Lab	----	Adv. Cost Acct. SM/218	PS & Salesmanship BS/201		

Saturday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
2nd Sem	B.Com (H) Gr-I		Macro Eco.[MD] SM/201	Cost Accounting SR/201	---	---	---	---
	B.Com (H) Gr-II		Prin. of Mkt. SR/301	Prin. of Mkt. SM/301	---	---	---	---
	B.Com (P)		Prin. of Mkt. SR/301	Prin. of Mkt. SM/301	---	---	---	---
4th Sem	B.Com (H) Gr-I	Comp. Appl. in Bus DH/Lab (N-Z)	Comp. Appl. in Bus DH/Lab (A-M)	Bus. Math AB/218	---	---	----	----
	B.Com (H) Gr-II	Comp. Appl. in Bus DH/Lab (N-Z)	Comp. Appl. in Bus DH/Lab (A-M)	Bus. Math AB/218	----	----	----	----
	B.Com (P)	---	Corp. Acct **/**	E-Commerce TM/220	----	----	---	---
6th Sem	B.Com (H) Gr-I-Acct	---	----	----	Auditing & Corp. G. TM/218	---	---	---
	B.Com(H) Gr-II-Fin	----	----	Cap. Mkt. Ope. BS/107/Lab	Auditing & Corp. G. TM218	Investment Analysis SR/218	----	----
	B.Com(P)	----	Indian Eco. BS/219	----	Indian Eco. **/**	----	----	----

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Day-wise Work Load

	SM		BS		DH		TM		SR		VA	
Monday	**3**	2					**3**	2	**3**	2	**1**	1
Tuesday	**3**	2	**3**	3	**3**	1	**3**	2			**1**	0
Wednesday			**3**	1	**3**	3	**4**	2	**3**	2	**2**	1
Thursday	**3**	3	**3**	3	**3**	1			**2**	1	**1**	0
Friday	**3**	2	**3**	1	**4**	2	**2**	2			**1**	1
Saturday	**2**	1	**2**	0	**2**	2	**2**	1	**4**	1		
	14	[10]	**14**	[8]	**16**	[10]	**14**	[9]	**12**	[6]	**06**	[3]

Summary of Prog Classes Merged with-H.Shift	SM	BS	DH	TM	SR
	2	**3**	**2**	**2**	**1**

CLASSES MERGED WITH HINDI SHIFT-(In Details)

Corporate Accounting			SM	BS	SM,BS, [S.Mallik, AS]
Indirect Tax Laws	TM		DH		TM,DH [S.Mallik, S.Mahato]
E-Commerce [SE]	TM		DH		TM, DH, [AS, S.Mahato]
Indian Economy-GE	SM		BS		SM, BS [AA,SM]
Personal Selling & Sal.-SE	BS	SR			BS, SR, [AA,AA]

Business Math Classes allotted to Teachers of Mathematics Department

Business Math & Stat. 04--Classes	**4-Classes**
	Monday -TKM, Tuesday-SS, Friday-PP, Saturday-AB

Classes Allotted to Mr. Vikram Agarwal

Mkt Mgt-02+02 Classes Macro Eco-1+1	**06-Classes**
	Monday -02, Tuesday-01, Wednesday-01, Thursday-01, Friday-01

6th Semester Computerised Accounting Class

Saroj	**02-Classes**
S. Mallick	**03 Classes**

Head
Department of Commerce

Convener
Routine sub-committee

Principal

SUMMARY OF COMPUTER CLASSES ALLOTTED FOR

B.COM HONS (2nd, 4th & 6th Semester) EVENING SHIFT 2023-2024

Classes	Time→ Classes ↓	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00
Monday	B.Com (H)-2nd Sem				TM		
	B.Com(H)-4th Sem					TM	
	B.Com (H)+ P-6th Sem		S-Mahato				
Tuesday	B.Com (H)-2nd Sem					TM	
	B.Com(H)-4th Sem						
	B.Com (H)+ P-6th Sem			S-Mallik			
Wednesday	B.Com (H)-2nd Sem			TM			
	B.Com(H)-4th Sem						
	B.Com (H)+ P-6th Sem		S-Mahato				
Thursday	B.Com (H)-2nd Sem	DH					
	B.Com(H)-4th Sem						
	B.Com (H)+ P-6th Sem			S-Mallik			
Friday	B.Com (H)-2nd Sem				DH		
	B.Com(H)-4th Sem						
	B.Com (H)+ P-6th Sem		S-Mallik				
Saturday	B.Com (H)-2nd Sem						
	B.Com(H)-4th Sem	DH	DH				
	B.Com (H)+ P-6th Sem						

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Department of Commerce [Evening Shift], BB College, Asansol

Class-Routine for the Session 2023-2024 (July to December) -1st, 3rd & 5th Semester

Monday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
1st Sem	B.Com (H) Gr-I		Fin. Acct **TM/201**	**MIL-Hindi–S.M/201** **MIL-Beng-SC/301** **MIL-Eng-**/**** **MIL-Urdu-IIQ/311**	**Prin. of Mgt. SM/201**	---	**Acct. for All** ****/**** **[Applicable for other Discipline]**	Tutorial/Remedial
	B.Com (H) Gr-II	MIL-II ****/****	**Fin. Acct SR/301**		**Entp. Dev VA/301**	---		Tutorial/Remedial
	B.Com (P)	MIL-Beng [AEC] SB/107	**Fin. Acct SR/301**		**Entp. Dev VA/301**	---		Tutorial/Remedial
3rd Sem	B.Com (H) Gr-I		I.Tax L&P SM/218	**Bus. Stat JS/218**	HRM SR/107	Mgt. P. & App **TM/107**	E-Commerce ****/****	
	B.Com (H) Gr-II		I.Tax L&P SM/218	**Bus. Stat JS/218**	HRM SR/107	Mgt. P. & App **TM/107**	E-Commerce ****/****	
	B.Com (P)		I.Tax L&P SM/218	**Company Law VA/107**	---	---	---	
5th Sem	B.Com (H) Gr-I-Acct		---	---	Mgt. Acct. TM//218	Fund. of F.Mgt. **SM/218**	Prin. of Mkt. **SR/218**	
	B.Com (H) Gr-II-Fin		---	---	Fin. Mkt. ****/****	Fund. of F.Mgt. **SM/218**	Prin. of Mkt. **SR/218**	
	B.Com (P)		---	---	Mgt. Acct. TM/218	**Prin of Micro Eco AS /220**	---	

Tuesday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
1st Sem	B.Com (H) Gr-I		Fin. Acct **DH/201**	**MIL-Hindi –AP/201** **MIL-Beng-BM/301** **MIL-Eng-**/**** **MIL-Urdu-**/****	**Entp. Dev VA/201**	---	**Acct. for All/ Tutorial Class TM/201** **[Applicable for other Discipline]** To be adjusted	
	B.Com (H) Gr-II	MIL ****/****	**Fin. Acct TM/301**		**Micro Economics SM/301**	**Prin. of Mgt BS/201**		
	B.Com (P)	MIL-Beng [AEC] RDT/107	**Fin. Acct TM/301**		**Micro Economics SM/301**	**Prin. of Mgt BS/201**		
3rd Sem	B.Com (H) Gr-I		Mgt. P. & App **SM/218**	HRM **BS/218**	**E-Commerce DH/107**	Mgt. P. & App DH/301	HRM **SM/301**	Tutorial/Remedial
	B.Com (H) Gr-II		Mgt. P. & App **SM/218**	HRM **BS/218**	**E-Commerce DH/107**	Mgt. P. & App DH/301	HRM **SM/301**	Tutorial/Remedial
	B.Com (P)	**MIL-II-Eng [7-8AM] SN/223**	**MIL-II-Hindi **/****	**Company Law VA/220**	---	---	---	Tutorial/Remedial
5th Sem	B.Com (H) Gr-I-Acct		---	---	Adv. Fin Acct **TM/218**	Prin. of Mkt. **SM/218**	Fund. of F.Mgt. **BS/218**	
	B.Com (H) Gr-II-Fin		---	---		Prin. of Mkt. **SM/218**	Fund. of F.Mgt. **BS218**	
	B.Com (P)		---	---	Adv. Fin Acct **TM/218**	**Prin of Micro Eco S.Mallik/219**	**Ent. Development AA/221**	

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Department of Commerce [Evening Shift], BB College, Asansol

Class-Routine for the Session 2023-2024 (July to December) -1st, 3rd & 5th Semester

Wednesday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
1st Sem	B.Com (H) Gr-I		Fin. Acct BS/201	Prin. of Mgt SR/201	Prin. of Mgt TM/201	---	Acct. for All/ Tutorial Class BS/301 [Applicable for other Discipline] To be adjusted	
	B.Com (H) Gr-II		Fin. Acct DH/301	Entp. Dev VA/301	Prin. of Mgt SR/301	---		
	B.Com (P)		Fin. Acct DH/301	Entp. Dev VA/301	Prin. of Mgt SR/301	---		
3rd Sem	B.Com (H) Gr-I		Bus. Stat JS/218	I.Tax L&P DH/218	E-Commerce **/**	---	---	
	B.Com (H) Gr-II		Bus. Stat JS/218	I.Tax L&P DH/218	E-Commerce **/**	---	---	
	B.Com (P)	MIL-II-Eng [7-8AM] SN/223	MIL-II-Beng RDT/111	I.Tax L&P DH/218	Company Law VA/220	---	---	
5th Sem	B.Com (H) Gr-I-Acct		---	---	Adv. Fin Acct BS/218	Fund-of F.Mgt. TM/218	Mgt. Acct. DH/218	Tutorial/Remedial
	B.Com (H) Gr-II-Fin		---	Adv. Fin. Mgt. BS/107	Adv. Fin. Mgt. DH/107	Fund-of F.Mgt. TM/218	Fin. Mkt. SR/201	Tutorial/Remedial
	B.Com(P)		---	---	Adv. Fin Acct BS/218	Prin of Micro Eco **/**	Mgt. Acct. DH/218	Tutorial/Remedial

Thursday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
1st Sem	B.Com (H) Gr-I		Fin. Acct SM/201	Entp. Dev VA/201	---	Prin. of Mgt VA/201	---	
	B.Com (H) Gr-II		Fin. Acct BS/301	Micro Economics DH/301	---	---	---	
	B.Com (P)	MIL-Hindi [AEC] 217/MB	Fin. Acct BS/301	Micro Economics DH/301	---	---	---	
3rd Sem	B.Com (H) Gr-I		---	I.Tax L&P SR/107	Bus. Stat KB/107	---		
	B.Com (H) Gr-II		---	I.Tax L&P SR/107	Bus. Stat KB/107	---		
	B.Com (P)	MIL-II-Urdu **/**	MIL-II-Urdu **/**	I.Tax L&P SR/107	Company Law VA/220	---	---	
5th Sem	B.Com (H) Gr-I-Acct		---	Mgt. Acct. BS/218	Adv. Fin Acct DH/218	---	---	
	B.Com(H) Gr-II-Fin		Adv. Fin. Mgt. DH/218	---	Fin. Mkt. SM/201	Adv. Fin. Mgt. SR/218	Fin. Mkt. BS/218	
	B.Com(P)		---	Mgt. Acct. BS/218	Adv. Fin Acct DH/218	Prin of Micro Eco. SM/220	Ent. Dev. SR/220	

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Department of Commerce [Evening Shift], BB College, Asansol

Class-Routine for the Session 2023-2024 (July to December) -1st, 3rd & 5th Semester

