



MUGBERIA GANGADHAR MAHAVIDYALAYA

P.O.—BHUPATINAGAR, Dist.—PURBA MEDINIPUR, PIN.—721425, WEST BENGAL, INDIA

NAAC Re-Accredited B+Level Govt. aided College

CPE (Under UGC XII Plan) & NCTE Approved Institutions

DBT Star College Scheme Award Recipient

E-mail : mugberia_college@rediffmail.com // www.mugberiangangadhar mahavidyalaya.ac.in

Teaching Plan under CBCS w.e.f. 2021-2022

Department of Commerce

Course	Course content/Syllabus	Credit/ Marks	Allotted Teach ers	Class allotted per week	Total class
SEM-I					
C1T	<p>Financial Accounting</p> <p>Unit 1:</p> <p>A. Theoretical Framework</p> <p>i. Accounting as an information system, the users of financial accounting information and their needs. Qualitative characteristics of accounting, information. Functions, advantages and limitations of accounting. Branches of accounting. Bases of accounting; cash basis and accrual basis.</p> <p>ii. The nature of financial accounting principles – Basic concepts and conventions: entity, money measurement, going concern, cost, realization, accruals, periodicity, consistency, prudence (conservatism), materiality and full disclosures.</p> <p>iii. Financial accounting standards: Concept, benefits, procedure for issuing accounting standards in India. Salient features of First-Time Adoption of Indian Accounting Standard (Ind-AS) 101. International Financial Reporting Standards (IFRS): - Need and procedures.</p> <p>B. Accounting Process</p> <p>From recording of a business transaction to preparation of trial balance including adjustments</p> <p>Unit 2:</p> <p>(a) Business Income</p> <p>i) Measurement of business income-Net income: the accounting period, the continuity doctrine and matching concept. Objectives of measurement.</p> <p>ii) Revenue recognition: Recognition of expenses.</p> <p>iii. The nature of depreciation. The accounting concept of depreciation. Factors in the measurement of depreciation. Methods of computing depreciation: straight line method and diminishing balance method; Disposal of depreciable assets-change of method.</p> <p>iv. Inventories: Meaning. Significance of inventory valuation. Inventory Record Systems: periodic and perpetual. Methods: FIFO, LIFO and Weighted Average.</p>	04(4-0-0) CA-15 +ESE- 40=55	A. Tripathi	04	4x15= 30

	<p>Salient features of Indian Accounting Standard (Ind-AS): 2</p> <p>(b) Final Accounts</p> <p>Capital and revenue expenditures and receipts: general introduction only.</p> <p>Preparation of financial statements of non-corporate business entities</p> <p>Unit 3: Accounting for Hire Purchase and Installment Systems</p> <p>Calculation of interest, partial and full repossession, Hire purchase trading (total cash price basis), stock and debtors system; Concepts of operating and financial lease (theory only)</p> <p>Unit 4: Accounting for Inland Branches</p> <p>Concept of dependent branches; accounting aspects; debtors system, stock and debtors system, branch final accounts system and whole sale basis system. Independent branches: concept-accounting treatment: important adjustment entries and preparation of consolidated profit and loss account and balance sheet.</p> <p>Unit 5: Accounting For Dissolution of the Partnership Firm</p> <p>Accounting of Dissolution of the Partnership Firm Including Insolvency of partners, sale to a limited company and piecemeal distribution</p>				
C1P:Practical	Computerised Accounting Systems				
	<p>Computerized Accounting Systems: 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</p>	02(0-0-4) ESE-20 Total-75	C. Kamila	4	4x15= 60
C2T	<p>Unit 1: The Indian Contract Act, 1872: General Principle of Law of Contract</p> <ol style="list-style-type: none"> Contract – meaning, characteristics and kinds Essentials of a valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects. Void agreements Discharge of a contract – modes of discharge, breach and remedies against breach of contract. Contingent contracts Quasi - contracts <p>Unit 2: The Indian Contract Act, 1872: Specific Contract</p> <ol style="list-style-type: none"> Contract of Indemnity and Guarantee Contract of Bailment Contract of Agency <p>Unit 3: The Sale of Goods Act, 1930</p> <ol style="list-style-type: none"> Contract of sale, meaning and difference between sale and agreement to sell. Conditions and warranties Transfer of ownership in goods including sale by a non-owner Performance of contract of sale Unpaid seller – meaning, rights of an unpaid seller against the goods and the buyer. 	06(5-1-0) CA-15 +ESE-60=75	S Adak	3	3x15= 45

	<p>Unit 4: Partnership Laws</p> <p>A) The Partnership Act, 1932</p> <ol style="list-style-type: none"> Nature and Characteristics of Partnership Registration of a Partnership Firms Types of Partners Rights and Duties of Partners Implied Authority of a Partner Incoming and outgoing Partners Mode of Dissolution of Partnership <p>B) The Limited Liability Partnership Act, 2008</p> <ol style="list-style-type: none"> Salient Features of LLP Differences between LLP and Partnership, LLP and Company LLP Agreement, Partners and Designated Partners Incorporation Document Incorporation by Registration Partners and their Relationship <p>Unit 5: The Negotiable Instruments Act 1881</p> <ol style="list-style-type: none"> Meaning, Characteristics, and Types of Negotiable Instruments : Promissory Note, Bill of Exchange, Cheque Holder and Holder in Due Course, Privileges of Holder in Due Course. Negotiation: Types of Endorsements Crossing of Cheque Bouncing of Cheque 		R. Giri	3	3x15= 45
GE-1T	Microeconomics				
	<p>Unit 1: Demand and Consumer Behaviour</p> <p>Concepts of revenue: marginal and Average: Revenue under conditions of Perfect and imperfect competition Elasticity of demand: price, income and cross. Consumer Behaviour: Indifference curve analysis of consumer behavior; Consumer's equilibrium (necessary and sufficient conditions). Price elasticity and price consumption curve, income consumption curve and Engel curve, price change and income and substitution effects. Indifference curves as an analytical tool (cash subsidy v/s. kind subsidy). Revealed Preference Theory.</p> <p>Unit 2: Production and Cost</p> <p>Production isoquants, marginal rate of technical substitution, economic region of production, optimal combination of resources, the expansion path, isoclines, returns to scale using isoquants.</p> <p>Cost of Production: Social and private costs of production, long run and short run costs of production. Economies and diseconomies of scale and the shape to the long run average cost. Learning curve and economies of scope.</p>	06(5-1-0) CA-15 +ESE- 60=75	C. Kamila	3	3x15= 45
	<p>Unit 3: Perfect Competition</p> <p>Perfect competition: Assumptions. Equilibrium of the firm and the industry in the short and the long runs, including industry's long run supply curve. Measuring producer surplus under perfect competition. Stability Analysis – Walrasian and Marshallian. Demand - supply analysis including impact of taxes and subsidy.</p> <p>Unit 4: Monopoly</p> <p>Monopoly: Monopoly short run and long run equilibrium.</p>		R. Dinda	3	3x15= 45

	<p>Shifts in demand curve and the absence of the supply curve. Measurement of monopoly power and the rule of thumb for pricing. Horizontal and vertical integration of firms. The social costs of monopoly power including deadweight loss. Degrees of price discrimination.</p> <p>Unit 5: Imperfect Competition Monopolistic Competition and Oligopoly: Monopolistic competition price and output decision-equilibrium. Monopolistic Competition and economic efficiency Oligopoly and Interdependence – Cournot's duopoly model, Stackelberg model, Kinked demand model. Prisoner's dilemma, collusive oligopoly – price-leadership model – dominant firm, cartels, sales maximization, Contestable markets theory. Pricing Public Utilities.</p>				
SEM-II					
C3T	Corporate Accounting				
	<p>Unit 1. Accounting for Share Capital & Debentures Issue, forfeiture and reissue of forfeited shares: concept & process of book building; Issue of rights and bonus shares; Buy back of shares; Redemption of preference shares; Issue and Redemption of Debentures</p> <p>Unit 2. Final Accounts Preparation of profit and loss account and balance sheet of corporate entities, excluding calculation of managerial remuneration, Disposal of company profits</p> <p>Unit 3. Valuation of Goodwill and Valuation of Shares Concepts and calculation: simple problem only</p> <p>Unit 4. Amalgamation of Companies Concepts and accounting treatment as per Accounting Standard: 14 (ICAI) (excluding inter-company holdings). Internal reconstruction: concepts and accounting treatment excluding scheme of reconstruction.</p>	06(5-1-0) CA-15 +ESE-60=75	A.Tripa thi	04	4x15= 60
	<p>Unit 5. Accounts of Holding Companies/Parent Companies Preparation of consolidated balance sheet with one subsidiary company. Relevant provisions of Accounting Standard: 21 (ICAI).</p> <p>Unit 6. Banking Companies Difference between balance sheet of banking and non-banking company; prudential norms. Asset structure of a commercial bank. Non-performing assets (NPA).</p> <p>Unit 7. Cash Flow Statement Concepts of funds. Preparation of cash flow statement as per Indian Accounting Standard(Ind- AS): 7.</p>		C. Kamila	02	2x15= 30
C4T	Corporate Laws				
	<p>UNIT 1: Introduction Administration of Company Law [including National Company Law Tribunal (NCLT), National Company Law Appellate Tribunal (NCLAT), Special Courts]; Characteristics of a company; lifting of corporate veil; types of companies including one person company, small company, and dormant company; association not for profit; illegal association; formation of company, on-line filing of documents, promoters, their legal position, pre- incorporation contract; on-line registration of a company.</p>	06(5-1-0) CA-15 +ESE-60=75	S. Adak	03	3x15= 45

	<p>UNIT 2: Documents Memorandum of association, Articles of association, Doctrine of constructive notice and indoor management, prospector-shelf and red herring prospectus, misstatement in prospectus, GDR; book-building; issue, allotment and forfeiture of share, transmission of shares, buyback and provisions regarding buyback; issue of bonus shares.</p> <p>UNIT 3: Management Classification of directors, women directors, independent director, small shareholder's director; disqualifications, director identity number (DIN); appointment; Legal positions, powers and duties; removal of directors; Key managerial personnel, managing director, manager; <i>Meetings:</i> Meetings of shareholders and board of directors; Types of meetings, Convening and conduct of meetings, Requisites of a valid meeting, postal ballot, meeting through video conferencing, e-voting. Committees of Board of Directors - Audit Committee, Nomination and Remuneration Committee, Stakeholders Relationship Committee, Corporate Social Responsibility Committee</p>				
	<p>UNIT 4: Dividends, Accounts, Audit: Provisions relating to payment of Dividend, Provisions relating to Books of Account, Provisions relating to Audit, Auditors' Appointment, Rotation of Auditors, Auditors' Report, Secretarial Audit.</p> <p>Winding Up: Concept and modes of Winding Up.</p> <p>Insider Trading, Whistle Blowing: Insider Trading; meaning & legal provisions; Whistleblowing : Concept and Mechanism.</p> <p>UNIT 5: Depositories Law The Depositories Act 1996 – Definitions; rights and obligations of depositories; participants issuers and beneficial owners; inquiry and inspections, penalty.</p>		R. Giri	03	3x15=45
GE2T	Macro Economics				
	<p>Unit 1: Introduction concepts and variables of macroeconomics, income, expenditure and the circular flow, components of expenditure. Static macroeconomic analysis short and the long run – determination of supply, determination of demand, and conditions of equilibrium</p> <p>Unit 2: Economy in the short run IS–LM framework, fiscal and monetary policy, determination of aggregate demand, shifts in aggregate demand, aggregate supply in the short and long run, and aggregate demand and aggregate supply analysis.</p> <p>Unit 3: Inflation, Unemployment and Labour market Inflation: Causes of rising and falling inflation, inflation and interest rates, social costs of inflation; Unemployment – natural rate of unemployment, frictional and wait unemployment. Labour market and its interaction with production system; Phillips curve, the trade-off between inflation and unemployment, sacrifice ratio, role of expectations adaptive and rational</p>	06(5-1-0) CA-15 +ESE-60=75	R. Giri	03	3x15=45

	<p>Unit 4: Open economy Open economy – flows of goods and capital, saving and investment in a small and a large open economy, exchange rates, Mundell – Fleming model with fixed and flexible prices in a small open economy with fixed and with flexible exchange rates, interest-rate differentials case of a large economy.</p> <p>Unit 5: Behavioral Foundations- Investment –determinants of business fixed investment, effect of tax, determinants of residential investment and inventory investment. Demand for Money – Portfolio and transactions theories of demand for real balances, interest and income elasticities of demand for real balances. Supply of money</p>		R. Dinda	03	3x15= 45
SEM-III					
C5T	Human Resource Management				
	<p>Unit 1: Introduction Human Resource Management: Concept and Functions, Role, Status and competencies of HR Manager, HR Policies, Evolution of HRM, HRM vs HRD. Emerging Challenges of Human Resource Management; Workforce diversity; Empowerment; Downsizing; VRS; Human Resource Information System</p> <p>Unit 2: Acquisition of Human Resource Human Resource Planning- Quantitative and Qualitative dimensions; job analysis – job description and job specification; Recruitment – Concept and sources; Selection – Concept and process; test and interview; placement and induction</p> <p>Unit 3: Training and Development Concept and Importance; Identifying Training and Development Needs; Designing Training Programmes; Role-Specific and Competency-Based Training; Evaluating Training Effectiveness; Training Process Outsourcing; Management Development; Career Development.</p>	06(5-1-0) CA-15 +ESE-60=75	C, Kamila	03	3x15= 45
	<p>Unit 4: Performance Appraisal Nature, objectives and importance; Modern techniques of performance appraisal; potential appraisal and employee counseling; job changes - transfers and promotions; Compensation: concept and policies; job evaluation; methods of wage payments and incentive plans; fringe benefits; performance linked compensation.</p> <p>Unit 5: Maintenance Employee health and safety; employee welfare; social security; Employer-Employee relations- an overview; grievance-handling and redressal; Industrial Disputes: causes and settlement machinery</p>		R, Giri	03	3x15= 45
C6T	Income Tax Law and Practice				
	<p>Unit 1: Introduction <i>Basic concepts:</i> Income, agricultural income, person, assessee, assessment year, previous year, gross total income, total income, maximum marginal rate of tax; Permanent Account Number (PAN) <i>Residential status:</i> Scope of total income on the basis of residential status Exempted income under section 10</p> <p>Unit 2: Computation of Income under different heads-1 Income from Salaries; Income from house property</p>	04(4-0-0) CA-15 +ESE-40=55	A.K. Tri pathi	02	2x15= 30

	Unit 3: Computation of Income under different heads-2 Profits and gains of business or profession; Capital gains; Income from other sources				
	Unit 4: Computation of Total Income and Tax Liability Income of other persons included in assessee's total income; Aggregation of income and set-off and carry forward of losses; Deductions from gross total income; Rebates and reliefs Unit 5: Preparation of Return of Income Filing of returns: Manually, On-line filing of Returns of Income & TDS; Provision & Procedures of Compulsory On-Line filing of returns for specified assesses.		S. Adak	02	2x15=30
C6P	Practical: Preparation of Return of Income Filing of returns: Manually, On-line filing of Returns of Income & TDS; Provision & Procedures of Compulsory On-Line filing of returns for specified assesses.	02(0-0-4) ESE-20 Total-75	R.Dinda	04	2x15=30
C7T	Management Principles and Application				
	Unit 1: Introduction a) Concept: Need for Study, Managerial Functions – An overview; Co-ordination: Essence of Managership b) Evolution of the Management Thought, Classical Approach – Taylor, Fayol, Neo- Classical and Human Relations Approaches – Mayo, Hawthorne Experiments, Behavioural Approach, Systems Approach, Contingency Approach – Lawrence & Lorsch, MBO - Peter F. Drucker, Re-engineering - Hammer and Champy, Michael Porter – Five-force analysis, Three generic strategies and valuechain, analysis, Senge's Learning Organisation, 'Fortune at the Bottom of the Pyramid' – C.K. Prahalad. Unit 2: Planning a) Types of Plan – An overview to highlight the differences b) Strategic planning – Concept, process, Importance and limitations c) Environmental Analysis and diagnosis (Internal and external environment) – Definition, Importance and Techniques (SWOT/TOWS/WOTS-UP, BCG Matrix, Competitor Analysis), Business environment; Concept and Components d) Decision-making – concept, importance; Committee and Group Decision-making, Process, Perfect rationality and bounded rationality, Techniques (qualitative and quantitative, MIS, DSS) Unit 3: Organising Concept and process of organising – An overview, Span of management, Different types of authority (line, staff and functional), Decentralization, Delegation of authority Formal and Informal Structure; Principles of Organising; Network Organisation Structure	06(5-1-0) CA-15 +ESE-60=75	R,Giri	03	3x15=45