Friday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
1st Sem	B.Com (H) Gr-I	---	Micro Economics DH/201	**Prin. of Mgt BS/201**	---	**Acct. for All/ Tutorial Class DH/107 [Applicable for other Discipline]** To be adjusted	---	
	B.Com (H) Gr-II	---	---	Fin. Acct **SM/301**	**Prin. of Mgt VA/301**		---	
	B.Com (P)	---	---	Fin. Acct **SM/301**	**Prin. of Mgt VA/301**		---	
3rd Sem	B.Com (H) Gr-I	---	---	---	Mgt. P. & App **BS/201**	**Bus. Stat KB/301**	HRM **DH/301**	
	B.Com (H) Gr-II	---	---	---	Mgt. P. & App **BS/201**	**Bus. Stat KB/301**	HRM **DH/301**	
	B.Com (P)	MIL-II-Hindi [9-10AM] NR/	**MIL-II-Beng RR/107**	**Computer App. TM/Com Lab**	**Computer App. TM/Com Lab**			
5th Sem	B.Com (H) Gr-I-Acct	----	---	---	Fund-of F.Mgt. DH/218	Mgt. Acct. **SM/218**	Prin. of Mkt. **TM/218**	
	B.Com(H) Gr-II-Fin	----	---	---	Fund of F.Mgt. DH/218	Adv. Fin. Mgt. **BS/201**	Prin. of Mkt. **TM/218**	
	B.Com(P)	----	---	---	--	Mgt. Acct. **SM/218**	**Ent. Dev BS/201**	

Saturday — **Commerce [Evening Shift]**

Time→ Classes ↓		11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00
1st Sem	B.Com (H) Gr-I		**Micro Economics SM/201**	Fin. Acct **SR**/201	---	---	---	
	B.Com (H) Gr-II		**Prin. of Mgt TM/301**	**Prin. of Mgt** SM/301	---	---	---	
	B.Com (P)	MIL-Urdu-[AEC] 216/TP	**Prin. of Mgt TM/301**	**Prin. of Mgt** SM/301	---	---	---	
3rd Sem	B.Com (H) Gr-I		I.Tax L&P **BS/218**	**E-Commerce TM/218**	Mgt. P. & App **SR/218**	---	---	
	B.Com (H) Gr-II		I.Tax L&P **BS/218**	**E-Commerce TM/218**	Mgt. P. & App **SR/218**	---	---	
	B.Com (P)	**Computer App. DH/Com Lab**	**Computer App. DH/Com Lab**	---	---	---	---	
5th Sem	B.Com (H) Gr-I-Acct		---	---	---	---	Adv. Fin Acct **SR/218**	
	B.Com(H) Gr-II-Fin		---	Adv. Fin. Mgt **/**	---	Fin. Mkt. **TM/218**	Adv. Fin. Mgt. **/201**	
	B.Com(P)		---	---	---	**Prin of Micro Eco SM/219**	Adv. Fin Acct **SR/218**	

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Day-wise Work Load

	SM		BS		DH		TM		SR			
Monday	3						3		3			
Tuesday	3		4		3		3					
Wednesday			3		4		2		3			
Thursday	3		3		3				3			
Friday	2		3		4		3					
Saturday	3		1		2		3		3			
	14		14		16		14		12			

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Summary of Classes allotted to Prof. Vikram Agarwal

Classes	Time→ Classes ↓	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00
Monday	B.Com (H)-Gr-I				
	B.Com(H)-Gr-II			Entp. Dev VA/301	
	B.Com-Prog-Eve +Hindi		Company Law VA/107		
Tuesday	B.Com (H)-Gr-I			Entp. Dev VA/201	
	B.Com(H)-Gr-II				
	B.Com-Prog-Eve +Hindi		Company Law VA/220		
Wednesday	B.Com (H)-Gr-I				
	B.Com(H)-Gr-II		Entp. Dev VA/301		
	B.Com-Prog-Eve +Hindi			Company Law VA/220	
Thursday	B.Com (H)-Gr-I		Entp. Dev VA/201		Prin. of Mgt VA/201
	B.Com(H)-Gr-II				
	B.Com-Prog-Eve +Hindi			Company Law VA/220	
Friday	B.Com (H)-Gr-I				
	B.Com(H)-Gr-II			Prin. of Mgt VA/301	
	B.Com-Prog-Eve +Hindi				
Saturday	B.Com (H)-Gr-I				
	B.Com(H)-Gr-II				
	B.Com-Prog-Eve +Hindi				

Head
Department of Commerce

Convener
Routine sub-committee

Principal

6TH SEM PROG-COMBINED CLASSES

	3-4	4-5
MONDAY	Prin of Micro Eco Saroj Mahato /220	Ent. Dev AA/220
TUESDAY	Prin of Micro Eco AA/219	Ent. Development AA/221
THURSDAY	Prin of Micro Eco SM/220	Ent. Dev SR/220
FRIDAY		Ent. Dev BS/201
SATURDAY	Prin of Micro Eco SM/219	

Head
Department of Commerce

Convener
Routine sub-committee

Principal

Department Of Computer Science Routine For 2022-23(Odd+Even Semester)

DEPARTMENT OF COMPUTER SCIENCE (ROOM NO. - 101 AND LAB ROOM [LR]) Routine
For Odd Semester

DAYS / TIMINGS		10:00 - 11:00	11:00 - 12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00
MONDAY	SEM I		ENVS (107)		CORE (SK) (101)		HONS (PRACTICAL)/T/R/S (AT)(LR)
	SEM III			CORE (SK) (101)	CORE(AT) (LR)	HONS (PRACTICAL) (SK) (LR)	
	SEM V			DSE(AT) (LR)		CORE(AT) (101)	
TUESDAY	SEM I				CORE(AT) (LR)	CORE(SK) (101)	
	SEM III			SEC (SK)(LR)		CORE(AT) (LR)	
	SEM V			DSE(AT) (101)	CORE(SK) (101)		HONS (PRACTICAL) (AT) (LR)
WEDNESDAY	SEM I					CORE(AT)(LR)	HONS (PRACTICAL)/ T/R/S (SM) (LR)
	SEM III			CORE (AT) (LR)	CORE (SM) (LR)		
	SEM V		DSE (SK) (LR)	DSE (SM) (101)	CORE(AT) (101)	CORE(SM) (101)	
THURSDAY	SEM I						CORE (SM) (101)
	SEM III			HONS (PRACTICAL) (AT) (LR)	CORE(AT) (101)	CORE(SM) (101)	
	SEM V		HONS (PRACTICAL) (SK) (LR)	DSE (SK) (101)	CORE(SM)(LR)	CORE(AT)(LR)	DSE(AT) (LR)
FRIDAY	SEM I				CORE (SM) (LR)		
	SEM III					SEC(SM) (LR)	
	SEM V			DSE (SM) (LR)			HONS (PRACTICAL)/T/R/S (SM) (LR)
SATURDAY	SEM I						
	SEM III				CORE (SM) (LR)		HONS (PRACTICAL) (SM) (LR)
	SEM V			DSE (SM) (LR)		CORE(SM) (LR)	

*(Details of the GE classes will be provided by the respective Department)

~AT - Mr. Arpan Tewary ~SK - Mr. Samrat Kundu ~SM - Mrs. Sutapa Majee

**Remarks: 50% attendance is mandatory. 40% internal marks for each paper will be on attendance & class performance.

DEPARTMENT OF COMPUTER SCIENCE (ROOM NO. - 101 AND LAB ROOM)

ROUTINE FOR EVEN SEMESTER

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00
MONDAY	SEM II					CORE201 PR. (AT)	
	SEM IV			CORE402 PR. (SK)	CORE403 (AT)	CORE402 (SK)	
	SEM VI		CORE602 PR. (SK)	CORE601 (AT)			DSE602 (AT)
TUESDAY	SEM II				CORE201 (AT)	CORE202 (SK)	
	SEM IV					CORE403 PR. (AT)	
	SEM VI		DSE602(SK)	DSE602 (AT)	CORE602 (SK)		CORE601 (AT)
WEDNESDAY	SEM II				CORE401 (SM)	CORE201 (AT)	
	SEM IV			CORE403 (AT)		CORE401 (SM)	CORE402 (SK)
	SEM VI		DSE603(SM)	DSE604 (SM)	CORE601 PR. (AT)		
THURSDAY	SEM II				CORE202 (SM)	CORE201 (SK)	
	SEM IV			CORE401 (SM)	CORE403 (AT)		CORE403 (AT)
	SEM VI		DSE604(SM)	DSE602(AT)		CORE601 (AT)	CORE602 (SK)
FRIDAY	SEM II				CORE202 (SM)		
	SEM IV					SEC401 (SM)	
	SEM VI		DSE603 (SM)	DSE604(SM)			
SATURDAY	SEM II						
	SEM IV				CORE401 (SM)	SEC401 (SM)	
	SEM VI		DSE603 (SM)	DSE604(SM)			

*(Details of the GE classes will be provided by the respective Department)

~SM - Mrs. Sutapa Majee ~SK - Mr. Samrat Kundu ~AT - Mr. Arpan Tewary

DEPARTMENT OF COMPUTER SCIENCE

ROUTINE FOR ODD SEM 2023(ROOM NO. 101 & LR[LAB ROOM])

DAYS \ TIMINGS		10AM-11AM	11AM-12NOON	12NOON-1PM	1PM-2PM	2PM-3PM	3PM-4PM	4PM-5PM
MON	1ST	MJC (AT) LR	*MNC (AT) 101	*(MD)AT 101	MIL			
	3RD				CORE Pr. (AT) LR			
	5TH		CORE Pr. (SK) LR		DSE (SK) 101			
TUE	1ST	MJC (AT) LR		*MD (SK) 101	MIL	MJC (BR) 101		
	3RD	CORE (SK) 101			CORE (AT) 101	SEC Pr. (SK) LR		
	5TH		CORE Pr. (AT) LR	DSE (AT) LR	DSE (SK) LR			
WED	1ST	MJC (SM) 101	*MNC (SM) LR	*MD (SM) 101	*MNC Th. (AT) LR	* MNC Pr. (AT) LR		
	3RD	SEC Pr. (SK) LR		CORE (AT) LR				
	5TH				DSE (SM) 101			
THU	1ST	MJC (SK) 101	*MNC (SM) LR	SEC Pr. (AT) LR	MJC Pr.(AT) LR			
	3RD	SEC Pr. (SM) LR			CORE (SK) 101	CORE (AC) 101		
	5TH		CORE (AT) 101	CORE (SM) 101				
FRI	1ST	MJC (SM) LR		SEC Pr. (SM) LR	* MNC Pr. (SM) LR			
	3RD		CORE (SM) LR					
	5TH							
SAT	1ST			MJC Pr. (SM) LR				
	3RD		SEC Pr. (SM) LR	CORE (AC) 101	CORE (SM) LR			
	5TH	CORE Pr. (SM) LR						

*Classes for other discipline students.

*Details of MIL classes will be provided by the respective department.