	<p>Unit 4: Staffing and Leading</p> <p>a) <i>Staffing</i>: Concept of staffing, staffing process</p> <p>b) <i>Motivation</i>: Concept, Importance, extrinsic and intrinsic motivation; Major Motivation theories - Maslow's Need-Hierarchy Theory; Herzberg's Two-factor Theory, Vroom's Expectation Theory.</p> <p>c) <i>Leadership</i>: Concept, Importance, Major theories of Leadership (Likert's scale theory, Blake and Mouten's Managerial Grid theory, House's Path Goal theory, Fred Fielder's situational Leadership), Transactional leadership, Transformational Leadership, Transforming Leadership.</p> <p>d) <i>Communication</i>: Concept, purpose, process; Oral and written communication; Formal and informal communication networks, Barriers to communication, Overcoming barriers to communication.</p> <p>Unit 5: Control</p> <p>a. <i>Control</i>: Concept, Process, Limitations, Principles of Effective Control, Major Techniques of control - Ratio Analysis, ROI, Budgetary Control, EVA, PERT/CPM.</p> <p>b. Emerging issues in Management</p>		A.K.Tri pathi	03	3x15=45
GE-3T	Business Statistics				
	<p>Unit 1: Statistical Data and Descriptive Statistics</p> <p>a. Nature and Classification of data: univariate, bivariate and multivariate data; time-series and cross-sectional data</p> <p>b. Measures of Central Tendency</p> <p>i. Mathematical averages including arithmetic mean, geometric mean and harmonic mean. Properties and applications.</p> <p>ii. Positional Averages</p> <p>c. Mode and Median (and other partition values including quartiles, deciles, and percentiles) (including graphic determination)</p> <p>d. Measures of Variation: absolute and relative. Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance</p> <p>e. Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis</p> <p>Unit 2: Probability and Probability Distributions</p> <p>a. Theory of Probability. Approaches to the calculation of probability; Calculation of event probabilities. Addition and multiplication laws of probability (Proof not required); Conditional probability and Bayes' Theorem (Proof not required)</p> <p>b. Expectation and variance of a random variable</p> <p>c. Probability distributions:</p> <p>i. Binomial distribution: Probability distribution function, Constants, Shape, Fitting of binomial distribution</p> <p>ii. Poisson distribution: Probability function, (including Poisson approximation to binomial distribution), Constants, Fitting of Poisson</p>	04(4-0-0) CA-15 +ESE-40=55	A. Das	04	4x15=60

	<p>distribution</p> <p>iii. Normal distribution: Probability distribution function, Properties of normal curve, Calculation of probabilities</p> <p>Unit 3: Simple Correlation and Regression Analysis</p> <p>a. Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (Proof not required). Correlation and Probable error; Rank Correlation</p> <p>b. Regression Analysis: Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of Estimate and its use in interpreting the results.</p> <p>Unit 4: Index Numbers Meaning and uses of index numbers; Construction of index numbers: fixed and chain base: univariate and composite. Aggregative and average of relatives – simple and weighted Tests of adequacy of index numbers, Base shifting, splicing and deflating. Problems in the construction of index numbers; Construction of consumer price indices: Important share price indices, including BSE SENSEX and NSE NIFTY</p> <p>Unit 5: Time Series Analysis Components of time series; Additive and multiplicative models; Trend analysis: Fitting of trend line using principle of least squares – linear, second-degree parabola and exponential. Conversion of annual linear trend equation to quarterly/monthly basis and vice-versa; Moving averages; Seasonal variations: Calculation of Seasonal Indices using Simple averages, Ratio-to-trend, and Ratio-to-moving averages methods. Uses of Seasonal Indices</p> <p>UNIT 6: Sampling Concepts, Sampling Distributions and Estimation: Sampling: Populations and samples, Parameters and Statistics, Descriptive and inferential statistics; Sampling methods (including Simple Random sampling, Stratified sampling, Systematic sampling, Judgement sampling, and Convenience sampling)</p> <p>Concept of Sampling distributions and Theory of Estimation: Point and Interval estimation of means (large samples) and proportions.</p>				
GE3P	Practical				
	The students will be familiarized with software (Spreadsheet and/or SPSS) and the statistical and other functions contained therein related to formation of frequency distributions and calculation of averages, measures of Dispersion and variation, correlation and regression coefficient.	02(0-0-4) ESE-20 Total-75	A.Das	04	4x15= 60
SEC1T	E-Commerce				
	Unit 1: Introduction: Meaning, nature, concepts, advantages, disadvantages and reasons for transacting online, types of E-Commerce, e-	02(1-0-2) CA- 10+ESE-	R,Dinda	02	2x15= 30

	<p>commerce business models (introduction , key elements of a business model and categorizing major E-commerce business models), forces behind e-commerce.</p> <p>Technology used in E-commerce: The dynamics of World Wide Web and internet (meaning, evolution and features) ; Designing, building and launching e-commerce website (A systematic approach involving decisions regarding selection of hardware, software, outsourcing vs. in-house development of a website)</p> <p>Unit 2: Security and Encryption: Need and concepts, the e-commerce security environment: (dimension, definition and scope of e-security), security threats in the E-commerce environment (security intrusions and breaches, attacking methods like hacking, sniffing, cyber-vandalism etc.), technology solutions (Encryption, security channels of communication, protecting networks and protecting servers and clients),</p> <p>Unit 3: IT Act 2000 and Cyber Crimes IT Act 2000: Definitions, Digital signature, Electronic governance, Attribution, acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital signatures certificates, Duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences and Cyber-crimes.</p>	40=50			
	<p>Unit 4: E-payment System: (8 Lectures,)</p> <p>Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures (procedure, working and legal position), payment gateways, online banking (meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting), risks involved in e-payments.</p> <p>Unit 5: On-line Business Transactions: (8 Lectures)</p> <p>Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications in various industries like {banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment} Online shopping (amazon, Snapdeal, Alibaba, flip kart, etc.)</p> <p>Unit 6: Website designing Introduction to HTML; tags and attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets.</p>				
	<p>Practical : e- payment system, On-line Business Transactions & Website designing</p> <p>1: E-payment System:</p>		C. Kamila	01	1x15= 15

	<p>(4 Practical Lab) Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures (procedure, working and legal position), payment gateways, online banking (meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting), risks involved in e-payments.</p> <p>2: On-line Business Transactions: (4 Practical Lab) Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications in various industries like {banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment} Online shopping (amazon, Snapdeal, Alibaba, flip kart, etc.)</p> <p>3: Website designing (18 Practical Lab) Introduction to HTML; tags and attributes: Text Formatting, Fonts, Hypertext Links, Tables, Images, Lists, Forms, Frames, Cascading Style Sheets.</p>				
SEM-IV					
C8T	Cost Accounting				
	<p>Unit 1: Introduction Meaning, objectives and advantages of cost accounting; Difference between cost accounting and financial accounting; Cost concepts and classifications; Elements of cost; Installation of a costing system; Role of a cost accountant in an organisation</p> <p>Unit 2: Elements of Cost: Material and Labour</p> <p>a. <i>Materials</i>: Material/inventory control techniques. Accounting and control of purchases, storage and issue of materials. Methods of pricing of materials issues — FIFO, LIFO, Simple Average, Weighted Average, Replacement, Standard Cost. Treatment of Material Losses</p> <p>b. <i>Labour</i>: 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 and the Incentive schemes- Halsey, Rowan, Taylor's Differential piece wage.</p>	06(5-1-0) CA-15 +ESE- 60=75	S. Adak	04	4x15= 60
	<p>Unit 3: Elements of Cost: Overheads Classification, allocation, apportionment and absorption of overheads; Under- and over absorption; Capacity Levels and Costs; Treatments of certain items in costing like interest on capital, packing expenses, bad debts, research and development expenses; Activitybased cost allocation.</p> <p>Unit 4: Methods of Costing Unit costing, Job costing, Contract costing, Process costing (process losses, valuation of work in progress, joint and by-products), Service costing (only transport).</p>		A.K.Tri pathi	02	2x15= 30

	Unit 5: Book Keeping in Cost Accounting Integral and non-integral systems; Reconciliation of cost and financial accounts.				
C9T	Business Mathematics				
	Unit 1: Matrices and Determinants <ol style="list-style-type: none"> Algebra of matrices. Inverse of a matrix, Matrix Operation – Business Application Solution of system of linear equations (having unique solution and involving not more than three variables) using matrix inversion Method and Cremer’s Rule, The Leontief Input Output Model (Open Model Only). Unit 2: Calculus I <ol style="list-style-type: none"> Mathematical functions and their types- linear, quadratic, polynomial, exponential, Logarithmic function Concepts of limit, and continuity of a function Concept and rules of differentiation, Maxima and Minima involving second or higher order derivatives. Concept of Marginal Analysis, Concept of Elasticity, Applied Maximum and Minimum Problems including effect of Tax on Monopolist’s optimum price and quantity, Economic Order Quantity. Unit 3: Calculus II <ol style="list-style-type: none"> Partial Differentiation: Partial derivatives up to second order; Homogeneity of functions and Euler’s theorem; Total differentials; Differentiation of implicit functions with the help of total differentials Maxima and Minima: Cases of two variables involving not more than one constraint including the use of the Lagrangian multiplier. Integration: Standard forms. Methods of integration – by substitution, by parts, and by use of partial fractions; Definite integration; Finding areas in simple cases Application of Integration to marginal analysis. Consumer’s and Producer’s Surplus, Rate of Sales and the Learning Curve. Unit 4: Mathematics of Finance <ol style="list-style-type: none"> Rates of interest-nominal, effective– and their inter-relationships in different compounding situations. Compounding and discounting of a sum using different types of rates. Types of annuities, like ordinary, due, deferred, continuous, perpetual, and their future and present values using different types of rates of interest. Depreciation of Assets. (<i>General annuities to be excluded</i>) Unit 5: Linear Programming <ol style="list-style-type: none"> Formulation of linear programming problem (LPP). Graphical solution to LPP. Cases of unique and multiple optimal solutions. Unbounded solutions, infeasibility, and redundant constraints. Solution to LPP using Simplex method – maximization and minimization cases. Shadow prices of the resources. Identification of unique and multiple optimal solutions, unbounded solution, 	04(4-0-0) CA-15 +ESE- 40=55	A. Das	04	4x15= 60

	infeasibility and degeneracy				
C9P	Practical: Business Mathematics				
	1. Mathematics of Finance <ol style="list-style-type: none"> Rates of interest-nominal, effective– and their inter-relationships in different compounding situations. Compounding and discounting of a sum using different types of rates. <p>c.Types of annuities, like ordinary, due, deferred, continuous, perpetual, and their future and present values using different types of rates of interest. Depreciation of Assets.</p> 2. Linear Programming <ol style="list-style-type: none"> Formulation of linear programming problem (LPP). Graphical solution to LPP. Cases of unique and multiple optimal solutions. Unbounded solutions, infeasibility, and redundant constraints. Solution to LPP using Simplex method – maximization and minimization cases. Shadow prices of the resources. Identification of unique and multiple optimal solutions, unbounded solution, infeasibility and degeneracy. 	02(0-0-4) ESE-20 Total-75	A. Das	04	4x15= 60
C10T	Computer Application in Business Unit 1: Word Processing 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: Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge: including linking with Database; Printing documents Creating Business Documents using the above facilities Unit 2: Preparing Presentations Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow. Creating Business Presentations using above facilities Unit 3: Spreadsheet and its Business Applications Spreadsheet concepts , Managing worksheets; Formatting, Entering data, Editing, and Printing a worksheet; Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions Unit 4: Creating Business Spreadsheet Creating spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression Unit 5: Database Management System	04(4-0-0) CA-15 +ESE-40=55	A. Das	04	4x15= 30
C10P	Practical :Computer Applications in Business				
	1: Word Processing	02(0-0-4) ESE-20	C. Kamila	04	4x15= 60

	<p>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: Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge: including linking with Database; Printing documents Creating Business Documents using the above facilities</p> <p>2: Preparing Presentations</p> <p>Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow. Creating Business Presentations using above facilities</p> <p>3: Spreadsheet and its Business Applications</p> <p>Spreadsheet concepts, Managing worksheets; Formatting, Entering data, Editing, and Printing a worksheet; Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs</p> <p>Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions</p> <p>4: Creating Business Spreadsheet</p> <p>Creating spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression</p> <p>5: Database Management System</p> <p>Database Designs for Accounting and Business Applications: Reality- Expressing the Application; Creating Initial design in Entity Relationship(ER) Model; Transforming ER Model to Relational data model concepts; Implementing RDM design using an appropriateDBMS.</p> <p>SQL and Retrieval of Information: Basic Queries in SQL; Embedded Queries in SQL; Insert, Delete and Update statements in SQL</p> <p>DBMS Software: Environment; Tables; Forms; Queries; Reports; Modules; Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, Managing the data records of Employees, Suppliers and Customers.</p>	Total-75			
GE4T	Indian Economy				
	<p>Unit 1: Basic Issues in Economic Development Concept and Measures of Development and Underdevelopment; Human Development</p> <p>Unit 2: Basic Features of the Indian Economy at Independence Composition of national income and occupational structure, the agrarian scene and industrial</p>	06(5-1-0) CA-15+ESE-60	A.Tripa thi	03	3x15= 45

	<p>structure</p> <p>Unit 5: Sectoral Trends and Issues</p> <p>a) Agriculture Sector: Agrarian growth and performance in different phases of policy regimes i.e. pre green revolution and the two phases of green revolution; Factors influencing productivity and growth; the role of technology and institutions; price policy, the public distribution system and food security.</p> <p>b) Industry and Services Sector: Phases of Industrialisation – the rate and pattern of industrial growth across alternative policy regimes; Public sector – its role, performance and reforms; The small scale sector; Role of Foreign capital.</p> <p>c) Financial Sector: Structure, Performance and Reforms. Foreign Trade and balance of Payments: Structural Changes and Performance of India's Foreign Trade and Balance of Payments; Trade Policy Debate; Export policies and performance; Macro Economic Stabilisation and Structural Adjustment; India and the WTO, Role of FDI, Capital account convertibility,</p>				
	<p>Unit 3: Policy Regimes</p> <p>a) The evolution of planning and import substituting industrialization.</p> <p>b) Economic Reforms since 1991.</p> <p>c) Monetary and Fiscal policies with their implications on economy</p> <p>Unit 4: Growth, Development and Structural Change</p> <p>a) The experience of Growth, Development and Structural Change in different phases of growth and policy regimes across sectors and regions.</p> <p>b) The Institutional Framework: Patterns of assets ownership in agriculture and industry; Policies for restructuring agrarian relations and for regulating concentration of economic power;</p> <p>c) Changes in policy perspectives on the role of institutional framework after 1991.</p> <p>d) Growth and Distribution; Unemployment and Poverty; Human Development; Environmental concerns.</p> <p>e) Demographic Constraints: Interaction between population change and economic development.</p>		R, Dinda	03	3x15= 45
SEC2T	Entrepreneurship				
	<p>Unit 1: Introduction</p> <p>Meaning, elements, determinants and importance of entrepreneurship and creative behavior; Entrepreneurship and creative response to the society's problems and at work; Dimensions of entrepreneurship: intrapreneurship, technopreneurship, cultural entrepreneurship, international entrepreneurship, netpreneurship, ecopreneurship, and social entrepreneurship</p> <p>Unit 2: Entrepreneurship and Micro, Small and Medium Enterprises</p> <p>Concept of business groups and role of business houses and family business in India; The contemporary role models in Indian business: their values, business philosophy and</p>	02(1-1-0)	R. Giri	01	1x15= 15