Department of Economics

MASTER ROUTINE SCIENCE ODD SEMESTER 2023-24

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:0005:00
MONDAY	SEM I	MAJOR SS	MINOR MB	MD	MIL	R/S	
	SEM III		CORE SS	GE MB	CORE	CORE	HONS (PRACTICAL)/T/R/S
	SEM V		DSE	DSE	CORE SS	CORE	HONS (PRACTICAL)/T/R/S
TUESDAY	SEM I	MAJOR SS	MINOR MB	MD AP	MIL	R/S	
	SEM III	SEC MB	CORE SS	GE MB	CORE SS	CORE AP	GE (PRACTICAL)
	SEM V		DSE AP	DSE	CORE AP	CORE SS	T/R/S
WEDNESDAY	SEM I	MAJOR	MINOR DB	MD AP	MINOR(PRACTICAL)		
	SEM III		CORE AP	GE	CORE DB	CORE DB	HONS (PRACTICAL)/T/R/S
	SEM V		DSE	DSE DB	CORE AP	CORE AP	HONS (PRACTICAL)/T/R/S
THURSDAY	SEM I	MAJOR SS	MINOR MB	SEC MB	MAJOR (PRACTICAL)		
	SEM III	SEC MB	CORE SS	GE	CORE SS	CORE AP	GE(PRACTICAL)
	SEM V		DSE AP	DSE AP	CORE AP	CORE SS	T/R/S
FRIDAY	SEM I	MAJOR SS	MINOR (T) MB	SEC MB	MINOR (PRACTICAL)		
	SEM III		CORE SS	GE	CORE SS	CORE AP	HONS (PRACTICAL)/T/R/S
	SEM V		DSE AP	DSE	CORE AP	CORE SS	HONS(PRACTICAL)/T/R/S
SATURDAY	SEM I	MAJOR (T)	SEC(T) DB	MAJOR (PRACTICAL)			
	SEM III		CORE	GE	CORE SS	CORE AP	GE(PRACTICAL)
	SEM V		DSE	DSE AP	CORE AP	CORE	T/R/S

Master Routine Even Semester 2023-24

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MONDAY	SEM II			MINOR PKM(216)				
	SEM IV			GE MB(217)	CORE MB(216)	CORE SS(216)		
	SEM VI		DSE SS(216)	DSE SS(223)	CORE SS(217)	CORE PKM(217)		
TUESDAY	SEM II		MAJOR AP(216)	MINOR PKM(216)		MINOR PRACTICAL PKM(216)		
	SEM IV	SEC PKM (216)	CORE SS(217)	GE MB(217)	CORE MB(216)	CORE AP(216)		
	SEM VI			DSE SS(223)	DSE AP(217)	CORE PKM(217)	CORE SS(217)	
WEDNESDAY	SEM II		MAJOR AP(216)	MINOR PKM(216)		MAJOR(PRACTICAL) AP(216)		
	SEM IV				CORE AP(216)	CORE AP(216)		
	SEM VI			DSE AP(217)	CORE PKM(217)	CORE PKM(217)		
THURSDAY	SEM II		MAJOR AP(216)					
	SEM IV		CORE SS(217)	GE MB(216)	CORE MB(216)	CORE MB(216)		
	SEM VI			DSE SS(217)	DSE AP(217)	CORE SS(217)		
FRIDAY	SEM II		MAJOR AP(216)	MINOR PKM(216)	SEC PKM(216)	VAC R-107		
	SEM IV			GE MB(217)	CORE MB(217)	CORE(216) SS	HONS (PRACTICAL)/T/R/S AP(216)	
	SEM VI		DSE SS(217)	DSE AP(223)	CORE SS( )	CORE PKM(217)		
SATURDAY	SEM II			T/R/S PKM (216)	MINOR PRACTICAL PKM(216)			
	SEM IV	SEC PKM(216)	CORE SS(216)		CORE AP(216)	CORE AP(217)		
	SEM VI		DSE AP (217)	DSE SS(217)	CORE PKM(217)	CORE SS(223)		

ROUTINE EVEN SEMESTER 2024

COMPUTER SCIENCE (ROOM -101 & LAB ROOM[LR])

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MONDAY	SEM II		MAJOR(AT) [R-101]		MD(AT) [LR]	MAJOR(PRACTICAL) AT [LR]		
	SEM IV			GE	CORE(SK) [R-101]			
	SEM VI		CORE(SK) PR. [LR]	CORE(AT) [R-101]		CORE(SK) [R-101]		
TUESDAY	SEM II		MAJOR(AT) [LR]		MD(SK) [R-101]			
	SEM IV	SEC(SK) [LR]	CORE(SK)[R-101]	GE	CORE(AT) (PR) [LR]	CORE(AT) [R-101]		
	SEM VI			CORE(AT) PR. [LR]				
WEDNESDAY	SEM II	SEC(SK) [LR]		MINOR(SM) [R-101]	MD(SM) [LR]			
	SEM IV		CORE(SM) PR. [LR]	GE		CORE(AT) [R-101]		
	SEM VI		CORE(SK) [R-101]	CORE(AT) [LR]	CORE(AT) [R-101]	DSE(SM) [LR]		
THURSDAY	SEM II		MAJOR(AT) [LR]	MINOR(SM) [R-101]		MINOR PRACTICAL(SM) [LR]		
	SEM IV	SEC(SK) [LR]	CORE(SM) [R-101]	GE	CORE(AT) [R-101]	CORE(AT) [R-101]		
	SEM VI			CORE(AT) [LR]	DSE(SM) [LR]			
FRIDAY	SEM II			MINOR(SM) [R-101]		VAC R-107		
	SEM IV			GE	CORE(SM) [R-101]	CORE(SM) [R-101]		
	SEM VI		DSE(SM) [R-101]					
SATURDAY	SEM II							
	SEM IV			GE	CORE(SM) [R-101]			
	SEM VI		DSE(SM) [R-101]	DSE(SM) [R-101]				

Routine for Odd Semester, Department of English

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MON	I	MAJOR SN, R. 107 (Science building)	MINOR SN, R. 208	MD SKM, R. 207				
	III			GE SSS, R. 208	CORE SSS, R. 208	CORE SSS, R. 208		SEC SKM, R. 208
	V					DSE SKM, R. 207	DSE SSS, R. 207	DSE SSS, R. 207
TUE	I	MAJOR SSS, R. 107 (Science building)	MINOR SSS, R. 208	MD SSS, R. 207				
	III			GE AM, R. 208	CORE SSS, R. 208	CORE AM, R. 208	CORE UD, R.208	T/R/S UD, R.208
	V	CORE AM, R. 207	CORE AM, R. 207		DSE UD, R. 207	DSE UD, R. 207		
WED	I	MAJOR AM, R. 107 (Science building)	MINOR AM, R. 208	MD SN/AM, R. 312	MIL UD, 208			
	III	SEC SKM, R. 207	CORE SKM, R. 207	GE UD, R. 208		CORE AM, R. 208	CORE UD, R. 208	
	V			CORE SKM, R. 207	CORE SSS, R. 207	CORE SSS, R. 207	DSE SKM, R. 207	DSE UD, R. 207
THU	I	MAJOR UD, R. 107 (Science building)	MINOR UD, R. 208	SEC AM, R. 107 (Science building)	MIL SSS, R. 208			
	III		CORE SKM, R. 312	GE SKM, R. 208		CORE UD, R. 208	CORE AM, R. 208	T/R/S UD
	V		DSE SSS, R. 207	DSE SSS, R. 207	CORE AM, R. 207	CORE AM, R. 207		
FRI	I	MAJOR SKM, R. 107 (Science building)	MINOR SKM, R. 208	SEC SKM, R. 107 (Science building)	MIL AM, R. 208			
	III		CORE SSS, R. 207			CORE AM, R. 208	CORE UD, R. 208	
	V		CORE AM, R. 207	DSE SSS, R. 207	CORE UD, R. 207	DSE UD, R. 207		T/R/S
SAT	I				MIL SKM, R.208			
	III	CORE UD, R. 208	CORE AM, R. 208			CORE SKM, R. 208	CORE	
	V	CORE SKM, R. 207	CORE SKM, R. 207					

HOD Convener Principal

Routine for Even Semester, Dept. of English, 2023-24

Day	Semester	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MON	II	MAJOR SN, R. 107 SCI. BLD	MINOR SN, R. 208	MD SN, R.208	VAC		
	IV	CORE 208	GE SSS, R.312	CORE SSS, R. 312	CORE SSS, R. 208		
	VI		CORE SKM, R. 207	CORE SKM, R.207		DSE SSS, R.208	T/R/S SSS, R. 208
TUE	II	MAJOR SSS, R.107	MINOR SSS, R.208	MD SSS, R.208	VAC R-107		
	IV	CORE AM, R. 208	GE AM, R.312	CORE AM, R. 312	CORE UD, R. 312		T/R/S UD, R. 208
	VI		CORE UD, R.207	CORE UD, R.207	DSE SSS, R. 208	DSE AM, R. 208	
WED	II	MAJOR AM, R.107	MINOR AM, R. 208	MD AM, R.208	VAC		
	IV	CORE SSS, R. 208	GE UD, R. 312	CORE SSS, R. 312	CORE UD, 312	SEC SKM, R. 312	
	VI		CORE SSS, R. 207	CORE SKM, R. 207	DSE AM, R. 208	DSE UD, R. 208	
THU	II	MAJOR UD, R.107	MINOR UD, R.208	SEC UD, R.107	VAC		
	IV	CORE SSS, R. 208	GE SKM, R.312	CORE AM, R. 312	CORE SKM, R. 312	SEC SKM, R. 312	T/R/S SKM, R. 208
	VI		CORE SSS, R. 207	CORE SKM, R. 207	DSE AM, R. 208	DSE UD, R. 208	
FRI	II	MAJOR SKM, R.107	MINOR SKM, R. 208	SEC SKM, R. 107	VAC		
	IV	CORE SSS, R. 208		CORE UD, R. 208	CORE UD, 208	CORE AM, R. 208	
	VI		CORE SSS, R. 312	CORE AM, R. 312	DSE AM, R. 312	DSE UD, R. 312	T/R/S AM, R. 312
SAT	II	VAC	T/R/S UD, R. 312	T/R/S	T/R/S		
	IV	CORE UD, R. 312		CORE			
	VI	CORE AM, R. 207	CORE AM, R. 208	DSE SKM, R. 208			

Principal HOD Convener

DEPARTMENT OF EDUCATION 2ND, 4TH, 6TH SEMESTER ROUTINE [2023 -24]

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MON	II	MAJOR SR (R-304)	MINOR	*MD*				
	IV		CC-8 SR (R-304)	*GE*				
	VI				DSE-3 SR(R-304)	DSE-4 SR (R-304)	T/R/S	
TUE	II	MAJOR SR (R-304)		*MD*				
	IV			*GE*	CORE-9 SR (R-304)	CORE-10 SR (R-304)	CORE	T/R/S
	VI		CORE-13 SR (R-304)					
WED	II	MAJOR PS (R-304)		*MD*				
	IV	SEC-2 SR(R-306)	CORE-9 SR(R-304)	*GE*		CORE-10 PS(R-306)	CORE	
	VI			DSE-4 PS (R-304)	CORE-13 PS (R-304)	DSE-3 SR(R-304)		DSE
THU	II	MAJOR PS (R-304)		SEC SR (R-304)		VAC SR (R-306)		
	IV		CORE-8 PS(R-304)	*GE*		CORE-9 PS (R-304)	CORE	T/R/S
	VI	CORE-14 SR (R-306)			CORE-14 SR (R-304)		DSE	
FRI	II			SEC PS (R-304)				
	IV			GE				
	VI	CORE-13 PS (R-304)			CORE-14 PS (R-304)	DSE-4 (R-304)	DSE	T/R/S
SAT	II	VAC PS (R-304)			MIL	SEC(T)	R/S	
	IV		CORE-10 PS (R-304)	*GE*	SEC-2 PS (R-304)		CORE	
	VI			DSE-3 PS (R-304)				

Signature of HOD Convener Principal

CLASS ALLOTMENT DETAILS

Satyashree Deviprasad Rout – [Friday & Saturday]
Poulami Sarkar - [Monday & Tuesday]

Total Class - 15×2 =30
2nd Sem – 1 Major - 4 Classes
Sec - 2 Classes
Vac - 2 Classes

4th Sem – 3 Core – 8 classes
1 Sec 2 classes
6th Sem – 2 Core – 6 classes
2 Dse – 6 classes

SR 2nd Semester 2 Major Class + 1 Sec+1 Vac =4
SR 4th Semester CC8 -1,CC9-2,CC10-1,SEC-1=5
SR 6th Semester CC13-1,CC14-2,DSE3-2,DSE4-1 =6

Poulami 2nd Semester 2Major Class+1 Sec+1 Vac = 4
Poulami 4th Semester CC8-1,CC9-1,CC10-2,SEC-1=5
Poulami 6th Semester CC13-2,CC14-1,DSE3-1,DSE4-2=6

		MAJOR	SEC	CC8	CC9	CC10	SEC2	CC13	CC14	DSE3	DSE4	TOTAL
MON	SR	1		1						1	1	4
TUES	SR	1			1	1		1				4
WED	SR				1		1			1		3
	PS	1				1		1			1	4
THUR	SR		1VAC + 1 SEC						2			4
	PS	1		1	1							3
FRI	PS		1 SEC					1	1		1	4
SAT	PS	1 VAC				1	1			1		4
		5	3	2	3	3	2	3	3	3	3	30

Envs schedule for 2022-23

	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00
Monday	B.A (Hons of Day shift) Gr-1 R-107	B.Sc (Hons of Day shift) Gr-1 R-107			
Tuesday				All B.Com (Hons+Program of Evening shift)**R-107**	All BA +BSc Program of Morning shift **(Online)**
Wednesday	B.A Prog Hindi Shift			All BCom (Hons+Program of Hindi shift)**R-107**	All BA program of Hindi shift
Thursday	B.A (Hons of Day shift) Gr-2 R-107	BBA+BCA **R-HALL(BBA/BCA)**			
Friday		All B.Sc (Hons of Day shift) Gr-1 R-107	All BA hons of Hindi shift R-HALL(HB)		

ROUTINE (ODD SEMESTER) 2023 ONWARDS
DEPARTMENT: GEOGRAPHY (SHIFT-DAY)

w.e.f. 25th August, 2023

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:0005:00
MONDAY	SEM I	MAJOR-SR-322	MINOR	MD-SR-316	MIL	R/S-SR	
	SEM III			GE	CORE-SR-322	CORE-DS-322	CORE PRACTICAL –DS-322
	SEM V		DSE-SR-322		CORE-DS-321		
TUESDAY	SEM I	MAJOR-DS-318	MINOR	MD(T/R)	MIL	R/S	
	SEM III	CORE PRACTICAL-CS-Central Comp Lab		GE	CORE-SR-318	CORE-DS-320	T/R-MM
	SEM V		DSE-DS-322	CORE-CS-322	DSE-MM-323	DSE-MM-323	CORE PRACTICAL-SR-322
WEDNESDAY	SEM I	MAJOR-MM-318	MINOR	MD-CS-316	SEC PRACTICAL-DS-322		
	SEM III		CORE-MM-322	GE	CORE-MM-326	CORE-SR-326	SEC-PRACTICAL-SR-326
	SEM V	CORE-CS-326	CORE-CS-326	DSE –DS-326	DSE-SR-323	DSE-MM-323	T/R-DS
THURSDAY	SEM I		MINOR	SEC-SR- PRACTICAL 322			
	SEM III	SEC PRACTICAL-DS-322		GE	CORE-CS-321		
	SEM V		DSE-SR-318	CORE-DS-323	CORE-DS-323		CORE PRACTICAL-CS-322
FRIDAY	SEM I	MAJOR -CS-318	MINOR		MINOR (PRACTICAL)		
	SEM III			GE	CORE-CS-326	CORE-CS-326	CORE PRACTICAL-MM-326
	SEM V				DSE-MM-322	DSE-MM-322	
SATURDAY	SEM I			SEC PRACTICAL-MM-322			
	SEM III	SEC PRACTICAL-MM-322		GE	SEC PRACTICAL-CS-326		
	SEM V	CORE PRACTICAL-CS-326		T/R-CS			

Dr. Chandana Singha (CS) (Monday); Mrs. Madhumita Mondal (MM) (Monday & Thrusday); Ms. Disha Sengupta(Ds) (Friday & Saturday); Ms. Sayantani Roy (SR) (Friday & Saturday)

Signature of HOD

Convener 26/8/23

Principal

DR. AMITAVA BASU
Principal, B. B. College
Ushagram, Asansol, P Bardhaman
West Bengal - 713303

Number of classes:
Dr. Chandana Singha: 17
Mrs. Madhumita Mondal: 15
Mrs. Disha Sengupta: 15
Mrs. Sayantani Roy: 15

Class Routine: Geography Department (Day Shift) Even Semester
w.e.f 18th January

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:0005:00
MONDAY	SEM II			GE		CORE(SR)322	HONS (PRACTICAL)SR 322
	SEM IV	CORE	GE		CORE(SR) 322		HONS (PRACTICAL)DS 326
	SEM VI			DSE(SR) 323	DSE(DS)323	DSE(DS)326	Tutorial/Remedial
TUESDAY	SEM II			GE	CORE(DS) 323	CORE(SR)322	DS(HONS PRACTICAL)326
	SEM IV	SEC(CS)323	GE		CORE(CS) 322	CORE(DS) 320	SEC (PRACTICAL)SR322
	SEM VI					DSE(MM)323	HONS (PRACTICAL)MM323
WEDNESDAY	SEM II			GE	CORE(MM)323		HONS (PRACTICAL)DS 323
	SEM IV		GE		CORE (DS)	CORE(SR)322	HONS (PRACTICAL)SR 326
	SEM VI			DSE(MM) 323	CORE(CS) 322		HONS (PRACTICAL)CS 322
THURSDAY	SEM II			GE		CORE(SR)	HONS (PRACTICAL)CS 322
	SEM IV	CORE	GE		CORE(CS) 326	CORE(CS)	Tutorial/Remedial DS
	SEM VI	DSE(DS)323	DSE(DS)323	DSE(DS) 323			HONS (PRACTICAL)SR 323
FRIDAY	SEM II			GE		CORE(CS)322	HONS (PRACTICAL)MM 322
	SEM IV	CORE	GE		CORE(MM)326	CORE(MM) 326	HONS (PRACTICAL)CS 326
	SEM VI			DSE(MM)323	CORE(CS) 322		Tutorial/Remedial MM
SATURDAY	SEM II			GE	CORE(CS) 322	CORE(CS) 322	GE(PRACTICAL)
	SEM IV	CORE	GE			CORE(MM) 322	HONS (PRACTICAL)MM 326
	SEM VI			CORE(CS)322	DSE(MM) 326		Tutorial/Remedial CS

Dr. Chandana Singha (CS) (Monday); Mrs. Madhumita Mondal (MM) (Monday & Thrusday); Ms. Disha Sengupta(Ds) (Friday & Saturday); Ms. Sayantani Roy (SR) (Friday & Saturday)

Signature of HOD Convener Principal

ROUTINE (ODD SEMESTER) 2023 ONWARDS
DEPARTMENT: GEOGRAPHY (SHIFT-DAY)

w.e.f. 25th August, 2023

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:0005:00
MONDAY	SEM I	MAJOR-SR-322	MINOR	MD-SR-316	MIL	R/S-SR	
	SEM III			GE	CORE-SR-322	CORE-DS-322	CORE PRACTICAL –DS-322
	SEM V		DSE-SR-322		CORE-DS-321		
TUESDAY	SEM I	MAJOR-DS-318	MINOR	MD(T/R)	MIL	R/S	
	SEM III	CORE PRACTICAL-CS-Central Comp Lab		GE	CORE-SR-318	CORE-DS-320	T/R-MM
	SEM V		DSE-DS-322	CORE-CS-322	DSE-MM-323	DSE-MM-323	CORE PRACTICAL-SR-322
WEDNESDAY	SEM I	MAJOR-MM-318	MINOR	MD-CS-316	SEC PRACTICAL-DS-322		
	SEM III		CORE-MM-322	GE	CORE-MM-326	CORE-SR-326	SEC-PRACTICAL-SR-326
	SEM V	CORE-CS-326	CORE-CS-326	DSE –DS-326	DSE-SR-323	DSE-MM-323	T/R-DS
THURSDAY	SEM I		MINOR	SEC-SR- PRACTICAL 322			
	SEM III	SEC PRACTICAL-DS-322		GE	CORE-CS-321		
	SEM V		DSE-SR-318	CORE-DS-323	CORE-DS-323		CORE PRACTICAL-CS-322
FRIDAY	SEM I	MAJOR -CS-318	MINOR		MINOR (PRACTICAL)		
	SEM III			GE	CORE-CS-326	CORE-CS-326	CORE PRACTICAL-MM-326
	SEM V				DSE-MM-322	DSE-MM-322	
SATURDAY	SEM I			SEC PRACTICAL-MM-322			
	SEM III	SEC PRACTICAL-MM-322		GE	SEC PRACTICAL-CS-326		
	SEM V	CORE PRACTICAL-CS-326		T/R-CS			

Dr. Chandana Singha (CS) (Monday); Mrs. Madhumita Mondal (MM) (Monday & Thrusday); Ms. Disha Sengupta(Ds) (Friday & Saturday); Ms. Sayantani Roy (SR) (Friday & Saturday)

Signature of HOD Convener Principal

DR. AMITAVA BASU
Principal, B. B. College
Ushagram, Asansol, P Bardhaman
West Bengal - 713303

Number of classes:
Dr. Chandana Singha: 17
Mrs. Madhumita Mondal: 15
Mrs. Disha Sengupta: 15
Mrs. Sayantani Roy: 15

Master Routine for Odd Semester, Day Section (Arts) 2023 Onwards

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00 - 05:00
MON	I	MAJOR(S.L)	MINOR	MD	R/S			
	III			GE(D.D)	CORE(D.D)	CORE(S.L)	CORE	SEC
	V	CORE	CORE(S.L)		DSE(S.L)	DSE(D.D)	T/R/S	
TUE	I	MAJOR	MINOR(S.L)	MD	R/S			
	III			GE(S.L)	CORE(S.L)	CORE(S.L)	CORE	T/R/S
	V	CORE	CORE		DSE	DSE		
WED	I	MAJOR(S.G)	MINOR(S.G)	MD	MIL	R/S		
	III	SEC(S.L)	CORE	GE(S.G)		CORE	CORE	
	V				CORE(S.L)	CORE	DSE(S.L)	DSE
THU	I	MAJOR(S.L)	MINOR(S.L)	SEC(S.L)	MIL	R/S		
	III		CORE	GE		CORE	CORE	T/R/S
	V	DSE			CORE	CORE	DSE	
FRI	I	MAJOR(T)	MINOR(T)	SEC(S.G)	MIL	R/S		
	III		CORE(S.G)	GE		CORE(D.D)	CORE(D.D)	
	V	CORE			CORE(S.G)	DSE(S.G)	DSE(D.D)	T/R/S
SAT	I				MIL	SEC(T)	R/S	
	III	CORE	CORE	GE		CORE(D.D)	CORE(D.D)	
	V	CORE(S.G)	CORE(S.L)	DSE(S.G)	DSE(D.D)			