	<p>behavioural orientations; Conflict in family business and its resolution</p> <p>Unit 3: Public and private system of stimulation, support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups, The concept, role and functions of business incubators, angel investors, venture capital and private equity fund.</p>				
	<p>Unit 4: Sources of business ideas and tests of feasibility. Significance of writing the business plan/ project proposal; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report (various aspects of the project report such as size of investment, nature of product, market potential may be covered); Project submission/ presentation and appraisal thereof by external agencies, such as financial/non-financial institutions</p> <p>Unit 5: Mobilising Resources Mobilising resources for start-up. Accommodation and utilities; Preliminary contracts with the vendors, suppliers, bankers, principal customers; Contract management: Basic start-up problems</p>		C. Kamila	01	1x15=15
SEM-V					
C11T	Principles of Marketing				
	<p>Unit 1: Introduction: Nature, scope and importance of marketing; Evolution of marketing; Selling vs Marketing; Marketing mix, Marketing environment: concept, importance, and components (Economic, Demographic, Technological, Natural, Socio-Cultural and Legal).</p> <p>Unit 2:</p> <p>a. Consumer Behaviour: Nature and Importance, Consumer buying decision process; Factors influencing consumer buying behaviour.</p> <p>b. Market segmentation: concept, importance and bases; Target market selection; Positioning concept, importance and bases; Product differentiation vs. market segmentation.</p> <p>Unit 3: Product: Concept and importance, Product classifications; Concept of product mix; Branding, packaging and labeling; Product-Support Services; Product life-cycle; New Product Development Process; Consumer adoption process.</p>	06(5-1-0) CA-15+ESE-60	A. Tripathi	03	3x15=45
	<p>Unit 4:</p> <p>a. Pricing: Significance. Factors affecting price of a product. Pricing policies and strategies.</p> <p>b. Distribution Channels and Physical Distribution: Channels of distribution - meaning and importance; Types of distribution channels; Functions of middle man; Factors affecting choice of distribution channel; Wholesaling and retailing; Types of Retailers; e-tailing, Physical Distribution.</p> <p>Unit 5:</p> <p>a. Promotion: Nature and importance of promotion; Communication process; Types of promotion: advertising, personal selling, public relations & sales promotion, and their distinctive characteristics;</p>		S. Adak	03	3x15=45

	Promotion mix and factors affecting promotion mix decisions;				
C12T	Fundamentals of Financial Management				
	<p>Unit 1: Introduction</p> <p>Nature, scope and objective of Financial Management, Time value of money, Risk and return (including Capital Asset Pricing Model), Valuation of securities – Bonds and Equities</p> <p>Unit 2: Investment Decisions</p> <p>The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index, Capital budgeting under Risk – Certainty Equivalent Approach and Risk-Adjusted Discount Rate.</p> <p>Unit 3: Financing Decisions</p> <p>Cost of Capital and Financing Decision: Sources of long-term financing Estimation of components of cost of capital. Methods for Calculating cost of equity capital, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average cost of capital (WACC) and Marginal cost of capital. Capital structure –Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating and financial leverage; Determinants of capital structure</p> <p>Unit 4: Dividend Decisions</p> <p>Theories for Relevance and irrelevance of dividend decision for corporate valuation; Cash and stock dividends; Dividend policies in practice</p> <p>Unit 5: Working Capital Decisions</p> <p>Concepts of working capital, the risk-return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, inventory management and payables management.</p>	04(4-0-0) CA-15+ESE-60	R. Giri	04	4x15=60
	Practical :Fundamentals of Financial Management				
	<p>1: Investment Decisions</p> <p>The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate of Return, Net Present Value (NPV), Net Terminal Value, Internal Rate of Return (IRR), Profitability Index, Capital budgeting under Risk – Certainty Equivalent Approach and Risk-Adjusted Discount Rate.</p> <p>2: Financing Decisions</p> <p>Cost of Capital and Financing Decision: Sources of long-term financing Estimation of components of cost of capital.</p>	02	C. Kamila	02	2x15=30

	Methods for Calculating cost of equity capital, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average cost of capital (WACC) and Marginal cost of capital. Capital structure –Theories of Capital Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating and financial leverage; Determinants of capital structure				
DSE 1T	Management Accounting				
	<p>Unit 1: Introduction Meaning, Objectives, Nature and Scope of management accounting, Difference between cost accounting and management accounting, Cost control and Cost reduction, Cost management</p> <p>Unit 2: Budgetary Control Budgeting and Budgetary Control: Concept of budget, budgeting and budgetary control, objectives, merits, and limitations. Budget administration. Functional budgets. Fixed and flexible budgets. Zero base budgeting. Programme and performance budgeting.</p> <p>Unit 3: Standard Costing Standard Costing and Variance Analysis: Meaning of standard cost and standard costing, advantages, limitations and applications. Variance Analysis – material, labour, overheads and sales variances. Disposition of Variances, Control Ratios.</p>	06(5-1-0) CA-15+ESE-60	A.	03	3x15= 45
	<p>Unit 4: Marginal Costing Absorption versus Variable Costing: Distinctive features and income determination. Cost- Volume-Profit Analysis, Profit / Volume ratio. Break-even analysis-algebraic and graphic methods. Angle of incidence, margin of safety, Key factor, determination of cost indifference point.</p> <p>Unit 5: Decision Making Steps in Decision Making Process, Concept of Relevant Costs and Benefits, Various short term decision making situations – profitable product mix, Acceptance or Rejection of special/ export offers, Make or buy, Addition or Elimination of a product line, sell or process further, operate or shut down. Pricing Decisions: Major factors influencing pricing decisions, various methods of pricing</p> <p>Unit 6: Contemporary Issues Responsibility Accounting: Concept, Significance, Different Responsibility Centres, Divisional Performance Measurement: Financial and Non-Financial measures. Transfer Pricing</p>		R. Dinda	03	3x15= 45
DSE2T	Financial Markets, Institutions and Financial Services				
	<p>Unit 1: Introduction Financial System and its Components – financial markets and institutions; Financial intermediation; Flow of funds matrix; Financial system and economic development; An overview of Indian financial system</p> <p>Unit 2: Financial Markets Money market – functions, organisation and instruments. Role</p>	06(5-1-0) CA-15+ESE-60	S. Adak	03	3x15= 45

	<p>of central bank in money market; Indian money market – An overview. Capital Markets – functions, organisation and instruments. Indian debt market; Indian equity market – primary and secondary markets; Role of stock exchanges in India</p> <p>Unit 3: Financial Institutions Commercial banking – introduction, its role in project finance and working capital finance; Development Financial institutions (DFIs) – An overview and role in Indian economy; Life and non-life insurance companies in India; Mutual Funds – Introduction and their role in capital market development. Non-banking financial companies (NBFCs).</p>				
	<p>Unit 4: Financial Services Overview of financial services industry: Merchant banking – pre and post issue management, underwriting. Regulatory framework relating to merchant banking in India</p> <p>Unit 5: Leasing and hire-purchase Consumer and housing finance; Venture capital finance; Factoring services, bank guarantees and letter of credit; Credit rating; Financial counseling.</p>		R. Giri	03	3x15=45
SEM-VI					
C13T	Auditing and Corporate Governance				
	<p>Unit 1: Introduction Auditing: Introduction, Meaning, Objectives, Basic Principles and Techniques; Classification of Audit, Audit Planning, Internal Control – Internal Check and Internal Audit; Audit Procedure Vouching and verification of Assets & Liabilities.</p> <p>Unit 2: Audit of Companies Audit of Limited Companies: Company Auditor- Qualifications and disqualifications, Appointment, Rotation, Removal, Remuneration, Rights and Duties Auditor's Report- Contents and Types. Liabilities of Statutory Auditors under the Companies Act 2013</p> <p>Unit 3: Special Areas of Audit Special Areas of Audit: Special features of Cost audit, Tax audit, and Management audit; Recent Trends in Auditing: Basic considerations of audit in EDP Environment; Computer aided audit techniques and tools; Auditing Standards; Relevant Case Studies/Problems;</p>	06(5-1-0) CA-15+ESE-60	R. Giri	03	3x15=45
	<p>Unit 4: Corporate Governance Conceptual framework of Corporate Governance: Theories & Models, Broad Committees; Corporate Governance Reforms. Major Corporate Scandals in India and Abroad: Common Governance Problems Noticed in various Corporate Failures. Codes & Standards on Corporate Governance</p> <p>Unit 5: Business Ethics Morality and ethics, business values and ethics, approaches and practices of business ethics, corporate ethics, ethics program, codes of ethics, ethics committee; Ethical Behaviour:</p>		C. Kamila	03	3x15=45

	<p>Concepts and advantages; Rating Agencies; Green Governance; Clause 49 and Listing Agreement</p> <p>Unit 6: Corporate Social Responsibility (CSR):</p> <p>Concept of CSR, Corporate Philanthropy, Strategic Planning and Corporate Social responsibility; Relationship of CSR with Corporate Sustainability; CSR and Business Ethics, CSR and Corporate Governance; CSR provisions under the Companies Act 2013; CSR Committee; CSR Models, Codes, and Standards on CSR</p>				
C14T	Indirect Tax Law				
	<p>Unit 1: Introduction</p> <p>Basic concept of Indirect taxes, Difference between direct and indirect taxes, Evolution of Indirect taxes, GST and its Constitutional framework, Rationale for GST, Rates of GST, GST Council- structure, functions, authorities and responsibilities, GSTN – Basic concept.</p> <p>Unit 2: Levy of GST</p> <p>Registration, Composition Levy Scheme, Taxable events for Supply of Goods and Services, Classification of Goods and Services, Composite and Mixed Supplies, Place of Supply (intra- state, inter- state, import and export), GST Returns, Exemption from GST.</p> <p>Unit 3: Time and Valuation of Supply</p> <p>Time of supply of Goods and Services, Valuation rules for Goods and Services, Taxability of reimbursement of expenses.</p> <p>Unit 4: Tax Credit and Payment of GST</p> <p>Eligibility, Apportionments of Credits, Tax credit in respect of capital goods, Availability of tax credit in special circumstances, Transfer of Input credit (Input Service Distribution).</p>	06(5-1-0) CA- 15+ESE-60	R. Dinda	04	4x15= 60
	<p>Unit 5: Customs Law</p> <p>Basic concepts of Customs Law: Territorial waters, High seas, Types of custom duties – Basic, Countervailing & Anti- Dumping Duty, Safeguard Duty, Valuation, Customs Procedures, Import and Export Procedures, Baggage, Exemptions.</p>		S. Adak	02	2x15= 30
DSE3T	Business Tax Procedure and Management				
	<p>Unit 1:</p> <p>Advance payment of tax; Tax deduction/collection at source, documentation, returns, certificates; Interest payable by Assessee/Government; Collection and recovery of tax</p> <p>Unit 2:</p> <p>Assessment, re-assessment, rectification of mistakes. Appeals and revisions. - Preparation and filing of appeals with appellate authorities. - Drafting of appeal; statement of facts and statement of law.</p> <p>Unit 3:</p> <p>Penalties and prosecutions, Settlement Commission, Search, seizure and survey</p> <p>Unit 4:</p> <p>Transactions with persons located in notified jurisdictional area; General anti-avoidance rule Tax clearance certificate; Securities transaction tax</p> <p>Unit 5:</p> <p>Information Technology and Tax administration. TAN (Tax Deduction and Collection Account Number), TIN (Tax Information</p>	06(5-1-0) CA- 15+ESE-60	A. Tripathi	06	6x15= 90

	Network), e-TDS/e-TCS Suggested Readings:				
DSE4T	Business Research Methods and Project Work				
	<p>Section A: Business Research Methods</p> <p>Unit 1: Introduction Meaning of research; Scope of Business Research; Purpose of Research – Exploration, Description, Explanation; Unit of Analysis – Individual, Organization, Groups, and Data Series; Conception, Construct, Attributes, Variables, and Hypotheses</p> <p>Unit 2: Research Process An Overview; Problem Identification and Definition; Selection of Basic Research Methods- Field Study, Laboratory Study, Survey Method, Observational Method, Existing Data Based Research, Longitudinal Studies, Panel Studies</p> <p>Unit 3: Measurement and Hypothesis Testing Measurement: Definition; Designing and writing items; Uni-dimensional and Multi- dimensional scales; Measurement Scales- Nominal, Ordinal, Interval, Ratio; Ratings and Ranking Scale, Thurstone, Likert and Semantic Differential scaling, Paired Comparison; Sampling –Steps, Types, Sample Size Decision; Secondary data sources</p> <p>Hypothesis Testing: Tests concerning means and proportions; ANOVA, Chi-square test and other Non-parametric tests . Testing the assumptions of Classical Normal Linear Regression</p>	06(5-1-0) CA- 15+ESE-60	S. Adak	03	3x15= 45
	<p>Section B: Project Report</p> <p>Report Preparation</p> <ol style="list-style-type: none"> 1. Project report to be prepared as assigned by the respective teacher/s of the concern colleges. 2. The students have to prepare the report following the standard procedure of project report writing and should give the reference and bibliography following APA style. 3. Viva-Voce. 		R. Giri	03	3x15= 45

Department of Mathematics (UG)

UG	Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Teacher Name	Allotted Topic /Unit	Weekly Class Hour	Total Class Hours
SEM I	C1T	Calculus, Geometry & Differential Equations	75 (CA-05 CIA-10 End SEM - 60)	6	Dr. Kalipada Maity	Differential equations	2	28
					Santu Hati	Calculus	2	28
					Goutam Mandal	Integral Calculus	2	28
					Subham Maity	Geometry	4	56
	C2T	Algebra	75 (CA-05 CIA-10 End SEM - 60)	6	Dr. Manoranjan De	Unit-1	2	28
					Suman Kr. Giri	Unit-2	3	42
					Debraj Manna	Unit-3 & Unit-4	2	28
	GE1	Calculus, Geometry & Differential Equation	75 (CA-05 CIA-10 End SEM - 60)	6	Debraj Manna	All Units	5	70
	Pure Pass DSC-1A	Differential Calculus	75 (CA-05 CIA-10 End SEM - 60)	6	Goutam Mandal	All Units	4	56
SEM		Theory of			Dr. Kalipada Maity	Metric Spaces	2	28

III	C5T	Real Functions & Introduction to Metric Spaces	75 (CA-05 CIA-10 End SEM - 60)	6	Bikash Panda	Theory of Real Functions	3	42	
					Hiranmay Manna	Theory of Real Functions	2	28	
					SubhamMaity	Metric space	1	14	
	C6T	Group Theory I	75 (CA-05 CIA-10 End SEM - 60)	6	Goutam Mandal	All Units	6	84	
	C7T	Numerical Methods	55 (CA-05 CIA-10 End SEM - 40)	4	Dr. Manoranjan De	Theory part of Numerial Methods	4	56	
			20	2	SantuHati	Practical Part using MATLAB	2	28	
	SEC I	Logic & Sets	50 (CA-05 CIA-05 End SEM - 40)	2	Suman Kr. Giri	All Units	2	28	
	Pure Pass C7 (DSC 1C)	Real Analysis	75 (CA-05 CIA-10 End SEM - 60)	6	SubhamMaity	All Units	4	56	
	Pure SEC I	Logic & Sets	50 (CA-05 CIA-05 End SEM - 40)	2	Suman Kr. Giri	All Units	2	28	
	SEM V	C11	Partial Differential Equations & Applications	75 (CA-05 CIA-10 End SEM - 60)	6	Dr. KalipadaMaity	Unit 1,2,3	3	42
						Suman Kr. Giri	Unit 4	4	56
		C12	Group Theory	75	6	Hironmay Manna	All unit	3	42