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
MONDAY	SEM I (R-321)	MAJOR MSC	MINOR SD	MD	MIL	R/S	
	SEM III (R-320)		CORE 5 MSC	GE	CORE 7 MSC		HONS (PRACTICAL) MSC/SD
	SEM V (R-318)			DSE 1 SD		CORE 11 MSC	HONS (PRACTICAL) SD/MSC
TUESDAY	SEM I (R-321)	MAJOR MSC/SD	MINOR MSC	MD	MIL	R/S	
	SEM III (R-320)	SEC SD/MSC		GE	CORE 6 SD		GE (PRACTICAL)
	SEM V (R-318)			DSE 1 MSC		CORE 12 SD	T/R/S SD/ MSC
WEDNESDAY	SEM I (R-321)	MAJOR SD	MINOR MM	MD	MINOR/ MAJOR (PRACTICAL) MSC/SD		
	SEM III (R-320)		CORE 5 SM	GE	CORE 6 MSC	CORE 7 MM	HONS (PRACTICAL) SM/MM
	SEM V (R-318)			DSE 2 MM	CORE 11 SD	CORE 12 MSC	HONS (PRACTICAL)SD/SM/MM
THURSDAY	SEM I (R-321)	MAJOR MM/SM	MINOR SM	SEC SD/MM	MAJOR/ MINOR (PRACTICAL) SM/SD/MM		
	SEM III (R-320)	SEC SM/MM	CORE 5 SD	GE	CORE 7 SD		GE(PRACTICAL)
	SEM V (R-318)			DSE 2 SD	CORE 11 SM	CORE 12 MM	T/R/S
	SEM I (R-321)	MAJOR SM	MINOR (T)	SEC SD/MSC	MINOR / MAJOR (PRACTICAL) MSC/MM/SM		

FRIDAY	SEM III (R-320)			GE	CORE 6 SM		HONS (PRACTICAL) SM/MSC/MM
	SEM V (R-318)		DSE 2 MSC	DSE 1 MM	CORE 11 MM	CORE 12 SM	HONS(PRACTICAL) MSC/MM/SM
SATURDAY	SEM I (R-321)	MAJOR (T) MM	SEC(T)	MINOR/ MAJOR (PRACTICAL) SM/MM			
	SEM III (R-320)		CORE 5 MM	GE	CORE 6 MM	CORE 7 SM	GE(PRACTICAL)
	SEM V (R-318)		DSE 1 SM	DSE 2 SM			T/R/S SM/MM

Department of Microbiology
Master Routine (Even semester) 2023-2024

(Details of the MIL classes will be provided by the respective Department)

N.B: 50% THEORY ATTENDANCE & 75% PRACTICAL ATTENDANCE IS COMPULSORY FOR ALL STUDENTS. 40% MARKS OF INTERNAL EXAM WILL BE BASED ON CLASS ATTENDANE AND REGULAR CLASS PERFORMANCE.

Signature of HOD Convener Principal

BANWARILAL BHALOTIA COLLEGE, ASANSOL

Department of Political Science Hindi Shift (ODD SEM) Routine, 2023-24

DAY	SEMESTER		09-10AM	10-11AM	11-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM
MON	FIRST	Hons		MAJOR SB-(R-4)	MINOR SB-(R-4)	MD PB-(R-5)	R/S			
		Prog	MIL MB(R301)				MD PB-(R-5)			
	THIRD	Hons			C5 PB-(R-5)	GE3 QS-(R-4)	C7 SB-(R-4)	C6 QS-(R-4)	SEC	**TUTORIAL** QS
		Prog					C5/C6-PSC QS-(R-6)	**SEC**	**TUTORIAL SB**	
	FIFTH	Hons						C11 PB-(R-5)	C12 QS-(R-4)	
		Prog						SECIII SB-(R-6)	DSE	DSE
TUE	FIRST	Hons	MIL MB(R301)	MAJOR SB-(R-4)	MINOR SB-(R-4)	MD PB-(R-5)	**R/S**			
		Prog		MAJOR PG-(R-5)	MINOR QS-(R-5)		**MD PB-(R-4)**			
	THIRD	Hons			C5 PB-(R-4)	GE3 QS-(R-4)	C6 QS-(R-5)		CORE	Tutorial PG
		Prog					C5/C6-PSC	SECI	CORE	

							SB-(R-6)	PG-(R-6)		
	FIFTH	Hons					**DSE1 PG-(R-4)**	DSE2 SB-(R-5)	C12 QS-(R-5)	Tutorial QS
		Prog				GEI PG-(R-6)			DSE1/2 PB-(Hall)	
WED	FIRST	Hons		MAJOR PG-(R-4)	MINOR PG-(R-4)					
		Prog	MIL NR(R301)	MAJOR SB-(R-5)	MINOR PB-(R-6)					
	THIRD	Hons			C7 SB-(R-5)			C5 PB-(R-4)	SEC1 PG-(R-4)	CORE
		Prog		MIL NR(Hall)						
	FIFTH	Hons				**C11 PB-(R-4)**	DSE1 PG-(R-4)	DSE2 SB-(R-5)		**TUTORIAL** PG
		Prog				GE	DSE1/2 PB-(Hall)		DSE	TUTORIAL PB
THURS	FIRST	Hons		MAJOR PG-(R-4)	MINOR PG-(R-4)	**SEC SB-(R-4)**				
		Prog		**MAJOR SB-(R-5)**	**MINOR QS(R-6)**	**SEC PG-(R-4)**	R/S			
	THIRD	Hons		**C5**	C7	**GE3**	C6		**TUTORIAL**	

				PB-(R-5)	SB-(R-5)	**QS-(R-5)**	QS-(R-4)		**SB**	
		Prog							CORE	**TUTORIAL** PG
	FIFTH	Hons				**C11 PB-(R-6)**	DSE1 PG-(R-5)	DSE2 SB-(R-5)	C12 QS-(R-4)	
		Prog					DSE1/2 PB-(Hall)	**SEC**		
FRI	FIRST	Hons	MIL NR(R301)			SEC PG-(R-4)	MAJOR R/S			
		Prog		MAJOR PG-(R-4)	MINOR PB-(R-5)	SEC SB-(R-6)				
	THIRD	Hons			C7 SB-(R-4)		SEC1 PG-(R-4)			TUTORIAL PB
		Prog		MIL NR(R-8)	CORE		CORE	SECI PG-(Hall)	CORE	
	FIFTH	Hons				C11 PB-(R-5)		DSE2 SB-(R-4)	TUTORIAL PB	
		Prog			GEI PG-(R-6)		DSE1/2 PB-(Hall)		SECIII SB-(R-4)	TUTORIAL SB
SATURDAY	FIRST	Hons								
		Prog				R/S				

	THIRD	Hons		CORE	C6 QS-(R-4)					
		Prog					C5/C6-PSC QS-(Hall)	CORE	**TUTORIAL** QS	
	FIFTH	Hons		CORE	DSE1 PG-(R-5)	C12 QS-(R-4)		DSE		
		Prog		DSE	DSE	GEI PG-(R-5)	DSE		TUTORIAL	

No of Classes per faculty per week: PG – 19, PB – 18, QS – 15, SB – 19

HOD CONVENER PRINCIPAL

PG – Pawan Gurung
SB – Santosh Bhagat
PB – Piyali Banerjee
QS – Queen Sinha

BANWARILAL BHALOTIA COLLEGE, ASANSOL

Department of Political Science Hindi Shift (EVEN SEM) Routine, 2023-24

DAY	SEMESTER		10-11AM	11-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM
MON	SECOND	Hons	MAJOR-2 SB-(R-9)	MINOR-2 SB-(R-9)	MD-2 PB-(R-9)	R/S			
		Prog				MD-2 PB-(R-9)			
	FOURTH	Hons		C10 PB-(R-5)	GE4 QS-(R-4)	C8 QS-(R-4)	C9 SB-(R-4)		**TUTORIAL** QS
		Prog					SEC2 QS-(R-9)	**TUTORIAL** **SB**	
	SIXTH	Hons	**DSE4** **PB-(R-5)**	C13 QS-(R-4)					
		Prog	**SEC4** **PB-(R-5)**						
TUE	SECOND	Hons	MAJOR-2 SB-(R-9)	MINOR-2 SB-(R-9)	MD-2 PB-(R-9)	**R/S**			
		Prog	MAJOR-2 PG-(R-12)	MINOR-2 QS-(R-12)		MD-2 PB-(R-9)			
	FOURTH	Hons		SEC2 PG-(R-4)	GE4 QS-(R-4)	C8 QS-(R-5)			Tutorial PG

		Prog		C4/C5-PSC PB-(R-5)					
	SIXTH	Hons					C-14 SB-(R-5)	C13 QS-(R-5)	Tutorial QS
		Prog			GE1 SB-(R-5)				
WED	SECOND	Hons	MAJOR-2 PG-(R-9)	MINOR-2 PG-(R-9)					
		Prog	MAJOR-2 SB-(R-12)	MINOR-2 PB-(R-12)					
	FOURTH	Hons		C9 SB-(R-5)			C10 PB-(R-4)	SEC2 PG-(R-4)	CORE
		Prog		ENGLISH-Hall Room	ENGLISH-Hall Room	C4/C5-PSC PB-(R-5)			
	SIXTH	Hons	**DSE4 PB-(R-5)**			**DSE3 PG-(R-4)**	C-14 SB-(R-5)		**TUTORIAL** PG
		Prog	**SEC4 PB-(R-5)**		GE1 SB-(R-5)	**DSE2-PSC PG-(R-4)**		DSE	TUTORIAL PB
THURS	SECOND	Hons	MAJOR-2 PG-(R-9)	MINOR-2 PG-(R-9)	**SEC-2 SB-(R-9)**				
		Prog	MAJOR-2 SB-(R-12)		**SEC-2 PG-(R-12)**	ENV/VAC Hall Room			

	FOURTH	Hons		C9 SB-(R-5)	**GE4** **QS-(R-5)**	C8 QS-(R-4)	**C10** **PB-(R-5)**	**TUTORIAL** **SB**	
		Prog				C4/C5-PSC PB-(R-9)	SEC-2 QS-(R-9)	CORE	**TUTORIAL** PG
	SIXTH	Hons	**DSE4** **PB-(R-5)**			**DSE3** **PG-(R-5)**	C-14 SB-(R-5)	C13 QS-(R-4)	
		Prog	**SEC4** **PB-(R-5)**			**DSE2-PSC** **PG-(R-5)**	**SEC**		
FRI	SECOND	Hons			SEC2 PG-(R-9)	ENV/VAC Hall Room			
		Prog	MAJOR-2 PG-(R-9)	MINOR-2 PB-(R-12)	SEC2 SB-(R-12)				
	FOURTH	Hons		C9 SB-(R-4)		SEC2 PG-(R-4)			TUTORIAL PB
		Prog				C4/C5-PSC PB-(R-9)	C10 PB-(R-4)		
	SIXTH	Hons	**DSE4** **PB-(R-5)**	**DSE3** **PG-(R-4)**		C-14 SB-(R-5)		TUTORIAL PB	
		Prog	**SEC4** **PB-(R-5)**	**DSE2-PSC** **PG-(R-5)**					TUTORIAL SB
SATURDAY	SECOND	Hons				MAJOR R/S			

		Prog		MINOR-2 QS-(R-12)	R/S				
	FOURTH	Hons	C8 QS-(R-4)		SEC2 PG-(R-4)		TUTORIAL QS		
		Prog							
	SIXTH	Hons		**DSE3** **PG-(R-5)**	C13 QS-(R-4)				
		Prog	DSE	**DSE2-PSC** **PG-(R-5)**		DSE		TUTORIAL	