		II	(CA-05 CIA-10 End SEM - 60					
	DSE-1	Probability and Statistics	75 (CA-05 CIA-10 End SEM - 60	6	Debraj Manna	Unit 1,2,3	4	56
						Unit 4	2	28
	DSE 2	Linear Programming	75 (CA-05 CIA-10 End SEM - 60	6	Dr. Manoranjan De	Unit 2,3	4	56
						Unit 1	2	28
UG	Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Teacher Name	Allotted Topic /Unit	Weekly Class Hour	Total Class Hours
SEM II	C3T	Real Analysis	75 (CA-05 CIA-10 End SEM - 60)	6	SantuHati	Unit 1,2	3	42
					Dr. Manoranjan De	Unit 3,4	3	42
	C4T	Differential Equation& vector Calculus	75 (CA-05 CIA-10 End SEM - 60)	6	Suman Kr. Giri	Unit-1,2	3	42
					GoutamMondal	Unit-3,	2	28
					Subham Maity	Unit-4	2	28
					Dr. KalipadaMaity	Unit-5	2	28
	GE2	Algebra	75 (CA-05 CIA-10 End SEM - 60)	6	Debraj Manna	All Units	4	56
					Hironmay Manna		1	14
	C8T	Riemann Integration and series of function	75 (CA-05 CIA-10 End SEM - 60)	6	Hironmay Manna	Unit- 2,4	4	56
					BikashPanda	Unit-3,	2	28
					SantuHati	Unit-1	2	28
	C9T	Multivariate Calculus	75 (CA-05 CIA-10 End SEM - 60)	6				
					Dr Manoranjan De	Unit-3	2	28
					Goutam Mondal	Unit-4	5	70

SEM IV	C10T	Ring Theory and Linear Algebra - I	75 (CA-05 CIA-10 End SEM - 60)	6	Debraj Manna	Unit-1,2,3,4	4	56
	SEC-2	Graph Theory	50 (CA-05 CIA-05 End SEM - 40)	2	Suman Kr Giri	All Unit	3	42
	GE-4							

UG	Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Teacher Name	Allotted Topic /Unit	Weekly Class Hour	Total Class Hours
SEM VI	C13T	Metric Space and Complex Analysis	75 (CA-05 CIA-10 End SEM - 60)	6	Subham Maity	Unit-3,4,	2	24
					SantuHati	Unit- 5,6	2	24
					BikashPonda	Unit-1,2	2	28
	C14T	Ring Theory and Linear Algebra II	75 (CA-05 CIA-10 End SEM - 60)	6	Debraj Manna	Unit-1	1	14
					Hironmay Manna	Unit-2,3	2	28
	DSE-3	Mechanics	75 (CA-05 CIA-10 End SEM - 60)	6	Debraj Manna	Unit-1,2	2	28
					Suman Kr. Giri	Unit-3	2	28
	DSE-4	Mathematical Modeling	50 (CA-05 CIA-05 End SEM - 40)	6	Dr. KalipadaMaity	Unit- 1	1	14
					Dr. Manoranjan De	Unit-2	2	28

Department of Mathematics (PG)

PG	Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Teacher Name	Allotted Topic /Unit	Weekly Class Hour	Total Class Hours
SEM I	MTM-101	Real Analysis	50	4	Hironmay Manna	All Units	4	56
	MTM-102	Complex Analysis	50	4	Goutam Kr Mondal	All Units	4	56
	MTM-103	Ordinary Differential Equations and Special Functions	50	4	Dr. Kalipada Maity	Unit-II	3	42
					SantuHati	Unit-1	3	42
	MTM-104	Advanced Programming in C and MATLAB	50	4	Dr. Manoranjan De	Unit - I	2	28
					SubhamMaity	Unit-II	2	28
	MTM-105	Classical Mechanics and non linear Dynamics	50	4	BikashPonda	All Unit	4	56
	MTM-106	Graph Theory	25	2	Hironmay Manna	All	2	28
	MTM-197	Lab1(Computational Methods : Using MATLAB)	25	2	SubhamMaity	All	2	28

PG	Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Teacher Name	Allotted Topic /Unit	Weekly Class Hour	Total Class Hours
SEM III	MTM-301	Partial Differential Equations and Generalized Functions	50	4	SantuHati	Unit -I	4	56
	MTM-302	Transforms and Integral Equations	50	4	Hironmay Manna	Unit-I	3	42
					GoutamMondal	Unit-II	2	28
	MTM-303	Dynamical Oceanology and Meteorology	25	2	Debraj Manna	All	3	42
		Operations Research	25	2	BikashPonda	All	2	28
	MTM-304	CBCS(Bengali)	50	4	Dr. Goutam Barman Rajesh Khan	All	4	56
	MTM-305B	Sp Paper-OR: Advanced Optimization and Operations Research	50	4	Dr. Manoranjan De	All	4	56
	MTM-306B	Sp paper OR: Operational Research Modelling -I	50	4	Dr. KalipadaMaity	All	3	42

	MTM-201	Fluid Mechanics	50	4	SantuHati	All	4	56
	MTM-202	Numerical Analysis	50	4	Dr. Kalipada Maity	All	4	56
	MTM-203	Unit-1: Abstract Algebra	25	2	Goutam Mondal	Unit -I	2	28
		Unit-2: Linear Algebra	25	2	BikashPanda	Unit-II	2	28

SEM II	C-MTM-204	Bengali	50	4	Dr. Pintu Ray Choudhuri & Pranab Mahapatra	All	4	56
	MTM-205	General theory of Continuum Mechanics	50	4	Suman Kr. Giri + Subham Maity	All	4	56
	MTM-206	General Topology	25	2	Hironmay Manna	All	2	28
	MTM-297	Lab 2: (Language C Programming with Numerical methods)	25	2	Dr. Manoranjan De	All	3	42

SEM IV	MTM-401	Functional Analysis	50	4	Dr. Arpan Dhara + Dr. Kalipada Maity	All	4	56
	MTM-402	Fuzzy Mathematics with applications	25	2	Dr. Manoranjan De	Unit -1	2	28
		Soft Computing	25	2	Dr. Manoranjan De	Unit-2	2	28
	MTM-403	Magneto Hydro Dynamics	25	2	Goutam Mondal	Unit -I	2	28
		Stochastic Process and Regression	25	2	Dr. Kalipada Maity	Unit-II	2	28
	MTM-404 A	Special Paper OM : Computational Oceanology	50	4	NA			
	MTM-405 A	Special Paper OM Dynamical Metrology II	25	4	NA			
	MTM-495A	Special Paper OM:Lab: Dynamical Metrology	25	2	NA			
	MTM-404B	Special Paper OR: Non linear Optimization	50	4	Bikash Panda	All	4	56
	MTM-405 B	Special Paper OR: Operational Research Modelling - II	25	2	Santu Hati	All	2	28
	MTM-495 B	Special Paper OR Lab (using MATLAB & LINGO)	25	2	Subham Maity	All	2	28
	MTM-	Dissertation	50	4	All Teachers	-	6	84

	406	Project Work						
--	-----	--------------	--	--	--	--	--	--

DEPARTMENT OF CHEMISTRY

Semester	Paper	Topic	Teacher's name	Total Credit	Total Allotted Marks	Weekly Class Hours	Total Class Hours
SEM-I	C1T (Organic Chemistry)	<u>Basics of Organic Chemistry –</u> 1. Bonding and Physical Properties 2. General Treatment of Reaction Mechanism	Dr. Bidhan Chandra Samanta	4	55 (T-40, CA -5, CIA - 10)	2	35
		Stereochemistry – 1 (total)	Goutam Kumar Jana			2	25
	C2T (Physical Chemistry)	Chemical Thermodynamics	Ribhu Maity	4	55 (T-40, CA -5, CIA - 10)	2	25
		1. Kinetic Theory and Gaseous State 2. Chemical Kinetics	Mrigendu Midya			2	35
	C1P (Organic Chemistry lab)	1. Separation of organic compound using solubility. 2. Boiling point of organic liquid compound. 3. Identification of a pure organic compound.	Goutam Kumar Jana	2	20	4	60
	C2P (physical Chemistry lab)	1. Heat of neutralization of a strong acid by a strong base.	Ribhu Maity				

		2. Study of kinetics of decomposition of H ₂ O ₂ 3. Heat of solution of oxalic acid from solubility measurement.	Mrigendu Midya	2	20	2	60
		1. PH of unknown Buffer Solution . 2. Study of kinetics of decomposition of H ₂ O ₂ .				2	
	GE-1T	1. Atomic structure 2. Chemical periodicity 3. Acid and bases 4. Redox reactions	Minakshi Maity	4	55 (T-40, CA - 5, CIA - 10)	2	30
		1. Fundamentals of organic chemistry 2. Stereochemistry 3. Nucleophilic substitution and Elimination Reactions 4. Aliphatic Hydrocarbons	Goutam Kumar Jana			1	30
	GE-1P	1. Estimation of sodium carbonate and sodium hydrogen carbonate. 2. Estimation oxalic acid by KMnO ₄ . 3. Estimation of water of crystallization in Mohr's salt by KMnO ₄ . 4. Estimation of	Minakshi Maity				

		Fe(II) by $K_2Cr_2O_7$. 5. Estimation of Cu(II) by $Na_2S_2O_3$.		2		2	60
		1. Detection special element 2. Detection of functional groups	Dr. Bidhan Chandra Samanta			2	
SEM II	C3T (Inorganic Chemistry)	1. Extra nuclear structure of atom 2. Redox reactions and precipitation reactions.	Dr. Narottam Sutradhar	4	55 (T-40, CA - 5, CIA - 10)	2	36
		1. Chemical Periodicity 2. Acid – Base reactions.	Minakshi Maity			2	24
	C3P (Inorganic Chemistry lab)	1. Acid and Base Titrations 2. Oxidation – Reduction Titrimetric	Dr. Narottam Sutradhar	2	20	4	60
	C4T (Organic Chemistry)	Stereochemistry II	Goutam Kumar Jana	4	55 (T-40, CA - 5, CIA - 10)	2	20
		1. General Treatment of reaction Mechanism II 2. Substitution and Elimination reactions	Dr. Bidhan Chandra Samanta			2	40
	C4P (Organic Chemistry lab)	Organic Preparations	Goutam Kumar Jana	2	20	4	60
	GE-2T	Kinetic theory of gases and real gases	Ribhu Maity	4	55 (T-40, CA - 5, CIA - 10)	1	10
		1. Liquids 2. Solids 3. Chemical kinetics	Mrigendu Midya			1	20
		1. Chemical Bonding and Molecular Structure	Minakshi Maity			1	30

		2. Comparative study of P-block elements					
	GE-2P	1. Surface tension measurements. 2. Viscosity measurements. 3. Kinetics Study	Mrigendu Midya	2	20	2	60
		Qualitative study of Acid and Basic Radicals	Minakshi Maity			2	
SEM III	C5T (Physical Chemistry)	1. Viscosity 2. Chemical Equilibrium 3. Partial properties and Chemical Potential	Mrigendu Midya	4	55 (T-40, CA - 5, CIA - 10)	2	25
		1. Conductance and transport number. 2. Fick's law 3. Foundation of Quantum Mechanics.	Ribhu Maity			2	35
	C5P (Physical Chemistry lab)	1. Viscosity measurements. 2. Determination of Partition Coefficient. 3. Determination of equilibrium constant using partition coefficient.	Mrigendu Midya	2	20	2	60
		1. Conductometric titration. 2. Study of saponification. 3. Verification of Ostwald's dilution law.	Ribhu Maity			2	
	C6T (Inorganic Chemistry)	Chemical Bonding -I	Minakshi Maity	4	55 (T-40, CA - 5, CIA - 10)	2	24
		1. Chemical Bonding –II. 2. Radioactivity	Dr. Narottam Sutradhar			2	36
	C6P (Inorganic Chemistry lab)	1. Iodimetric Titrations .	Minakshi Maity	2	20	4	60
		2. Estimation of metal content in some selective samples (Brass,					

		Steel, Cement)					
	C7T (Organic Chemistry)	1. Chemistry of alkenes and alkynes. 2. Aromatic Substitution.	Goutam Kumar Jana	4	55 (T-40, CA -5, CIA -10)	2	25
		1. Carbonyl and Related Compounds 2. Organometallics	Dr. Bidhan Chandra Samanta			2	35
	C7P (Organic Chemistry lab)	Qualitative analysis of single solid organic compounds	Dr. Bidhan Chandra Samanta	2	20	4	60
	SEC1T	1. Drugs and Pharmaceuticals. 2. Fermentation.	Dr. Bidhan Chandra Samanta	2	50 (T-25, P-15, CA -5, CIA -5)	2	30
	SEC1P	1. Preparation of Aspirin and its analysis. 2. Preparation of magnesium bisilicate .	Dr. Bidhan Chandra Samanta			2	30
	GE -3T	Chemical Energetics	Ribhu Maity	4	55 (T-40, CA -5, CIA -10)	1	14
		1. Chemical Equilibrium. 2. Ionic Equilibria .	Mrigendu Midya			1	16
		1. Aromatic Hydrocarbons 2. Organometallic Compounds 3. Aryl Halides 4. Alcohols, phenols, ether 5. Carbonyl Compounds.	Dr. Bidhan Chandra Samanta & Goutam Kumar Jana			1	30
	GE-3P	1. Determination of heat capacity of Calorimeter for different volumes. 2. Determination of enthalpy of ionization. 3. Determination of enthalpy of neutralization.	Ribhu Maity	2	20	2	60

		1. Find the PH of an unknown buffer solution. 2. Study of the solubility of benzoic acid in water.	Mrigendu Midya			2	
SEM - IV	C8T (Physical Chemistry)	1. Electromotive Force. 2. Quantum Chemistry.	Ribhu Maity	4	55 (T-40, CA - 5, CIA - 10)	2	36
		1. Colligative Properties 2. Phase rule 3. Binary solutions. 4. Ionic equilibria.	Mrigendu Midya			2	24
	C.8P (Physical Chemistry lab)	1. Determination of solubility of sparingly soluble salt in water. 2. Determination of solubility product .3. Effect of ionic strength on the rate of Persulphate – Iodide reaction.	Ribhu Maity	2	20	2	60
		1. Potentiometric titration of Mohr's salt . 2. Study of phenol – Water phase diagram. 3. PH - metric titration of acid against base.	Mrigendu Midya			2	
	C.9T (Inorganic Chemistry)	1. General Principle of Metallurgy 2. Inorganic Polymers 3. Coordination Chemistry – 1.	Dr. Narottam Sutradhar	4	55 (T-40, CA - 5, CIA - 10)	2	36
		1. Chemistry of s and p Block elements .2. Nobel Gases .	Minakshi Maity			2	24
	C9P (Inorganic Chemistry lab)	1.Complexometric titration 2.Inorganic Preparation	Dr. Narottam Sutradhar	2	20	4	60
	C10T (Organic	1.Nitrogens Compound	Goutam Kumar Jana	4	55 (T-40, CA -	2	36