No of classes per faculty per week: PG – 16, PB – 18, QS – 15, SB – 18

BA 2nd Semester (4 Year)	**BA 2nd Semester (3 Year)**	**BA Hons 4th Semester**	**BA Prog 4th Semester**	**BA Hons 6th Semester**	**BA Prog 6th Semester**
Major – 4 Class	Major – 4 Class	Core 8 – 4 Class	Core 4 – 4 Class	Core 13 – 4 Class	DSE 2 – 4 Class
Minor – 4 Class	Minor – 4 Class	Core 9 – 4 Class	SEC 2 – 2 Class	Core 14 – 4 Class	SEC 2 – 4 Class
SEC – 2 Class	SEC – 2 Class	Core 10 – 4 Class		DSE 3 – 4 Class	GEC 2 – 2 Class
MD – 2 Class	MD – 2 Class	SEC 2 – 4 Class		DSE 4 – 4 Class	
		GEC 4 – 3 Class			

HOD CONVENER PRINCIPAL

PG – Pawan Gurung
SB – Santosh Bhagat
PB – Piyali Banerjee
QS – Queen Sinha

ROUTINE FOR ODD SEMESTERS 2023 ONWARDS
DEPARTMENT OF PHYSICS

DAYS \ TIMINGS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MONDAY	SEM I		MINOR KKD (R-212)	MD KKD (R-223)	MIL	MAJOR (PRACTICAL) KKD (R-213)		
	SEM III	KM Jr (C-7) (R-207)		GE KM (R-212)			Thermal Physics-I Lab (C-6) RKR (R-212)	
							Analog Electr Lab(C-7) KM Jr (R-203)	
	SEM V	AG (C11) Seminar (R-206)		SM (C-12) Seminar (R-206)		Quan Mech Lab KM & AG (R-203)		
TUESDAY	SEM I	MAJOR AB (R-212)		MD SM (R-223)	MIL	Remedial Major KM / AB (R-203)	Remedial Major JKM / AG (R-203)	
	SEM III	SEC JKM,AG,SSM	SSM (C5) (R-212)	GE SSM (R-212)	RKR (C6) (R-212)		GE PRACTICAL KKD (R-213)	
	SEM V		KM Jr (DSE 1) Seminar (R-206)		AG (C-11) Seminar (R-206)			
WEDNESDAY	SEM I	MAJOR JKM (R-212)	MINOR JKM (R-212)	MD KM (R-223)	MINOR (PRACTICAL) AG & AB (R-213)			
	SEM III		SEC KM, PG, KM Jr	GE SM (R-212)	PG (C-7) (R-212)		Analog Electr Lab(C-7) KM (R-203)	
							Thermal Physics -I Lab (C-6) AB (R-212)	
	SEM V		KKD (C11) Seminar (R-206)		DSE2 SSM Seminar (R-206)		Quan Mech Lab KM Jr & SSM (R-203)	
THURSDAY	SEM I	MAJOR AG (R-212)	MINOR AB (R-212)	SEC PG, KM, RKR, AG	MAJOR (PRACTICAL) JKM (R-213)			
	SEM III	SEC KKD, RKR, SM, AB	Tutorial SM (R-203)	GE KM Jr (R-212)	KKD (C5) (R-212)		GE PRACTICAL PG (R-213)	
	SEM V		JKM (DSE2) Seminar (R-206)		AB (C12) Seminar (R-206)		Quan Mech Lab KKD & SM (R-203)	
FRIDAY	SEM I	MAJOR KM (R-212)	MINOR RKR (R-212)	SEC KM Jr, SM, SSM	MINOR (PRACTICAL) RKR (R-213)			
	SEM III				SSM(C6) (R-212)		Analog Electr Lab(C-7) JKM (R-203)	
							Thermal Physics–I Lab (C-6) SM (R-212)	
	SEM V		AB (DSE1) Seminar (R-206)		SM (DSE1) Seminar (R-206)			
SATURDAY	SEM I		SEC JKM, KKD,AB	MAJOR (PRACTICAL) SSM (R-213)				
	SEM III						GE PRACTICAL RKR (R-213)	
	SEM V			JKM(DSE2) Seminar (R-206)				

(Details of the MIL classes will be provided by the respective Department)

N.B. Remedial classes may be taken in alternate week / as per convenience, if necessary

Signature of

01/9/2023
HOD
Head
Department of Physics (UG & PG)
B.B. College, Asansol-713303 (W.B)

1/9/23
Convener

Principal

ROUTINE FOR EVEN SEMESTERS 2024
DEPARTMENT OF PHYSICS

DAYS / TIMINGS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MONDAY	SEM II		MAJOR XXXX	MINOR XXXX	MD XXXX	MAJOR (PRACTICAL) KKD		
	SEM IV		CORE XXXX	GE XXXX	KM (CC-10) (R-212)		Digital Electronics Lab (KM Jr)	
							Wave Optics Lab (SM)	
	SEM VI		AG (DSE-4) Seminar (R-206)		CORE XXXX	CORE XXXX		
TUESDAY	SEM II		MAJOR AB (R-212)	MINOR AB (R-212)	MD XXXX	MINOR (PRACTICAL) XXXX		
	SEM IV	SEC SM, SSM, AG	CORE XXXX	GE SM (R-212)	RKR (CC-9) (R-212)		GE PRACTICAL (SM)	
	SEM VI			KM (CC-13) Seminar (R-206)		JKM (DSE-3) Seminar (R-206)		KKD TUTORIAL Seminar (R-206)
WEDNESDAY	SEM II		MAJOR JKM (R-212)	MINOR SSM (R-212)	MD XXXX	MAJOR (PRACTICAL) AG		
	SEM IV		CORE XXXX	GE AG (R-212)	AB (CC-9) (R-212)		Digital Electronics Lab (KM)	
							Wave Optics Lab (KKD)	
	SEM VI		DSE XXXX	DSE XXXX	SSM (CC-13) Seminar (R-206)			
THURSDAY	SEM II		MAJOR JKM (R-212)	MINOR AG (R-212)	SEC PG, KM Jr	MINOR (PRACTICAL) AG		
	SEM IV	SEC KM, JKM, KM Jr	CORE XXXX	GE KM Jr (R-223)	SM (CC-8) (R-212)		GE PRACTICAL (KM)	
	SEM VI			KKD (CC-13) Seminar (R-206)		RKR (CC-14) Seminar (R-206)		JKM TUTORIAL Seminar (R-206)
FRIDAY	SEM II		MAJOR SSM (R-212)	MINOR RKR (R-212)	SEC KM, JKM, SSM	VAC R-107	MAJOR (PRACTICAL) AB	
	SEM IV		PG (CC-10) (R-212)	GE AB (R-212)	KM Jr (CC-8) (R-212)		Digital Electronics Lab (KM Jr)	
							Wave Optics Lab (JKM)	
	SEM VI		DSE XXXX	AG (DSE-4) Seminar	SM (CC14) Seminar (R-206)			
SATURDAY	SEM II		REMDEDIAL SSM(R-212)	REMEDIAL AB(R-212)	MINOR (PRACTICAL) SSM			
	SEM IV	SEC RKR, KKD, AB	CORE XXXX	GE XXXX	CORE XXXX	CORE XXXX	GE PRACTICAL(RKR)	
	SEM VI		KKD (DSE-4) Seminar (R-206)		RKR (DSE-3) Seminar(R-206)	RKR TUTORIAL		

N.B. Remedial classes may be taken in alternate week / as per convenience, if necessary

Signature of HOD 08/02/2024 Convener 12/2/24 Principal

Department of Physics (UG & PG)
B.B. College, Asansol-713303 (W.B)

Master Routine Science (Day Section) ODD Semesters
Department of Physics (November 2022- January 2023)

Remarks: 50 % Attendance in Theory Classes and 75 % Attendance in Practical Classes is Compulsory for Students.

TIMINGS / DAYS		10:00-11:00 (CORE)	11:00-12:00	12:00-1:00	01:00-02:00 (CORE)	2:00-3:00 (CORE)	3:00 - 5:00
MONDAY	SEM I		ENVS (R-107)	GE(RKR) R-223	KKD(C-2) R-223	RKR(C-1) R-223	Mechanics-I Lab(C-2) KM
	SEM III		GE (SM) R-223		KM Jr.(C-7) (R-212)	KM Jr. (C-7) (R-212)	Thermal Physics -I Lab (C-6) (RKR)
							Analog Electronics Lab(C-7) (KMJr. PG)
	SEM V		DSE 1(AKM) Seminar		AG (C-11) Seminar	SM (Tutorial) Seminar	Quantum Mechanics Lab (KKD)
TUESDAY	SEM I			GE(KM) R-223	SM (C-2) R-223	RKR (C-1) R-223	Generic Practical (SSM)
	SEM III		GE (SSM) R-223	SEC (JKM)	SSM (C-6) (R-212)	SM (C-6) (R-212)	Generic Practical (SM)
	SEM V		DSE 1 (KM Jr.) R-212		AG (C-11) Seminar	AG (C-11) Seminar	Quantum Mechanics Lab (JKM)
WEDNESDAY	SEM I			GE(JKM) R-223	AKM (C-1) R-223	AKM (C-1) R-223	Mechanics-I Lab(C-2) KKD, AKM
	SEM III		GE(SM) R-223		PG (C-7) (R-212)	PG (C-7) (R-212)	Analog Electronics Lab (JKM)
							Thermal Physics -I Lab (C-6) (AB)
	SEM V		DSE 2 (SSM) Seminar		KKD (C-11) Seminar	KKD (C-11) Seminar	Quantum Mechanics Lab (AG,PG)
THURSDAY	SEM I			GE (AG) R-223	AG (C-1) (R-223)	AG (C-1) (R-223)	Generic Practical (RKR,AKM)
	SEM III		GE (KM Jr) R-223	SEC (KM, KM Jr)	KKD (C-5) (R-212)	KKD (C-5) (R-212)	Generic Practical (PG)
	SEM V		DSE 2 (JKM) Seminar		SM (C-12) Seminar	SM (C-12) Seminar	Quantum Mechanics Lab (KM Jr)
FRIDAY	SEM I			GE (KM) R-223	JKM(C-1) R-223	JKM(C-1) R-223	Mechanics-I Lab(C-2) (SSM,KM Jr.)
	SEM III	SSM (C-6) (R-212)	GE(KMJr) R-223		RKR (C-6) (R-212)	RKR (C-6) (R-212)	Analog Electronics Lab (KM)
							Thermal Physics -I Lab (C-6(SM)
	SEM V		DSE1 (AKM) R-212		AB (C-12) Seminar	AB (C-12) Seminar	Tutorial (AG)
SATURDAY	SEM I				JKM (C-1) (R-223)		Generic Practical (RKR, PG)
	SEM III		GE (KM) R-223		KM (C-5) (R-212)	KM (C-5) (R-212)	Generic Practical (KKD)
	SEM V		DSE 2 (SSM) Seminar	DSE 2 (JKM) Seminar	Tutorial (AB) Seminar	Tutorial KKD Seminar	Assignment (AB)

Signature of HOD RKRoy Convener Principal

Head
Department of Physics (UG & PG)
B.B. College, Asansol-713303 (W.B)

Master Routine Science (Day Section) BSc Even Semesters
Department of Physics (January 2023– June 2023)