	Chemistry)	2.Rearrangements			5, CIA - 10)		
		1.Organic Synthesis 2.Organic Spectroscopy	Dr. Bidhan Chandra Samanta			2	24
	C10P (Organic Chemistry lab)	Quantitative Estimations	Dr. Bidhan Chandra Samanta	2	20	4	60
	SEC -2T	Pesticides Chemistry	Dr. Bidhan Chandra Samanta	2	50 (T-25, P-15, CA -5, CIA -5	2	30
	SEC -2P	Determination of PH, acidity, alkalinity, ion exchange capacity. TLC, ion exchange paper chromatography method, Complexometric titration. Or Preparation	Dr. Bidhan Chandra Samanta			2	30
	GE4T	Solutions and Phase equilibrium	Mrigendu Midya	4	55 (T-40, CA -5, CIA -10)	1	18
		Conductance and Electrochemistry	Ribhu Maity			1	12
		Analytical and Environmental Chemistry	Goutam Kumar Jana			1	30
	GE4 P	Distribution law , Phase equilibria	Mrigendu Midya	2		2	60
		Conductance , Potentiometry titration	Ribhu Maity			2	
	C11T (Inorganic Chemistry)	Coordination Chemistry-II	Dr. Narottam Sutradhar	4	55 (T-40, CA -5, CIA -10)	2	36
		Chemistry of d- and f- block elements	Minakshi Maity			2	24
	C11P (Inorganic Chemistry lab)	Chromatography of metal ions, Gravimetry and spectrophotometric method.	Dr. Narottam Sutradhar	2	20	4	60
	C12T	Carbocycles and	Dr. Bidhan	4	55 (T-	2	36

	(Organic Chemistry)	Heterocycles , Cyclic Stereochemistry ,Pericyclic reactions	Chandra Samanta		40, CA - 5, CIA - 10)		
		Carbohydrates , Bio-molecules	Goutam Kumar Jana			2	24
	C12P (Organic Chemistry lab)	Chromatographic Separations ,Spectroscopic Analysis of Organic Compounds	Dr. Bidhan Chandra Samanta	2	20	4	60
	DSE-1T	Crystal Structure , Polymers	Mrigendu Midya	4	55 (T-40, CA - 5, CIA - 10)	2	24
		Statistical Thermodynamics	Ribhu Maity			2	36
	DSE-1P	Computer programs based on numerical methods	Ribhu Maity	2	20	4	60
	DSE-2T	Analytical Methods in Chemistry Or Instrumental Methods of Chemical Analysis	Dr. Bidhan Chandra Samanta	4	55 (T-40, CA - 5, CIA - 10)	2	60
	DSE-2P	Separation Techniques , Solvent Extractions , Spectrophotometry Or Instrumental Methods of Chemical Analysis	Dr. Bidhan Chandra Samanta			4	60
SEM-VI	C13T (Inorganic Chemistry)	Bioinorganic Chemistry , Reaction Kinetics and Mechanism	Dr. Narottam Sutradhar	4	55 (T-40, CA - 5, CIA - 10)	2	36
		Organometallic Chemistry	Minakshi Maity			2	24
	C13P (Inorganic Chemistry lab)	Qualitative Analysis	Dr. Narottam Sutradhar	2	20	4	60
	C14T	Molecular Spectroscopy ,	Ribhu	4	55 (T-40, CA -	2	36

	(Physical Chemistry)	Surface phenomenon	Maity		5, CIA - 10)		
		Photochemistry	Mrigendu Midya			2	24
	C14P (physical Chemistry lab)	Determination of surface tension and CMC	Mrigendu Midya	2	20	2	60
		Verification of Beer and Lambert's Law , Study of kinetics of $K_2S_2O_8 + KI$ reaction , Determination of pH of unknown buffer and CMC spectrophotometrically	Ribhu Maity			2	
	DSE3T	Inorganic Materials of Industrial Importance	Dr. Bidhan Chandra Samanta	4	55 (T-40, CA - 5, CIA - 10)	4	60
	DSE3P	1. Determination of free acidity in ammonium sulphate fertilizer. 2. Estimation of Calcium in Calcium ammonium nitrate fertilizer. 3. Estimation of phosphoric acid in superphosphate fertilizer. 4. Electrolysis metallic coatings on ceramic and plastic material. 5. Determination of composition of dolomite (by complexometric titration). 6. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples. 7. Analysis of Cement. 8. Preparation of	Dr. Bidhan Chandra Samanta	2	20	4	60

		pigment (zinc oxide).					
	DSE4T	Polymer Chemistry	Mrigendu Midya & Ribhu Maity	4	55 (T-40, CA - 5, CIA - 10)	4	60
	DSE4P	Polymer characterization, Polymer analysis.	Dr. Bidhan Chandra Samanta	2	20	4	60

Department of Physics

Physics (Hons)				
Course	Course content/Syllabus	Credit/Marks	Allotted Teachers	Class allotted per week
SEMESTER I				
C1T	Mathematical Physics Calculus Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value	04	Dr. Wadut Shaikh	02

	<p>Problems. Particular Integral.</p> <p>Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.</p> <p>Introduction to Probability</p> <p>Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance. Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing.</p> <p>Vector Calculus</p> <p>Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields.</p> <p>Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities.</p> <p>Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs).</p> <p>Orthogonal Curvilinear Coordinates</p> <p>Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian</p> <p>Dirac Delta function and its properties</p> <p>Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.</p>		Gourchand Manna	02
C1P	<p>Mathematical Physics Lab</p> <p>Introduction and Overview of Computer architecture and organization</p> <p>Basics of scientific computing</p> <p>Errors and error Analysis</p> <p>Introduction to plotting graphs with Gnuplot</p> <p>Introduction to programming in python</p> <p>Basic Programs</p> <p>Random number generation</p>	02	Dr. Wadut Shaikh	04

	<p>Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods</p> <p>Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation</p> <p>Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method</p> <p>Solution of Ordinary Differential Equations (ODE) First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods</p>			
C2T	<p>Mechanics</p> <p>Fundamentals of Dynamics</p> <p>Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean invariance. Momentum of variable-mass system: motion of rocket. Motion of a projectile in Uniform gravitational field Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse.</p> <p>Work and Energy</p> <p>Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Qualitative study of one dimensional motion from potential energy curves. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.</p> <p>Collisions</p> <p>Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames</p> <p>Rotational Dynamics</p> <p>Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.</p>	04	Debasish Das	01
	<p>Elasticity</p> <p>Relation between Elastic constants. Twisting torque on a Cylinder or Wire.</p> <p>Fluid Motion</p> <p>Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube.</p> <p>Gravitation and Central Force Motion</p> <p>Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid</p>		Arpita Das	02

	<p>sphere. 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. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).</p> <p>Oscillations SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor.</p> <p>Non-Inertial Systems Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.</p> <p>Special Theory of Relativity Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum.</p>		Sourav Panda	01
C2P	<p>Mechanics Lab</p> <p>General Topic Discussion on random errors in observations.</p> <p>List of Practical</p> <ol style="list-style-type: none"> 1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope. 2. To study the random error in observations. 3. To determine the height of a building using a Sextant. 4. To study the Motion of Spring and calculate, (a) Spring constant, (b) g and (c) Modulus of rigidity. 5. To determine the Moment of Inertia of a Flywheel. 6. To determine g and velocity for a freely falling body using Digital Timing Technique 7. To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). 8. To determine the Young's Modulus of a Wire by Optical Lever Method. 9. To determine the Modulus of Rigidity of a Wire by Maxwell's needle. 10. To determine the elastic Constants of a wire by Searle's method. 11. To determine the value of g using Bar Pendulum. 12. To determine the value of g using Kater's Pendulum. 	02	Gourchand Manna	04

	<p>Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves.</p> <p>Wave Optics Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence.</p> <p>Interference Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.</p> <p>Interferometer Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.</p> <p>Diffraction and Holography Kirchhoff's Integral Theorem, Fresnel-Kirchhoff's Integral formula. (Qualitative discussion only) Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. Holography: Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms.</p>		Gourchand Manna	01
C4P	<p>Wave and Optics Lab</p> <p>List of Practical</p> <ol style="list-style-type: none"> 1. To determine the frequency of an electric tuning fork by Melde's experiment and verify $\lambda^2 - T$ law. 2. To investigate the motion of coupled oscillators. 3. To study Lissajous Figures. 4. Familiarization with: Schuster's focusing; determination of angle of prism. 5. 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 source. 7. To determine the wavelength of sodium source using Michelson's interferometer. 8. To determine wavelength of sodium light using Fresnel Biprism. 9. To determine wavelength of sodium light using Newton's Rings. 10. To determine the thickness of a thin paper by measuring the width of the interference fringes produced 	02	Gourchand Manna	04

	<p>by a wedge-shaped Film.</p> <p>11. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.</p> <p>12. To determine dispersive power and resolving power of a plane diffraction grating.</p>			
C5T	<p>Mathematical Physics-II</p> <p>Fourier Series</p> <p>Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity.</p> <p>Frobenius Method and Special Functions</p> <p>Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite and Laguerre Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. 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 ($J_0(x)$ and $J_1(x)$) and Orthogonality.</p>	04	Dr. Wadut Shaikh	02
	<p>Some Special Integrals</p> <p>Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral).</p> <p>Variational calculus in physics</p> <p>Functionals. Basic ideas of functionals. Extremization of action as a basic principle in mechanics. Lagrangian formulation. Euler's equations of motion for simple systems: harmonics oscillators, simple pendulum, spherical pendulum, coupled oscillators. Cyclic coordinates. Symmetries and conservation laws. Legendre transformations and the Hamiltonian formulation of mechanics. Canonical equations of motion. Applications to simple systems.</p> <p>Partial Differential Equations</p> <p>Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes. Diffusion Equation.</p>		Rupam Mal	02

C5P	<p>Mathematical Physics II Lab</p> <p>Introduction to Numerical computation using numpy and scipy</p> <p>Introduction to the python numpy module. Arrays in numpy, array operations, array item selection, slicing, shaping arrays. Basic linear algebra using the linalg submodule. Introduction to online graph plotting using matplotlib. Introduction to the scipy module. Uses in optimization and solution of differential equations. Introduction to OCTAVE (if time permits)</p> <p>Curve fitting, Least square fit, Goodness of fit, standard deviation</p> <p>Ohms law to calculate R, Hooke's law to calculate spring constant</p> <p>Solution of Linear system of equations by Gauss elimination method and Gauss Seidal method. Diagonalization of matrices, Inverse of a matrix, Eigen vectors, eigen values problems</p> <p>Solution of mesh equations of electric circuits (3 meshes) Solution of coupled spring mass systems (3 masses)</p> <p>Generation of Special functions using User defined functions</p> <p>Generating and plotting Legendre Polynomials Generating and plotting Generating and Bessel function</p> <p>Solution of ODE First order Differential equation Euler, modified Euler and Runge- Kutta second order methods Second order differential equation Fixed difference method</p> <p>First order differential equation</p> <ol style="list-style-type: none"> 1. Radioactive decay 2. Current in RC, LC circuits with DC source 3. Newton's law of cooling 4. Classical equations of motion Second order Differential Equation 5. Harmonic oscillator (no friction) 6. Damped Harmonic oscillator 7. Over damped 8. Critical damped 9. Oscillatory 10. Forced Harmonic oscillator 11. Transient and Steady state solution 12. Apply above to LCR circuits also 13. Solve $x^2 \frac{d^2 y}{dx^2} - 4x(1+x) \frac{dy}{dx} + 2(1+x)y = x^3$ with the boundary condition at $x = 1, y = \frac{1}{2}e^2, \frac{dy}{dx} = -\frac{3}{2}e^2 - 0.5$, in the range $1 \leq x \leq 3$. Plot y and $\frac{dy}{dx}$ against x in the given range in 	02	Dr. Wadut Shaikh	04
-----	--	----	------------------	----

	<p>the same graph.</p> <p>Partial differential equations</p> <ol style="list-style-type: none"> 1. Wave equation 2. Heat equation 3. Poisson equation 4. Laplace equation 			
C6T	<p>Thermal Physics</p> <p>Introduction to Thermodynamics</p> <p>Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient.</p> <p>Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence.</p> <p>Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale.</p> <p>Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Temperature–Entropy diagrams for Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero.</p> <p>Thermodynamic Potentials</p> <p>Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature. Magnetic Work, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations</p>	04	<p>Debasish Das</p> <p>Arpita Das</p>	<p>02</p> <p>02</p>

	<p>Maxwell's Thermodynamic Relations</p> <p>Derivations and applications of Maxwell's Relations, Maxwell's Relations: (1) Clausius Clapeyron equation, (2) Values of $C_p - C_v$, (3) TdS Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process.</p> <p>Kinetic Theory of Gases</p> <p>Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Doppler Broadening of Spectral Lines and Stern's Experiment. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases.</p> <p>Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance.</p> <p>Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO₂ Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. P-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule-Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule-Thomson Cooling.</p>			
C6P	<p>Thermal Physics Lab</p> <p>List of Practical</p> <ol style="list-style-type: none"> 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 Cu by Angstrom's Method. 4. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method. 5. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT). 6. To study the variation of Thermo-Emf of a Thermocouple with Difference of Temperature of its Two Junctions. 7. To calibrate a thermocouple to measure temperature in a specified Range using (1) Null Method, (2) Direct measurement using Op-Amp difference amplifier and to determine Neutral 	02	Arpita Das	04

	Temperature			
C7T	<p>Digital Systems and Applications</p> <p>Integrated Circuits</p> <p>Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs.</p> <p>Digital Circuits</p> <p>Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers.</p> <p>Boolean algebra</p> <p>De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map.</p> <p>Data processing circuits</p> <p>Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.</p> <p>Circuits</p> <p>Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor.</p> <p>Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop.</p> <p>Timers</p> <p>C 555: block diagram and applications: Astable multivibrator and Monostable multivibrator.</p> <p>Shift registers</p> <p>Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).</p>	04	Sourav Panda	04

	<p>Counters (4 bits)</p> <p>Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter.</p> <p>Computer Organization</p> <p>Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map</p>			
C7P	<p>Digital Systems and Applications Lab</p> <p>List of practical</p> <ol style="list-style-type: none"> 1. To measure (a) Voltage, and (b) Time period of a periodic waveform using CRO. 2. To test a Diode and Transistor using a Multimeter. 3. To design a switch (NOT gate) using a transistor. 4. To verify and design AND, OR, NOT and XOR gates using NAND gates. 5. To design a combinational logic system for a specified Truth Table. 6. To convert a Boolean expression into logic circuit and design it using logic gate ICs. 7. To minimize a given logic circuit. 8. Half Adder, Full Adder and 4-bit binary Adder. 9. Half Subtractor, Full Subtractor, Adder-Subtractor using Full Adder I.C. 10. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates. 11. To build JK Master-slave flip-flop using Flip-Flop ICs 12. To build a 4-bit Counter using D-type/JK Flip-Flop ICs and study timing diagram. 13. To make a 4-bit Shift Register (serial and parallel) using D-type/JK Flip-Flop ICs. 14. To design an astable multivibrator of given specifications using 555 Timer. 15. To design a monostable multivibrator of given specifications using 555 Timer. 	02	Sourav Panda	04
SEC1T	<p>Electrical Circuits and Network Skills</p> <p>Basic Electricity Principles</p> <p>Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multimeter, voltmeter and ammeter.</p> <p>Understanding Electrical Circuits</p> <p>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.</p>	02	Rupam Mal	02

	<p>Saving energy and money.</p> <p>Electrical Drawing and Symbols</p> <p>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.</p> <p>Generators and Transformers</p> <p>DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers.</p> <p>Electric Motors</p> <p>Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor</p> <p>Solid-State Devices</p> <p>Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources</p> <p>Electrical Protection</p> <p>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)</p> <p>Electrical Wiring</p> <p>Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board.</p>			
C8T	<p>Mathematical Physics III</p> <p>Complex Analysis</p> <p>Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem.</p>	04	Dr. Wadut Shaikh	02

	<p>Application in solving Definite Integrals.</p> <p>Integrals Transforms</p> <p>Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations.</p> <p>Matrices</p> <p>Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Upper-Triangular and Lower-Triangular Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew- Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix. Inner Product.</p> <p>Eigen-values and Eigenvectors</p> <p>Cayley- Hamilton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary Differential Equations. Functions of a Matrix.</p>		Modhumita Sahoo	02
C8P	<p>Mathematical Physics III Lab</p> <p>List of practical</p>	02	Dr. Wadut Shaikh	04

	<p>1. Solve differential equations:</p> $\frac{dy}{dx} = e^{-x} \text{ with } y = 0 \text{ for } x = 0$ $\frac{dy}{dx} + e^{-x} = x^2$ $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} = -y$ $\frac{d^2y}{dt^2} + e^{-t}\frac{dy}{dt} = -y$ <p>2. Dirac Delta Function:</p> <p>Evaluate $\frac{1}{\sqrt{2\pi\sigma^2}} \int e^{-\frac{(x-2)^2}{2\sigma^2}} (x+3) dx$, for $\sigma=1, .1, .01$ and show it tends to 5</p> <p>3. Fourier Series</p> <p>Program to sum $\sum_{n=1}^{\infty} (.2)^n$ Evaluate the Fourier coefficients of a given periodic function (square wave)</p> <p>4. Frobenius method and Special functions:</p> $\int_{-1}^{+1} P_n(\mu) P_m(\mu) d\mu = \delta_{n,m}$ <p>Plot $P_n(x), J_p(x)$</p> <p>Show recursion relation</p> <p>5. Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two).</p> <p>6. Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program.</p> <p>7. Evaluation of trigonometric functions e.g. $\sin \theta$, Given Bessel's function at N points find its value at an intermediate point. Complex analysis: Integrate $1/(x^2+2)$ numerically and check with computer integration</p> <p>8. Compute the nth roots of unity for $n = 2, 3$, and 4.</p> <p>9. Find the two square roots of $-5+12j$.</p> <p>10. Integral transform: FFT of e^{-x^2}</p>			
C9T	<p>Elements of Modern Physics</p> <p>Unit 1</p> <p>Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions.</p> <p>Unit 2</p> <p>Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction.</p> <p>Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.</p>	04	Rupam Mal	02

	<p>Unit 3</p> <p>One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier.</p> <p>Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.</p> <p>Unit 4</p> <p>Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy- momentum</p> <p>Conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.</p> <p>Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).</p> <p>Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. Basic lasing.</p>		Gourchand Manna	02
C9P	<p>Elements of Modern Physics Lab</p> <p>List of Practical</p> <ol style="list-style-type: none"> 1. Measurement of Planck's constant using black body radiation and photo-detector 2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light 3. To determine work function of material of filament of directly heated vacuum diode. 4. To determine the Planck's constant using LEDs of at least 4 different colours. 5. To determine the wavelength of H-alpha emission line of Hydrogen atom. 6. To determine the ionization potential of mercury. 7. To determine the absorption lines in the rotational spectrum of Iodine vapour. 8. To determine the value of e/m by (a) Magnetic focusing or 	02	Rupam Mal	04

	<p>(b) Bar magnet.</p> <ol style="list-style-type: none"> 9. To setup the Millikan oil drop apparatus and determine the charge of an electron. 10. To show the tunneling effect in tunnel diode using I-V characteristics. 11. To determine the wavelength of laser source using diffraction of single slit. 12. To determine the wavelength of laser source using diffraction of double slits. 13. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating 			
C10T	<p>Analog Systems and Applications</p> <p>Semiconductor Diodes</p> <p>P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. Current Flow Mechanism in Forward and Reverse Biased Diode.</p> <p>Two-terminal Devices and their Applications</p> <p>Rectifier Diode: Half-wave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, C-filter</p> <p>Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode and (3) Solar Cell.</p> <p>Bipolar Junction transistors</p> <p>n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.</p> <p>Field Effect transistors</p> <p>Basic principle of operations only.</p> <p>Amplifiers</p> <p>Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2- port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. Frequency response of a CE amplifier.</p> <p>Coupled Amplifier: Two stage RC-coupled amplifier.</p> <p>Feedback in Amplifiers: Effects of Positive and Negative Feedback on</p>	04	<p>Sourav Panda</p> <p>Arpita Das</p>	<p>02</p> <p>02</p>

	<p>Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise.</p> <p>Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators.</p> <p>Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground.</p> <p>Applications of Op-Amps: Linear - (1) Inverting and non-inverting amplifiers, (2) Adder, (3) Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. Non-linear – (1) inverting and non-inverting comparators, (2) Schmidt triggers.</p> <p>Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation)</p>			
C10P	<p>Analog Systems and Applications Lab</p> <p>List of Practical</p> <ol style="list-style-type: none"> 1. To study V-I characteristics of PN junction diode, and Light emitting diode. 2. To study the V-I characteristics of a Zener diode and its use as voltage regulator. 3. Study of V-I & power curves of solar cells, and find maximum power point & efficiency. 4. To study the characteristics of a Bipolar Junction Transistor in CE configuration. 5. To study the various biasing configurations of BJT for normal class A operation. 6. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias. 7. To study the frequency response of voltage gain of a RC-coupled transistor amplifier. 8. To design a Wien bridge oscillator for given frequency using an op-amp. 9. To design a phase shift oscillator of given specifications using BJT. 10. To study the Colpitt's oscillator. 11. To design a digital to analog converter (DAC) of given specifications. 12. To study the analog to digital convertor (ADC) IC. 13. To design an inverting amplifier using Op-amp (741,351) for dc voltage of given gain 14. To design inverting amplifier using Op-amp (741,351) and study its frequency response 15. To design non-inverting amplifier using Op-amp (741,351) & study its frequency response 16. To study the zero-crossing detector and comparator 17. To add two dc voltages using Op-amp in inverting and non-inverting mode 	02	Arpita Das	04

	<p>18. To design a precision Differential amplifier of given I/O specification using Op-amp.</p> <p>19. To investigate the use of an op-amp as an Integrator.</p> <p>20. To investigate the use of an op-amp as a Differentiator.</p> <p>21. To design a circuit to simulate the solution of a 1st/2nd order differential equation.</p>			
SEC2T	<p>Basic of Measurement</p> <p>Basic of Measurement</p> <p>Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.</p> <p>Electronic Voltmeter</p> <p>Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.</p> <p>Cathode Ray Oscilloscope</p> <p>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. Front panel controls. Specifications of a CRO and their significance.</p> <p>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.</p> <p>Signal Generators and Analysis Instruments</p> <p>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.</p> <p>Impedance Bridges & Q-Meters</p> <p>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.</p> <p>Digital Instruments</p> <p>Principle and working of digital meters. Comparison of analog &</p>	01	Dr. Wadut Shaikh	01

	<p>digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.</p> <p>Digital Multimeter</p> <p>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.</p>			
SEC2P	<p>Basic of Measurement Lab List of Practical</p> <p>A: The test of lab skills will be of the following test items</p> <ol style="list-style-type: none"> 1. Use of an oscilloscope. 2. CRO as a versatile measuring device. 3. Circuit tracing of Laboratory electronic equipment, 4. Use of Digital multimeter/VTVM for measuring voltages 5. Circuit tracing of Laboratory electronic equipment, 6. Winding a coil / transformer. 7. Study the layout of receiver circuit. 8. Trouble shooting a circuit 9. Balancing of bridges <p>B: Laboratory Exercises</p> <ol style="list-style-type: none"> 1. To observe the loading effect of a multimeter while measuring voltage across a lowresistance and high resistance. 2. To observe the limitations of a multimeter for measuring high frequency voltage andcurrents. 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. <p>C: Open Ended Experiments</p> <ol style="list-style-type: none"> 1. Using a Dual Trace Oscilloscope 2. Converting the range of a given measuring 	01	Dr. Wadut Shaikh	02

C11P	<p>Quantum Mechanics and Applications</p> <p>Schrodinger equation</p> <p>Time dependent Schrodinger equation and dynamical evolution of a quantumstate; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energyoperators; commutator of position and momentum operators; Expectation values of position and momentum.Wave Function of a Free Particle.</p> <p>Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues; expansion of anarbitrary wave function as a linear combination of energy eigen functions; General solution of the time dependent Schrodinger equation interms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wave function; Position- momentum uncertainty principle.</p> <p>General discussion of bound states in an arbitrary potential</p> <p>Continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermitepolynomials; ground state, zero point energy & uncertainty principle.</p>	04	Gourchan d Manna	02
	<p>Quantum theory of hydrogen-like atoms</p> <p>Time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angularmomentum operator & quantum numbers; Radial wave functions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angula rmomentum quantum numbers l and m;s,p,d,...shells</p> <p>Atoms in Electric & Magnetic Fields</p> <p>Electron angular momentum. Space quantization. Electron Spinand Spin Angular Momentum. Larmor's Theorem. Spin</p>		Rupam Mal	02

	<p>Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magnetron</p> <p>Atoms in External Magnetic Fields</p> <p>Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only).</p> <p>Many electron atoms</p> <p>Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic Table. Fine structure. Spin-orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms - L- S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.).</p>			
C11P	<p>List of Practical</p> <p>1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom:</p> $\frac{d^2y}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E] \text{ where } V(r) = -\frac{e^2}{r}$ <p>S wave Schrodinger equation for the ground state and the first excited state of the</p> <p>Downloaded from Vidyasaagar University by 42.110.151.98 on 05 April 2022 : 07:02:42. Copyright : Vidyasaagar University http://www.vidyasaagar.ac.in/DownloadDocs/SharePoint.aspx?File=UG_Syllabus_CGCS&BSC_HONORSPhysics_rmt00_122919.pdf</p> <p>hydrogen atom : Here, m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wavefunctions. Remember that the ground state energy of the hydrogen atom is ≈ -13.6 eV. Take $e = 3.795$ (eV Å)^{1/2}, $\hbar c = 1973$ (eV Å) and $m = 0.511 \times 10^6$ eV/c².</p> <p>2. Solve the s wave radial Schrodinger equation for an atom:</p> $\frac{d^2y}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$ <p>where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential</p> $V(r) = \frac{e^2}{r} e^{-r/a}$ <p>Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take $e = 3.795$ (eV Å)^{1/2}, $m = 0.511 \times 10^6$ eV/c², and $a = 3$ Å, 5 Å, 7 Å. In these units $\hbar c = 1973$ (eV Å). The ground state energy is expected to be above -12 eV in all three cases.</p> <p>3. Solve the s-wave radial Schrodinger equation for a particle of mass m:</p> $\frac{d^2y}{dr^2} = A(r)u(r), A(r) = \frac{2m}{\hbar^2} [V(r) - E]$ <p>For the anharmonic oscillator potential</p> $V(r) = \frac{1}{2}kr^2 + \frac{1}{3}br^3$ <p>for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose $m = 940$ MeV/c², $k = 100$ MeV fm⁻², $b = 0, 10, 30$ MeV fm⁻³ in these units, $\hbar c = 197.3$ MeV fm. The ground state energy is expected to lie between 90 and 110 MeV for all three cases.</p> <p>4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule:</p> $\frac{d^2y}{dr^2} = A(r)u(r), A(r) = \frac{2\mu}{\hbar^2} [V(r) - E]$ <p>Where μ is the reduced mass of the two atom system for the Morse potential</p> $V(r) = D(e^{-2\alpha r'} - e^{-\alpha r'}), r' = \frac{r - r_0}{r_0}$ <p>Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take $m = 940 \times 10^6$ eV/c², $D = 0.755501$ eV, $\alpha = 1.44$, $r_0 = 0.131349$ Å.</p> <p>Laboratory based experiments:</p> <ol style="list-style-type: none"> 1. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency 2. Study of Zeeman effect: with external magnetic field; 	02	Dr. Wadut Shaikh	04

	<p>Hyperfine splitting</p> <p>3. To show the tunneling effect in tunnel diode using I-V characteristics.</p> <p>4. Quantum efficiency of CCDs</p>			
C12T	<p>Solid State Physics</p> <p>Crystal Structure:</p> <p>Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis– Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg’s Law. Atomic and Geometrical Factor.</p> <p>Elementary Lattice Dynamics:</p> <p>Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit’s Law, Einstein and Debye theories of specific heat of solids. T₃ law</p> <p>Magnetic Properties of Matter:</p> <p>Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie’s law, Weiss’s Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.</p>	04	Debasish Das	02
	<p>Dielectric Properties of Materials</p> <p>Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeier relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes.</p> <p>Ferro electric Properties of Materials:</p> <p>Structural phase transition, Classification of crystals, Piezo electric effect, Pyro electric effect, Ferro electric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop.</p> <p>Elementary band theory</p> <p>Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient.</p>		Arpita Das	02

	<p>Superconductivity</p> <p>Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (Noderivation)</p>			
C12P	<p>Solid State Physics Lab</p> <p>List of Practicals</p> <ol style="list-style-type: none"> 1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method) 2. To measure the Magnetic susceptibility of Solids. 3. To determine the Coupling Coefficient of a Piezoelectric crystal. 4. To measure the Dielectric Constant of a dielectric Materials with frequency 5. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR) 6. To determine the refractive index of a dielectric layer using SPR 7. To study the PE Hysteresis loop of a Ferroelectric Crystal. 8. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis. 9. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150° C) and to determine its band gap. 10. To determine the Hall coefficient of a semiconductor sample. 	02	Debasish Das	04
DSE1T	<p>Classical Dynamics</p> <p>Classical Mechanics of Point Particles</p> <p>Review of Newtonian Mechanics; Application to the motion of a charge particle in external electric and magnetic fields- motion in uniform electric field, magnetic field- gyroradius and gyrofrequency, motion in crossed electric and magnetic fields. Generalized coordinates and velocities,</p> <p>Recap of Lagrangian and Hamiltonian mechanics. Applications: Hamiltonian for a harmonic oscillator, solution of Hamilton's equation for Simple Harmonic Oscillations; particle in a central force field- conservation of angular momentum and energy. Effective potential. The Laplace- Runge-Lenz vector.</p> <p>Small Amplitude Oscillations</p> <p>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.</p>	06	Sourav Panda	03

	<p>Special Theory of Relativity</p> <p>Postulates of Special Theory of Relativity. Lorentz Transformations. Minkowski space. The invariant interval, light cone and world lines. Space-time diagrams. Time-dilation, length contraction and twin paradox. Four-vectors: space-like, time-like and light-like. Four-velocity and acceleration. Metric and alternating tensors. Four-momentum and energy-momentum relation. Doppler effect from a four-vector perspective. Concept of four-force. Conservation of four-momentum. Relativistic kinematics. Application to two-body decay of an unstable particle.</p> <p>Fluid Dynamics</p> <p>Density ρ and pressure P in a fluid, an element of fluid and its velocity, continuity equation and mass conservation, stream-lined motion, laminar flow, Poiseuille's equation for flow of a liquid through a pipe, Navier-Stokes equation, qualitative description of turbulence, Reynolds number.</p>		Rupam Mal	03
DSE2T	<p>Nuclear and Particle Physics</p> <p>General Properties of Nuclei :</p> <p>Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excited states.</p> <p>Nuclear Models :</p> <p>Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force.</p> <p>Radioactivity decay :</p> <p>Alpha decay: basics of α-decay processes, theory of α- emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) β-decay: energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion.</p> <p>Particle physics :</p> <p>Particle interactions; basic features, types of particles and its families.</p>	06	Dr. Wadut Shaikh	03

	<p>Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons.</p>		Gourchand Manna	03
	<p>Nuclear Reactions :</p> <p>Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering).</p> <p>Interaction of Nuclear Radiation with matter :</p> <p>Energy loss due to ionization (Bethe- Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter.</p> <p>Detector for Nuclear Radiations :</p> <p>Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector.</p> <p>Particle Accelerators :</p> <p>Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons.</p>			
C13T	<p>Electromagnetic Theory</p> <p>Maxwell Equations</p> <p>Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density.</p> <p>EM Wave Propagation in Unbounded Media</p> <p>Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma,</p>	04	Arpita Das	02