TIMINGS / DAYS		10:00-11:00 (CORE)	11:00-12:00	12:00-1:00	01:00-02:00 (CORE)	2:00-3:00 (CORE)	3:00 - 5:00
MONDAY	SEM II					AKM(C-3) R-223	Electricity & Magnetism Lab RKR
							Computer Lab (KM Jr.)
	SEM IV		GE(KM Jr R-223	KM Jr (R-212)	KM Jr.(C-8) Lab (R-212)		Wave Optics Lab (KKD)
							Digital Electronics Lab (PG, SM)
	SEM VI		DSE Appl.Opt (AKM) R-212		SM (C-14) Seminar	SM (C-14) Seminar	Tutorial (KM)
TUESDAY	SEM II		MIL	GE(KMJr R-223	RKR(C-3) R-223	JKM(C-3) R-223	Generic Practical (KM Jr)
	SEM IV			SEC (JKM, SSM)	AKM(C-9) R-212	AKM(C-9) R-212	Generic Practical (KKD)
	SEM VI		DSE Cl-Dyn (KKD) Seminar		DSE Appl Opt (KM) Seminar		Tutorial (SM)
WEDNESDAY	SEM II			GE(KKD R-223	SSM(C-4) R-223	SSM(C-4) R-223	Electricity & Magnetism Lab (SSM)
	SEM IV		GE (SM) R-223		KM(C-10) R-212	KM(C-10) R-212	Digital Electronics Lab (KM)
							Wave Optics Lab(SM)
	SEM VI		DSE Cl - Dyn (AG) Seminar		AKM(C-13) Seminar	AKM(C-13) Seminar	Assignment JKM
THURSDAY	SEM II		MIL		KKD(C-4) R-223	KKD(C-4) R-223	Generic Practical (RKR)
	SEM IV		GE (AG) R-223	SEC (KM, SM)	PG(C-10) .R-212	PG(C-10) R-212	Generic Practical (KM)
	SEM VI		DSE Appl.Opt (JKM) Seminar		RKR (C-14) Seminar	RKR (C-14) Seminar	Tutorial (AG)
FRIDAY	SEM II			GE(RKR) R-223	AG(C-3) R-223	AG(C-3) R-223	Electricity & Magnetism Lab (AG)
							Computer Lab (AB)
	SEM IV		GE (KMJr R-223		SM(C-8) R-212	SM(C-8) R-212	Digital Electronics lab (KM Jr)
							Wave Optics Lab(JKM)
	SEM VI		SSM (C-13) R-212				Tutorial (PG)
SATURDAY	SEM II			GE(SSM) R-223	JKM (C-3) R-223		Generic Practical (SSM, PG)
	SEM IV				Tutorial (PG)	Tutorial (PG)	Generic Practical (RKR)
	SEM VI		Tutorial (KKD) Seminar		Tutorial (RKR) Seminar	Tutorial(RKR) Seminar	Assignment (KKD)

(Details of the MIL classes will be provided by the Corresponding Department)

RKRoy

Signature of HOD Convener Principal

Head
Department of Physics (UG & PG)
B.B. College, Asansol-713303 (W.B)

Sanskrit Routine for 1st, 3rd and 5th Semester 2023

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MON	I	MAJOR MC—308	MINOR SB—308	MD				
	III		CORE—7 MC—307		SEC SB—307			
	V							
TUE	I	MAJOR SB—308		MD				
	III		CORE—6 SD—308	GE SD—308	CORE—5 SP—308			T/R/S
	V	CORE—12 SD—307	CORE—11 SP—307	DSE—2 SB—307	DSE—1 SD—307			
WED	I		MINOR SD—308	MD	MIL	R/S		
	III	SEC SB—307	CORE—5 SP—307	GE SB—308	CORE—7 SP—308	CORE—6 SD—308		
	V			CORE—12 SD—307	DSE—2 SB—307	CORE—11 SP—307	DSE—1 SD—307	
THU	I	MAJOR SD—308	MINOR SP—308	SEC SP—308		R/S		
	III		CORE—7 MC—307	GE SD—307	CORE—6 SD—307	CORE—5 SP—307		T/R/S
	V				CORE—12 MC—308	DSE—1 SD—308	CORE—11 SP—308	
FRI	I	MAJOR SP—308	MINOR MC—308	SEC MC—308	MIL	R/S		
	III				CORE—6 SD—308	CORE—5 SP—308		
	V	CORE—12 MC—307	CORE—11 SP—307	DSE—1 SD—307	DSE—2 SP—307			T/R/S
SAT	I					SEC(T)	R/S	
	III		CORE—5 SP—308		CORE—7 SP—308			
	V			DSE—2 SP—308				

SP — Mr. Sukumar Paul (HOD)
SD — Miss. Suchandra Das
MC — Miss. Madhuchanda Chowdhury
SB — Miss. Suchibrata Bishnu

N.B.: 75% Attendance is compulsory.

Signature of Principal

HOD

Convener

Sanskrit Routine for 2nd, 4th and 6th Semester 2024

Day	Semester	10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
MON	II	MAJOR MC—308	MINOR SB—308	MD				
	IV		CORE—10 MC—307	GE MC—308	SEC SB—307			
	VI							
TUE	II	MAJOR SB—308		MD				
	IV		CORE—9 SD—308		CORE—8 SP—308	CORE—10 SD—308		T/R/S
	VI	DSE—4 SD—307	CORE—14 SP—307	CORE—13 SB—307		DSE—3 SP—307		
WED	II		MINOR SD—308	MD		R/S		
	IV	SEC SB—307	CORE—8 SP—307	GE SB—308	CORE—9 SD—308			
	VI			CORE—14 SP—307	CORE—13 SB—307	DSE—4 SD—307	DSE—3 SP—307	
THU	II	MAJOR SD—308	MINOR SP—308	SEC SP—308		R/S		
	IV		CORE—10 MC—307		CORE—9 SD—307	CORE—8 SP—307		T/R/S
	VI			CORE—13 SD—308	DSE—3 MC—308	. DSE—4 SD—308	CORE—14 SP—308	
FRI	II	MAJOR SP—308	MINOR MC—308	SEC SD—308		R/S		
	IV				CORE—8 SP—308	CORE—9 SD—308		
	VI	DSE—3 MC—307	CORE—13 SD—307	CORE—14 SP—307	DSE—4 SD—307			T/R/S
SAT	II					SEC(T)	R/S	
	IV		CORE—8 SP—308		CORE—10 SP—308			
	VI			CORE—14 SP—308				

SP — Mr. Sukumar Paul (HOD)
SD — Miss. Suchandra Das
MC — Miss. Madhuchanda Chowdhury
SB — Miss. Suchibrata Bishnu

N.B.: 75% Attendance is compulsory.

Signature of Principal

HOD

Convener

Roputine for Even Semester: B.B. College: Urdu Department (2024) Jan- June.

Day	Time								
	Semester		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-04:00	04:00-05:00
Mon	II			IIQ (Major) R-311	TP (Minor) R-310	DK(MD) 310	IIQ (SEC) R-311		
	IV					IIQ (C-9)R-311	DK(SEC-2)R-310		
	VI			DK (C-14)R-310					
Tue	II			MA (Major) R-311	TP(Minor)R310			R/S	
	IV				DK (GE-4)R311		DK (SEC-2)R-310	MA(C-10) R-310	T/R/S
	VI			DK (C-14)R-310		MA (DSE-4)R311			
Wed	II			MA (Major) R-311	TP(Minor)R310	IIQ (SEC) R-311			
	IV					MA (C-10)R-310	IIQ (C-9) R-310		
	VI						MA (DSE-4)R-311	IIQ (DSE-3)R311	
Thurs	II				TP(Minor)R310			R/S	
	IV						MA (C-10)R-310	IIQ (C-9) R-310	T/R/S
	VI			MA(C-13) R-310		MA (DSE-4)R311	IIQ (DSE-3)R311		
Fri	II			MA (Major-T) R311		MA(MD) 311		R/S	
	IV				DK (GE-4)R311		DK (SEC-2)R-310	MA (C-8)R-311	
	VI			DK(C-14) R-310		MA (C-13)R-310	MA (DSE-4)R-311		T/R/S
Sat	II							R/S	
	IV			MA (C-10)R310	JA (C-8)R311				
	VI			JA (C-13)R311	MA(DSE-4) R310	JA(DSE-3) R 311			

MA: Dr. Md. MashkoorAlam (P-Day: Monday) (16 Classes)
TP: Mrs. Tamkinat Parwez (Mon-Thus)
DK: Mrs. Darakhshan Khurshid (Mon, Tue & Fri)
IIQ: Dr. Intekhab Iqbal (Mon, Wed & Thus) P
JA: Dr. Jamshed Ahmad (Special Guest, Only Saturday)

Dr. Md. MashkoorAlam
(HOD, Assistant Professor) **Convener** **Principal**

Remarks: 40% of the Internal Marks are reserved for class attendance and class performance.

B.Sc. Semester I, III, & V, Odd Semester Routine, PG Dept. Of Zoology-2023

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
MONDAY	SEM I	MJR PD 302	MIN SP 302	MD AD 311	MIL	MJR/S AD 302	
	SEM III		CC VI AD 313	GE3 SP 302	CC VI SC 302	CC V PD 311	
	SEM V		DSE1 SC 311	CCXI PD 313	CC XII AD 313		HONS (PRACTICAL) CCXI/CCXII/DSE1 PD 312 (LAB II)
TUESDAY	SEM I	MJR KM 302	MIN AG 311	MD RG 302	MIL	MJR/S RM 302	
	SEM III	CCVII AG 311	SEC 1 RG 302	GE3 SP 311	CC VI SC 302	CC V PD 311	GE 3 (PRACTICAL) RG 312 (LAB 2)
	SEM V		DSE 2 AD 313	DSE 1 SC 313	CC XI KM 313	CC XII SC 313	HONS(PRACTICAL) DSE1 SC 312(LAB I)
WEDNESDAY	SEM I	MJR SL 302	MIN SP 311	MD PD 313	MINOR PRAC KM+SP 312 (LAB I)		
	SEM III	CCVII SC 311	CCVII RM 302	GE3 RG 311	CC V SL 311	CC V KM 311	HONS (PRACTICAL) CC VII(GR1+2) SL+SC+RM 312 (LAB II)
	SEM V		CCXII AD 313	DSE 1 ~~ZJ~~ SC 302	CC XI AG 313	CC XII SL 302	HONS (PRACTICAL) CC XI(GR1+2) KM+AD 312(LAB I)
THURSDAY	SEM I	MJR RG 302	MIN KM 302	MJR/SEC SC 302	MAJOR PRAC. PD+AD 312 (LAB I)		
	SEM III	SEC 1 AD 311	CC VII AG 311	GE3 ~~SP~~ RG 311	CCV KM 311	CC VI SC 311	GE 3(PRACTICAL) RG 312(LAB I)
	SEM V		CCXI SL 313	CCXI PD 313	CC XI SC 313	DSE1/ CC XII SP 313	HONS (PRACTICAL) CCXII(GR1+2) AD+SL+SC 312 (LAB II)

FRIDAY	**SEM I**	**MJR AG 302**	**MIN AG 311**	**SEC AD 302**	**MINOR PRAC. SL+RG 312 (LAB I)**		
	SEM III	**CC V AD 311**	**CC VII SL 313**	**GE 3 RG 313**	**CC VI AD 311**	**CCVII RM 302**	**HONS (PRACTICAL)/T/R/S CCV/CCVI(GR1+2) PD+AG 312 (LAB II)**
	SEM V		**DSE 2/CCXI I RM 302**	**DSE 1 SC 311**	**CC XI AG 313**	**CCXI AG 313**	**HONS(PRACTICAL)/T/R /S DSE 2/CCXI(GR1+2) RM 312 (LAB I)**
SATURD AY	**SEM I**	**MJR SL 302**	**SEC RM 302**	**MAJOR PRAC. KM+RM 312 (LAB I)**			
	SEM III		**CC VII AG 313**	**GE 3 RG 313**	**CC VI AG 302**	**CC V KM 302**	
	SEM V		**DSE1 SL 311**	**DSE1 AG 302**	**CC XII KM 313**		

MJR= MAJOR; MIN= MINOR; MD= MULTIDISCIPLINARY;