	<p>electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere.</p> <p>EM Wave in Bounded Media</p> <p>Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal Incidence).</p> <p>Polarization of Electromagnetic Waves</p> <p>Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter.</p> <p>Wave guides</p> <p>Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission.</p> <p>Optical Fibres</p> <p>Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only).</p>		Debasish Das	02
C13P	<p>Electromagnetic Theory (Lab)</p> <p>List of Practical</p> <ol style="list-style-type: none"> 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. To study dependence of radiation on angle for a simple Dipole antenna. 	02	Debasish Das	04

	Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas, White Dwarf Stars, Chandrasekhar Mass Limit.			
C14P	Statistical Mechanics Lab List of Practical <ol style="list-style-type: none"> Computational analysis of the behavior of a collection of particles in a box that satisfy Newtonian mechanics and interact via the Lennard-Jones potential, varying the total number of particles N and the initial conditions: <ol style="list-style-type: none"> Study of local number density in the equilibrium state (i) average; (ii) fluctuations. Study of transient behavior of the system (approach to equilibrium). Relationship of large N and the arrow of time. Computation of the velocity distribution of particles for the system and comparison with the Maxwell velocity distribution. Computation and study of mean molecular speed and its dependence on particle mass. Computation of fraction of molecules in an ideal gas having speed near the most probable speed. Computation of the partition function $Z(\square)$ for examples of systems with a finite number of single particle levels (e.g., 2 level, 3 level, etc.) and a finite number of non-interacting particles N under Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics: <ol style="list-style-type: none"> Study of how $Z(\square)$, average energy $\langle E \rangle$, energy fluctuation $\square E$, specific heat at constant volume C_v, depend upon the temperature, total number of particles N and the spectrum of single particle states. Ratios of occupation numbers of various states for the systems considered above Computation of physical quantities at large and small temperature T and comparison of various statistics at large and small temperature T. Plot Planck's law for Black Body radiation and compare it with Raleigh-Jeans Law at high temperature and low temperature. Plot Specific Heat of Solids (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature and low temperature and 	02	Dr. Wadut Shaikh	04

	<p>compare them for these two cases.</p> <p>5. Plot the following functions with energy at different temperatures</p> <p>a) Maxwell-Boltzmann distribution</p> <p>b) Fermi-Dirac distribution</p> <p>c) Bose-Einstein distribution</p>			
DSE3T	<p>Communication Electronics</p> <p>Electronic communication</p> <p>Introduction to communication – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio.</p> <p>Analog Modulation</p> <p>Amplitude Modulation, modulation index and frequency spectrum. Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver.</p> <p>Analog Pulse Modulation</p> <p>Channel capacity, sampling theorem, Basic Principles- PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.</p> <p>Digital Pulse Modulation</p> <p>Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK).</p> <p>Introduction to Communication and Navigation systems:</p> <p>Satellite Communication - Introduction, need, geosynchronous satellite orbits geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.</p>	04	<p>Sourav Panda</p> <p>Debasish Das</p>	<p>02</p> <p>02</p>

	<p>Mobile Telephony System</p> <p>– Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only).</p> <p>GPS navigation system (qualitative idea only).</p>			
DSE3P	<p>Communication Electronics Lab</p> <p>List of Practical</p> <ol style="list-style-type: none"> 1. To design an Amplitude Modulator using Transistor. 2. To study envelope detector for demodulation of AM signal. 3. To study FM - Generator and Detector circuit. 4. To study AM Transmitter and Receiver. 5. To study FM Transmitter and Receiver. 6. To study Time Division Multiplexing (TDM). 7. To study Pulse Amplitude Modulation (PAM). 8. To study Pulse Width Modulation (PWM). 9. To study Pulse Position Modulation (PPM). 10. To study ASK, PSK and FSK modulators. 	02	Sourav Panda	04
DSE4T	<p>Experimental Techniques</p> <p>Measurements</p> <p>Accuracy and precision. Significant figures. Error and uncertainty analysis. Types of errors: Gross error, systematic error, random error. Statistical analysis of data (Arithmetic mean, deviation from mean, average deviation, standard deviation, chi-square) and curve fitting. Guassian distribution.</p> <p>Signals and Systems</p> <p>Periodic and aperiodic signals. Impulse response, transfer function and frequency response of first and second order systems. Fluctuations and Noise in measurement system. S/N ratio and Noise figure. Noise in frequency domain. Sources of Noise: Inherent fluctuations, Thermal noise, Shot noise, 1/f noise.</p>	04	<p>Dr. Wadut Shaikh</p> <p>Rupam Mal</p>	<p>01</p>
	<p>Shielding and Grounding</p> <p>Methods of safety grounding. Energy coupling. Grounding. Shielding: Electrostatic shielding. Electromagnetic Interference</p>			<p>02</p>

	<p>Transducers & industrial instrumentation (working principle, efficiency, applications)</p> <p>Static and dynamic characteristics of measurement Systems. Generalized performance of systems, Zero order first order, second order and higher order systems. Electrical, Thermal and Mechanical systems. Calibration. Transducers and sensors. Characteristics of Transducers. Transducers as electrical element and their signal conditioning. Temperature transducers: RTD, Thermistor, Thermocouples, Semiconductor type temperature sensors (AD590, LM35, LM75) and signal conditioning. Linear Position transducer: Strain gauge, Piezoelectric. Inductance change transducer: Linear variable differential transformer (LVDT), Capacitance change transducers. Radiation Sensors: Principle of Gas filled detector, ionization chamber, scintillation detector.</p> <p>Digital Multimeter</p> <p>Comparison of analog and digital instruments. Block diagram of digital multimeter, principle of measurement of I, V, C. Accuracy and resolution of measurement.</p> <p>Impedance Bridges and Q-meter</p> <p>Block diagram and working principles of RLC Bridge. Q - meter and its working operation. Digital LCR bridge.</p> <p>Vacuum Systems</p> <p>Characteristics of vacuum: Gas law, Mean free path. Application of vacuum. Vacuum system- Chamber, Mechanical pumps, Diffusion pump & Turbo Modular pump, Pumping speed, Pressure gauges (Pirani, Penning, ionization).</p>		Gourchand Manna	01
DSE4P	<p>Experimental Techniques Lab</p> <p>List of Practical</p> <ol style="list-style-type: none"> 1. Determine output characteristics of a LVDT & measure displacement using LVDT 2. Measurement of Strain using Strain Gauge. 3. Measurement of level using capacitive transducer. 4. To study the characteristics of a Thermostat and determine its parameters. 5. Study of distance measurement using ultrasonic transducer. 6. Calibrate Semiconductor type temperature sensor (AD590, LM35, or LM75) 7. To measure the change in temperature of ambient using Resistance Temperature Device (RTD). 8. Create vacuum in a small chamber using a 	02	Rupam Mal	04

	<p>mechanical (rotary) pump and measure the chamber pressure using a pressure gauge.</p> <p>9. Comparison of pickup of noise in cables of different types (co-axial, single shielded, double shielded, without shielding) of 2m length, understanding of importance of grounding using function generator of mV level & an oscilloscope.</p> <p>10. To design and study the Sample and Hold Circuit.</p> <p>11. Design and analyze the Clippers and Clampers circuits using junction diode</p> <p>12. To plot the frequency response of a microphone.</p> <p>13. To measure Q of a coil and influence of frequency, using a Q-meter</p>			
Generic Elective (GE) (For others department students)				
GE3T	<p>Solid State Physics</p> <p>Crystal Structure</p> <p>Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.</p> <p>Elementary Lattice Dynamics</p> <p>Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T3 law</p> <p>Magnetic Properties of Matter</p> <p>Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.</p> <p>Dielectric Properties of Materials</p> <p>Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeier relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons.</p>	04	<p>Dr. Wadut Shaikh</p> <p>Debasish Das</p>	<p>02</p> <p>02</p>

	<p>Elementary band theory</p> <p>Kronig Penny model. Band Gaps. Conductors, Semiconductors and insulators. P and N type Semiconductors. Conductivity of Semiconductors, mobility, Hall Effect, Hall coefficient.</p> <p>Superconductivity</p> <p>Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect.</p>			
GE3P	<p>List of Practical</p> <ul style="list-style-type: none"> • Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method) • To measure the Magnetic susceptibility of Solids. • To determine the Coupling Coefficient of a piezoelectric crystal. • To measure the Dielectric Constant of a dielectric Materials with frequency • To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR) • To determine the refractive index of a dielectric layer using SPR • To study the PE Hysteresis loop of a Ferroelectric Crystal. • To study the BH curve of iron using a Solenoid and determine the energy loss. • To measure the resistivity of a semiconductor (Ge) crystal with temperature by four-probe method (room temperature to 150 oC) and to determine its band gap. • To determine the Hall coefficient of a semiconductor sample. 	02	<p>Debasish Das</p> <p>Rupam Mal</p>	04
GE4T	<p>Electricity and Magnetism</p> <p>Vector Analysis</p> <p>Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).</p> <p>Electrostatics</p> <p>Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric</p>	04	Rupam Mal	02

	dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.		Gourchand Manna	01	
	Magnetism Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferro- magnetic materials.				
	Electromagnetic Induction Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. Maxwell's equations and Electromagnetic wave propagation Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.				
GE4P	Electricity and Magnetism Lab List of Practical <ol style="list-style-type: none"> To use a Multimeter for measuring <ol style="list-style-type: none"> Resistances AC and DC Voltages DC Current Checking electrical fuses. Ballistic Galvanometer: <ol style="list-style-type: none"> Measurement of charge and current sensitivity Measurement of CDR Determine a high resistance by Leakage Method To determine Self Inductance of a Coil by Rayleigh's Method. To compare capacitances using De'Sauty's bridge. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx) To study the Characteristics of a Series RC Circuit. To study a series LCR circuit LCR circuit and determine its <ol style="list-style-type: none"> Resonant frequency 	02	Sourav Panda Debasish Das	04	

	<p>Oscillations:</p> <p>Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations.</p> <p>Elasticity:</p> <p>Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia - q, η and σ by Searles method</p> <p>Special Theory of Relativity:</p> <p>Constancy of speed of light. Postulates of Special Theory of relativity. Length contraction. Time dilation. Relativistic addition of velocities.</p>			
DSC1A-P	<p>Mechanics Lab</p> <p>Practical:</p> <ol style="list-style-type: none"> 1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope. 2. To determine the Height of a Building using a Sextant. 3. To determine the Moment of Inertia of a Flywheel. 4. To determine the Young's Modulus of a Wire by Optical Lever Method. 5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle. 6. To determine the Elastic Constants of a Wire by Searle's method. 7. To determine g by Bar Pendulum. 8. To determine g by Kater's Pendulum. 9. To determine g and velocity for a freely falling body using Digital Timing Technique 10. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g 	02	Rupam Mal	04
SEMESTER II				
DSC1B-T	<p>Electricity and Magnetism</p> <p>Vector Analysis:</p> <p>Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line,</p>	04	Debasish Das	02

	<p>surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).</p> <p>Electrostatics:</p> <p>Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem - Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric ipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.</p>			
	<p>Magnetism:</p> <p>Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials.</p> <p>Electromagnetic Induction:</p> <p>Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field.</p> <p>Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic electric medium, transverse nature of EM waves, polarization.</p>		Gourchand Manna	02
DSC1B-P	<p>Electricity and Magnetism</p> <p>Practical:</p> <p>1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.</p> <p>2. Ballistic Galvanometer:</p> <p>(i) Measurement of charge and current sensitivity</p> <p>(ii) Measurement of CDR</p>	02	Gourchand Manna	04

	(iii) Determine a high resistance by Leakage Method (iv) To determine Self Inductance of a Coil by Rayleigh's Method . 3. To compare capacitances using De'Sauty's bridge. 4. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx). 5. To study the Characteristics of a Series RC Circuit. 6. To study the a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor 7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q 8. To determine a Low Resistance by Carey Foster's Bridge. 9. To verify the Thevenin and Norton theorem			
SEMESTER III				
DSC1C-T	Thermal Physics and Statistical Mechanics 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 CP & CV, 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, Unattainability of absolute zero. Thermodynamic Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Maxwell's relations & applications - Joule-Thompson Effect, Clausius- Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations. Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocities and its experimental verification, Mean free path (Zeroth Order), Transport Phenomena: Viscosity, Conduction and Diffusion (for vertical case), Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases. Theory of Radiation: Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.	04	Debasish Das	04

	Statistical Mechanics: Phase space, Macrostate and Microstate, Entropy and Thermodynamic probability, Maxwell-Boltzmann law - distribution of velocity - Quantum statistics - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law - photon gas - comparison of three statistics.			
DSC1C-P	Thermal Physics and Statistical Mechanics (lab) List of Practical <ol style="list-style-type: none"> 1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method. 2. Measurement of Planck's constant using black body radiation. 3. To determine Stefan's Constant. 4. To determine the coefficient of thermal conductivity of copper by Searle's apparatus. 5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method. 6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method. 7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer. 8. To study the variation of thermo emf across two junctions of a thermocouple with temperature. 9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system. 10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge 	02	Debasish Das	04
SEMESTER IV				
DSC1D-T	Waves and Optics Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal and unequal frequency and their uses. Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure - Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaeger's method. Viscosity:	04	Gourchand Manna	04

	<p>Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of a liquid with temperature lubrication. Physics of low pressure - production and measurement of low pressure - Rotary pump - Diffusion pump - Molecular pump - Knudsen absolute gauge - penning and pirani gauge – Detection of leakage.</p> <p>Sound:</p> <p>Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria.</p> <p>Wave Optics:</p> <p>Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle.</p> <p>Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.</p> <p>Michelson's Interferometer: Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index and Visibility of fringes.</p> <p>Diffraction:</p> <p>Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.</p> <p>Polarization:</p> <p>Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization.</p>			
DSC1D-P	<p>Waves and Optics (lab)</p> <p>Practical:</p> <ol style="list-style-type: none"> 1. To investigate the motion of coupled oscillators 2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify $\lambda^2 \propto T$ Law. 3. To study Lissajous Figures 	02	Gourchand Manna	04

	<ol style="list-style-type: none"> 4. Familiarization with Schuster's focussing; determination of angle of prism. 5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method). 6. To determine the Refractive Index of the Material of a given Prism using Sodium Light. 7. To determine Dispersive Power of the Material of a given Prism using Mercury Light 8. To determine the value of Cauchy Constants of a material of a prism. 9. To determine the Resolving Power of a Prism. 10. To determine wavelength of sodium light using Fresnel Biprism. 11. To determine wavelength of sodium light using Newton's Rings. 12. To determine the wavelength of Laser light using Diffraction of Single Slit. 13. To determine wavelength of (1) Sodium & (2) spectrum of Mercury light using plane diffraction Grating 14. To determine the Resolving Power of a Plane Diffraction Grating. 15. To measure the intensity using photosensor and laser in diffraction patterns of single and double slits 			
SEC2-T	<p>Basic Instrumentation Skills</p> <p>Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.</p> <p>Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.</p> <p>Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.</p> <p>AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.</p> <p>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. Front panel 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.</p>	01	01	Dr. Wadut Shaikh

	<p>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.</p> <p>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.</p> <p>Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.</p> <p>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.</p>			
SEC2-P	<p>Basic Instrumentation Skills Lab</p> <p>The test of lab skills will be of the following test items:</p> <ol style="list-style-type: none"> 1. Use of an oscilloscope. 2. CRO as a versatile measuring device. 3. Circuit tracing of Laboratory electronic equipment, 4. Use of Digital multimeter/VTVM for measuring voltages 5. Circuit tracing of Laboratory electronic equipment, 6. Winding a coil / transformer. 7. Study the layout of receiver circuit. 8. Trouble shooting a circuit 9. Balancing of bridges 	01	Dr. Wadut Shaikh	02
SEMESTER V				
DSE1T	<p>Elements of Modern Physics</p> <p>Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- Germer experiment</p> <p>Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.</p>	04	Rupam Mal	04