Principal
Banwarilal Bhalotia College
Asansol

Head of the Department
Post Graduate Department of Zoology
Banwarilal Bhalotia College

B.Sc. Semester II, IV, & VI, Even Semester Routine, PG Dept. Of Zoology-2024

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
MONDAY	SEM II		MJR PD 302	MIN SP 302	MD	MJR-2 AD 302	
	SEM IV		CC-9 SC 302	GE-4 SCH 311	CC -8 PD 302	CC-9 ZJ 311	HONS (PRACTICAL) CC-10 ZJ
	SEM VI		DSE4 AD 313	CC-13 ZJ 313	CC-14 SC 313	DSE 4 SC 313	HONS (PRACTICAL) CC-13/DSE-4 PD/SC 312 (LAB II)
TUESDAY	SEM II		MJR-2 KM 302	MINOR 2 SCH 302	MD	MJR-2 SL 302	MJR-2T AG 313
	SEM IV	CC-10 SC 302	CC-9 AD 313	GE 4 SP 302	CC-10 ZJ 302	CC -8 PD 302	GE 4 (PRACTICAL) AG/PD 312 (LAB II)
	SEM VI	CCXI V RM 313	CC XIII SC 311	DSE 3 RM 313	DSE 4 AD 313	CC XIV KM 313	HONS(PRACTICAL) DSE 4 RG/AD 312 (LAB III)
WEDNESDAY	SEM II		MJR-2 SL 302	MINOR-2 AG 302	MD	MAJOR (PRACTICAL) PD+AD 312 (LAB 1)	
	SEM IV	CCIX AG 313	SEC 2 RG 311	CCX SC 311	CC VIII SL 311	CC IX AD 311	HONS (PRACTICAL)/T/R/S CC IX AD/SL 312 (LAB II)
	SEM VI	DSE 4 RG 311	DSE 3 SC 311	CC XIV SL 313	CCXI V RM 313	CC XIV ZJ 313	HONS (PRACTICAL)/T/R/S CCXIII ZJ+AG 312 (LAB III)
THURSDAY	SEM II	MJR-2 RG 302	MINOR-2 SP 302	SEC/ MJR KM 302	MINOR (PRACTICAL) KM+SP 312 (LAB 1)		SEC-2 SL 302
	SEM IV	CC X AG 302	GE 4 AG 302	GE 4 SP	CC X KM 311	CC VIII ZJ 311	GE 4(PRACTICAL) AG 312(LAB II)

	SEM VI	DSE 4 AD 313	DSE 3 SL 311	CC XIV SC 313	CC XIII ZJ 313	DSE 4 RG 313	HONS (PRACTICAL) CCXIV RG+SC 312 (LAB III)
FRIDAY	SEM II		MJR-2 ZJ 302	MINOR-2 AG 302	SEC PD	VAC R-107	MJR-PRACTICAL AD
	SEM IV	CCIX KM 302	CC IX SL 311	GE 4 KM 302	CC IX AD 311	CC IX SC 311	HONS (PRACTICAL) CCVIII/CCIX PD/AG 312 (LAB II)
	SEM VI		DSE-3 AD	CC XIII AD 313	CCXI V KM 313	CC XIV ZJ 313	HONS (PRACTICAL) DSE-3 KM+SL 312 (LAB III)
SATURDAY	SEM II		SEC SL		MINOR (PRACTICAL) KM+SL 312 (LAB 1)		
	SEM IV		CC IX/CC X AG 311	GE KM 302	CCIX /SEC2 RM 302		GE (PRACTICAL) 312 (LAB I)
	SEM VI		DSE4 RG 302	DSE4 RG 302	CC XIV AG 313	CC XIII AG 313	HONS (PRACTICAL)/T/R/S CCXIII AG 302

MJR= MAJOR; MIN= MINOR; MD= MULTIDISCIPLINARY;

Principal

Convener

Head of the Department

B.Sc. Honours Semester II, IV, & VI, Even Semester Routine, P.G. Dept. Of Zoology 2023

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
MONDAY	SEM II				CC IV ZJ 302	CC IV PD 302	
	SEM IV				CC VIII PD 311	CC X ZJ 311	HONS (PRACTICAL)/T/R/S CC X ZJ 312 (LAB I)
	SEM VI		AD DSE 3 313	CC XIII/CCXIV PD 302	CC XIII AD 313	AD CCXIV 302	HONS (PRACTICAL)/T/R/S CC XIII/ DSE4/DSE3 PD 312 (LAB II)
TUESDAY	SEM II			GE 2 KM 302	CC IV AG 302	CC III SL 302	GE 2 (PRACTICAL) SL/SC 312 (LAB 1)
	SEM IV	CCIX AG 302	GE 4 KM 302	SEC 2 RG 311	CC IX ZJ 311	CC VIII PD 311	GE 4 (PRACTICAL) KM/PD 312 (LAB II)
	SEM VI	CCXIV ZJ 313	CC XIII SC 311	DSE 4 AD 313	DSE 3 KM 313	CC XIV KM 313	HONS(PRACTICAL)/T/R/S DSE 4 RG/AD 312 (LAB III)
WEDNESDAY	SEM II			GE 2 SP 302	CC III AD 302	CC III RG 302	HONS (PRACTICAL)/T/R/S CCIV PD / SC 312 (LAB I)
	SEM IV		GE 4 SP 302	CCX SC 311	CC VIII SL 311	CC IX SL 311	HONS (PRACTICAL)/T/R/S CC IX AD/SL 312 (LAB II)
	SEM VI	DSE 4 RG 311	DSE 3 SL 311	CC XIV SL 313	CCXIV RM 313	CC XIV ZJ 313	HONS (PRACTICAL)/T/R/S CCXIII ZJ+AG 312 (LAB III)
THURSDAY	SEM II			GE 2 KM 302	CC IV SC 302	CC IV PD 302	GE 2 (PRACTICAL) SP/RG 312 (LAB 1)
	SEM IV		GE 4 SP 302	SEC 2 RG 311	CC X KM 311	CC VIII ZJ 311	GE 4(PRACTICAL) AG/KM 312(LAB II)
	SEM VI		CC XIV SC 311	DSE 3 SL 313	CC XIII ZJ 313	DSE 4 RG 313	HONS (PRACTICAL) CCXIV/DSE3 SL/SC 312 (LAB III)

DR. AMITAVA BASU
Principal, B. B. College
Asansol, P Bardhaman
West Bengal - 713303

Head
P.G. Department of Zoology
B. B. College, Asansol

		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
FRIDAY	SEM II		CCIII RG 311	GE2 SP 302	CC III/CC IV KM 302	CC III AD 302	HONS (PRACTICAL)/T/R/S CC III SC/SL 312 (LAB I)
	SEM IV	CCIX KM 302	GE 4 KM 302	CC IX SL 311	CC IX AD 311	CC IX SC 311	HONS (PRACTICAL)/T/R/S CCVIII/CCIX PD/AG 312 (LAB II)
	SEM VI		DSE 4 SL 311	CC XIII AD 313	CCXIV RM 313	CC XIV ZJ 313	HONS(PRACTICAL)/T/R/S DSE 3 AD/KM 312 (LAB III)
SATURDAY	SEM II		CC3 RG 302	GE 2 KM 311	CC IV SP 311	CC IV SC 311	
	SEM IV	CC IX/CCX AG 311	GE 4 SP 313	CCIX/SEC2 RM 302	CC VIII SC 302	CC X KM 302	
	SEM VI		DSE 4 SC 311	DSE4 RG 302	CC XIV AG 313	CC XIII AG 313	HONS (PRACTICAL)/T/R/S CCXIII AG 302

Head
P.G. Department of Zoology
B. B. College, Asansol

DR. AMITAVA BASU
Principal, B. B. College
Ushagram, Asansol, P Bardhaman
West Bengal - 713303

B.Sc. Honours Semester I, III, & V, Odd Semester Routine, PG Dept. Of Zoology-2022

TIMINGS / DAYS		10:00-11:00	11:00-12:00	12:00-01:00	01:00-02:00	02:00-03:00	03:00-05:00
MONDAY	SEM I				CC I ZJ 302	CC II PD 302	
	SEM III				CC V PD 311	CC VI ZJ 311	HONS (PRACTICAL) CC VI ZJ 312 (LAB I)
	SEM V		DSE1 ZJ 302	CCXI PD 302	CC XII AD 313		HONS (PRACTICAL) CCXI/CCXII/DSE1 PD 312 (LAB II)
TUESDAY	SEM I			GE 1 AG 302	CC I AG 302	CC II / CC I SL 302	GE 1 (PRACTICAL) KM 312 (LAB I)
	SEM III	CCVII AG 302		SEC 1 RG 311	CC VI ZJ 311	CC V PD 311	GE 3 (PRACTICAL) RG 312 (LAB 2)
	SEM V		DSE 2 AD 313	DSE 1 ZJ 313	CC XI KM 313	CC XII SC/RM 313	HONS(PRACTICAL) DSE1 SC/ZJ 302
WEDNESDAY	SEM I			GE 1 SP 302	CC I AD 302	CC I RG 302	HONS (PRACTICAL) CC II PD/AD 312 (LAB I)
	SEM III	CCV KM 302	GE 3 RG 302		CC V SL 311	CC VII SC 311	HONS (PRACTICAL) CC VII SC/RM/SL 312 (LAB II)
	SEM V		DSE 2/CCXII RM 311	DSE 1 ZJ 313	CC XI AG 313	CC XII SL 313	HONS (PRACTICAL) CC XI KM/ZJ 302
THURSDAY	SEM I			GE 1 AG 302	CC II PD 302	CC I SC 302	GE 1 (PRACTICAL) SP 312 (LAB 1)
	SEM III		GE 3 SP 302	SEC 1 AD 311	CCV KM 311	CC VI ZJ 311	GE 3(PRACTICAL) RG 312(LAB
	SEM V		CCXI SL 311	CCXI PD 313	CC XI SC 313	CC XII AD 313	HONS (PRACTICAL) CCXII AD/SL/SC 312 (LAB III)
	SEM I		ENVS	GE 1 SP	CC I KM	CC II AD	HONS (PRACTICAL)/T/R/S CC I

FRIDAY				302			312 (LAB I)
	SEM III	CC V AD 302	GE 3 RG 302	CC VII SL 311	CC VI AD 311		HONS (PRACTICAL)/T/R/S CCV/CCVI PD/AG 312 (LAB II)
	SEM V		DSE2 RM 311	DSE 1 SC 302	CC XI ZJ 313	CC XII AG 313	HONS(PRACTICAL)/T/R/S DSE 2 AD/RM 312 (LAB III)
SATURDAY	SEM I		CC I RG 302	GE 1 KM 311	CC I RM 311	CC II SC 311	GE (PRACTICAL) VACANT
	SEM III	CC VI AG 311	GE 3 SP. 313	CCVII RM 313	CC VI SC 302	CC V KM 302	GE3(PRACTICAL) VACANT 312
	SEM V		DSE1 AG 302	DSE1 SL 302	CC XI KM 313	DSE1/CC XII SP 313	T/R/S AG/SC 302

REMARKS:AS PER DECISION TAKEN IN THE TEACHERS' COUNCIL, 50% ATTENDANCE IN THEORETICAL CLASSES AND 75% ATTENDANCE IN PRACTICAL CLASSES IS COMPULSORY FOR STUDENTS, FAILING WHICH 40% WILL BE DEDUCTED FROM INTERNAL EXAMINATIONS. FOR A 10 MARK EXAMINATION IF THE STUDENT GETS 5, HE OR SHE WILL BE GIVEN 3.