	<p>Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle.</p> <p>Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wave function, probabilities and normalization; Probability and probability current densities in one dimension.</p> <p>One dimensional infinitely rigid box- energy eigenvalues and eigen functions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier.</p> <p>Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy.</p> <p>Radioactivity: stability of nucleus; Law of radioactive decay; Mean life & half-life; α decay; β decay - energy released, spectrum and Pauli's prediction of neutrino; γ - ray emission.</p> <p>Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions.</p>			
DSE1P	<p>Elements of Modern Physics (Practical)</p> <p>Practical:</p> <ol style="list-style-type: none"> 1. To determine value of Boltzmann constant using V-I characteristic of PN diode. 2. To determine work function of material of filament of directly heated vacuum diode. 3. To determine value of Planck's constant using LEDs of at least 4 different colours. 4. To determine the ionization potential of mercury. 5. To determine the wavelength of H-alpha emission line of Hydrogen atom. 6. To determine the absorption lines in the rotational spectrum of Iodine vapour. 7. To study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photo-sensor and compare with incoherent source – Na light. 8. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light 	02	Rupam Mal	04

	9. To determine the value of e/m by magnetic focusing. 10. To setup the Millikan oil drop apparatus and determine the charge of an electron.			
SEMESTER VI				
DSE2T	Solid State Physics Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor. Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T3 law Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeier relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons. Elementary band theory: Kronig Penny model. Band Gaps. Conductors, Semiconductors and insulators. P and N type Semiconductors. Conductivity of Semiconductors, mobility, Hall Effect, Hall coefficient. Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect.	04	Debasish Das	04
DSE2P	Solid State Physics (Practical) Practical: <ol style="list-style-type: none"> 1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method) 2. To measure the Magnetic susceptibility of Solids. 3. To determine the Coupling Coefficient of a Piezoelectric crystal. 4. To measure the Dielectric Constant of a dielectric Materials with frequency 5. To determine the complex dielectric constant and plasma frequency of metal using Surface Plasmon resonance (SPR) 6. To determine the refractive index of a dielectric layer using SPR 7. To study the PE Hysteresis loop of a Ferroelectric Crystal. 8. To draw the BH curve of iron using a Solenoid and determine the energy loss from Hysteresis. 	02	Debasish Das	04

	<p>9. To measure the resistivity of a semiconductor (Ge) crystal with temperature by four probe method (from room temperature to 150 °C) and to determine its band gap.</p> <p>10. To determine the Hall coefficient of a semiconductor sample.</p>			
--	---	--	--	--

DEPARTMENT OF ZOOLOGY

PAPER	Course contents / Syllabus	Alloted Teachers	Credits & Marks	Class Allotted per weeks	Total Class
SEM I					
CC1 T	NON CHORDATES				
	Unit 1: Basics of Animal Classification Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types. Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdoms. Concept of classification (Card woose).	KM RM	4	6	15x6=90
	Unit 2: Protista and Metazoa Protozoa General characteristics and Classification up to phylum (according to Levine et. al., 1981) Locomotion in Euglena, Paramoecium and Amoeba; Conjugation in Paramoecium. Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica. Metazoa Evolution of symmetry and segmentation of Metazoa	SM SDM			
	Unit 3: Porifera General characteristics and Classification up to classes; Canal system and spicules in sponges	SB			
	Unit 4: Cnidaria General characteristics and Classification up to classes Metagenesis in Obelia & Aurelia Metagenesis in Obelia Polymorphism in Cnidaria Corals and coral reef diversity, function & conservation	RM			
	Unit 5: Ctenophora General characteristics	SB			
	Unit 6: Platyhelminthes General characteristics and Classification up to classes Life cycle and pathogenicity and control measures of Fasciola hepatica and Taenia solium	SDM			

	Unit 7: Nematoda General characteristics and Classification up to classes. Life cycle, and pathogenicity and control measures of <i>Ascaris lumbricoides</i> and <i>Wuchereria bancrofti</i> . Parasitic adaptations in helminthes.	PM			
CC1 P	NON CHORDATES				
	List of Practical . 1.Study of whole mount of Euglena, Amoeba and Paramecium 2.Identification of Amoeba, Euglena, Entamoeba, Opalina, Paramecium, Plasmodium vivax and Plasmodium falciparum (from the preparedslides) 3. Identification of Sycon, Neptune’s Cup, Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora 4. Identification and significance of adult Fasciola hepatica, Taenia solium and Ascaris lumbricoides 5. Staining/mounting of any protozoa/ from gut of cockroach	KM RM PM SB SDM SM	2	3	15x6=90
CC2 T	ECOLOGY				
	Unit 1: Introduction to Ecology History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.	SDM	4	6	15x6=90
	Unit 2: Population Unitary and Modular populations. Unique and group attributes of population: Demographic factors, life tables, fecundity tables. survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population. regulation - density-dependent and independent factors. Population Interactions, Gause’s Principle with laboratory and field examples, Lotka-Volterra equation for competition	SM SB			

	Unit 3: Community Community characteristics: species diversity, abundance, , dominance, richness, Vertical stratification, Ecotone and edge effect. Ecological succession with one example	KM			
	Unit 4: Ecosystem Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies Nutrient and biogeochemical cycle with an example of Nitrogen cycle Human modified ecosystem	PM			
	Unit 5: Applied Ecology Wildlife Conservation (in-situ and ex-situ conservation). Management strategies for tiger conservation; Wild life protection act (1972)	RM			
CC2 P	ECOLOGY				
	List of Practical Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided. 1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided 2. Determination of population density in a natural/hypothetical community by quadrature method and calculation of Shannon-Weiner diversity index for the same community 3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO ₂ 4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary Note: In field report costal area to be included	RM PM KM SB SM SDM	2	3	15x6=90
GE1 T	ANIMAL BIOTECHNOLOGY				

	Unit 1: Introduction Concept and Scope of Biotechnology	RM	4	6	15x6=90
	Unit 2: Techniques in Gene manipulation Recombinant DNA technology, Isolation of genes, Concept of restriction and modification: Restriction endonucleases, DNA modifying enzymes. Cloning Vectors: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, and HAC. Shuttle and Expression Vectors. Construction of Genomic libraries and cDNA libraries Transformation techniques: microbial, plants and animals: Cloning in mammalian cells, Integration of DNA into mammalian genome- Electroporation and Calcium Phosphate Precipitation method.	KM PM			
	Unit 3: Animal cell Culture Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines Culture media- Natural and Synthetic, Stem cells, Cryopreservation of cultures. Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, DNA sequencing: Sanger method, Polymerase chain reaction, DNA Fingerprinting and DNA microarrays.	SB SM			
	Unit 4: Fermentation Different types of Fermentation: Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized Downstream Processing: Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization.	RM			
	Unit 5: Transgenic Animal Technology Production of transgenic animals: nuclear transplantation, Retroviral method, DNA microinjection method, Dolly and Polly.	SDM			

	Unit 6: Application in Health Development of recombinant Vaccines, Hybridoma technology, Gene Therapy. Production of recombinant Proteins: Insulin and growth hormones	SDM			
	Unit 7: Bio safety Physical and Biological containment Bio safety Physical and Biological containment.	KM			
GE1	PRACTICAL				
	List of Practical 1. Packing and sterilization of glass and plastic wares for cell culture. 2. Preparation of culture media. 3. Preparation of genomic DNA from E. coli/animals/human. 4. Plasmid DNA isolation (p UC 18/19) and DNA quantitation using agarose gel electrophoresis (by using lambda DNA as standard). 5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III. 6. Preparation of competent cells and Transformation of E. coli with plasmid DNA using CaCl ₂ , Selection of transformants on X-gal and IPTG (Optional). 7. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays	KM RM PM SB	2	2	15x2=30
SEM -II					
C3 T	Non-Chordates				
	Unit 1: Introduction Evolution of coelom and metamerism	RM	4	6	15x6=90
	Unit 2: Annelida General characteristics and Classification up to classes Excretion in Annelida through nephridia. Metamerism in Annelida	RM			

	Unit3:Arthropoda General characteristics and Classification up to classes Vision in Insecta only. Respiration in Arthropoda (Gills in prawn and trachea in cockroach). Metamorphosis in Lepidopteran Insects. Social life in termite	SB KM			
	Unit 4: Onychophora General characteristics and Evolutionary significance	KM			
	Unit 5: Mollusca General characteristics and Classification up to classes Nervous system and torsion in Gastropoda Feeding and respiration in Pila sp.	PM			
	Unit 6: Echinodermata General characteristics and Classification up to classes Water-vascular system in Asteroidea. Larval forms in Echinodermata. Affinities with Chordates.	SM			
	Unit 7: Hemichordata General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates	SDM			
C3 P	Non-Chordates				

	List of Practical 1.Study of following specimens: a. Annelids - <i>Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria.</i> b. Arthropods - <i>Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees Onychophora – Peripatus.</i> c. Molluscs - <i>Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus.</i> d. Echinodermates - <i>Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon.</i> 2. Study of digestive system, septal nephridia and pharyngeal nephridia of earthworm. 3. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm. 4. Mount of mouth parts and dissection of digestive system and nervous system of Periplaneta* 5. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)	KM RM SB SDM PM SM	2	3	15x6=90
C4 T	CELL BIOLOGY				
	Unit 1: Overview of Cells Basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma	PM	4	6	15x6=90
	Unit 2: Plasma Membrane Ultra structure and composition of Plasma membrane: Fluid mosaic model. Transport across membrane: Active and Passive transport, Facilitated transport. Cell junctions: Tight junctions, Gap junctions, Desmosomes.	SM			
	Unit 3: Cytoplasmic organelles I Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes. Protein sorting and mechanisms of vesicular transport.	KM			

	Unit 4: Cytoplasmic organelles II Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis. Peroxisomes: Structure and Functions. Centrosome: Structure and Functions	SB			
	Unit 5: Cytoskeleton Type, structure and functions of cytoskeleton. Accessory proteins of microfilament & microtubule. A brief idea about molecular motors.	RM			
	Unit 6: Nucleus Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus. Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome).	SDM			
	Unit 7: Cell Division Cell cycle and its regulation, Cancer (Concept of oncogenes and tumor suppressor genes with special reference to p53, Retinoblastoma and Ras and APC. Mitosis and Meiosis: Basic process and their significance.	PM			
	Unit 8: Cell Signaling Cell signaling transduction pathways; Types of signaling molecules and receptors GPCR and Role of second messenger (cAMP) Extracellular matrix-Cell interactions. Apoptosis and Necrosis.	SM			
C4 P	Cell Biology				

	List of Practical 1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis 2. Study of various stages of meiosis. 3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells. 4. Preparation of permanent slide to demonstrate: a. DNA by Feulgen reaction b. Cell viability study by Trypan Blue staining c. Mitochondria identification through vital staining	PM RM KM SB	2	3	15x6=90
GE2 T	Animal Diversity				
	Unit 1: Protista Protozoa: General characters of Protozoa; Life cycle of Plasmodium	KM	4	6	15x6=90
	Unit 2: Porifera General characters and canal system in Porifera.	RM			
	Unit 3: Radiata General characters of Cnidarians and polymorphism.	KM			
	Unit 4: Aceolomates General characters of Helminthes.	RM			
	Unit 5: Pseudocoelomates. General characters of Nematoda. Parasitic adaptations	PM			
	Unit 6: Annelida General characters of Annelida. Metamerism.	SB			
	Unit 7: Arthropoda General characters. Social life in insects	SB			

	Unit 8: Mollusca General characters of mollusk. Pearl Formation.	PM			
	Unit 9: Echinodermata General characters of Echinodermata. Water Vascular system in Starfish.	SM			
	Unit 10: Protochordata Salient features.	SM			
	Unit 11: Pisces General Characters. Osmoregulation, Migration of Fish	SDM			
	Unit 12: Amphibia General characters, Adaptations for terrestrial life, Parental care	SDM			
	Unit 13: Reptilia General Characters. Amniotes; Origin of reptiles. Terrestrial adaptations in reptiles.	SM			
	Unit 14: Aves General Characters. The origin of birds; Flight adaptations	KM			
	Unit 15: Mammalia General Characters. Early evolution of mammals; Primates; Dentition in mammals	RM			
GE2 P	Animal Diversity				

	<p>1.Study of following specimens:</p> <p>A .Non Chordates: Euglena, Noctiluca, Paramecium, Sycon, , Physalia, Tubipora, Metridium, Taenia, Ascaris, Nereis, Aphrodite, Leech, Peripatus, Limulus, Hermitcrab, Daphnia, Millipede, Centipede, Beetle, Chiton, Dentalium, Octopus, Asterias, and Antedon.</p> <p>B . Chordates: Balanoglossus, Amphioxus, Petromyzon, Pristis, Hippocampus, Labeo, Ichthyophis/Uraeotyphlus, Salamander, Rhacophorus, Draco, Uromastix, Naja, Viper, model of Archaeopteryx, any three common birds-(Crow, duck, Owl), Squirrel and Bat</p> <p>2.Study of following Permanent Slides: Cross section of Sycon, Sea anemone and Ascaris (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva.</p> <p>3.Temporary mounts of: A. Septal & pharyngeal nephridia of earthworm. B. Unstained mounts of Placoid, cycloid and ctenoid scales.</p> <p>4. Dissections of: a. Digestive and nervous system of Cockroach. b. Urinogenital system of Rat.</p>	PM RM SB KM SDM SM	2	3	15x6=90
SEM III					
C5T	Chordates				
	<p>Unit 1: Introduction to Chordates General characteristics and outline classification of Phylum Chordata.</p>	KM	4	6	15x6=90
	<p>Unit 2: Protochordata General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in Ascidia. Chordate Features and Feeding in Branchiostoma</p>	RM			
	<p>Unit 3: Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata.</p>	KM			

	Unit 4: Agnatha General characteristics and classification of cyclostomes up to order.	PM			
	Unit 5: Pisces General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses. Accessory respiratory organ, migration and parental care in fishes Swim bladder in fishes. Classification up to Sub-Classes.	PM			
	Unit 6: Amphibia General characteristics and classification up to living Orders. Metamorphosis and parental care in Amphibia.	SB			
	Unit 7: Reptilia General characteristics and classification up to living Orders. Poison apparatus and Biting mechanism in Snake.	SB			
	Unit 8: Aves General characteristics and classification up to Sub-Classes Exoskeleton and migration in Birds Principles and aerodynamics of flight.	SDM			
	Unit 9: Mammals General characters and classification up to living orders Affinities of Prototheria. Exoskeleton derivatives of mammals Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Micro chiropterans and Cetaceans.	SM			
	Unit 10: Zoogeography Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms.	RM			
C5 P	Chordates				

	List of Practical 1. Protochordata Balanoglossus, Herdmania, Branchiostoma. 2.Agnatha Petromyzon, Myxine. 3.Fishes Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echineis, Anguilla, Hippocampus, Tetodon/ Diodon, Anabas, Flat fish. 4.Amphibia Necturus, Bufo, Hyla, Alytes, Axolotl, Tylotriton. 5.Reptilia Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Key for Identification of poisonous and non-poisonous snakes. 6.Mammalia: Bat (Insectivorous and Frugivorous), Funambulus. 7. Pecten from Fowl head. 8.Dissection of brain and pituitary of Tilapia	KM RM PM SB SDM SM	2	3	15x6=90
C6P	Animal Physiology				
	Unit 1: Tissues Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue and, fixation and staining of tissues.	PM	4	6	15x6=90
	Unit2: Bone and Cartilage Structure and types of bones and cartilages, Ossification.	SDM			
	Unit 3: Nervous System Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and Neuromuscular junction; Reflex action and its types.	RM			

	Unit 4: Muscular system Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre.	SM			
	Unit 5: Reproductive System Histology of testis and ovary Physiology of Reproduction.	KM			
	Unit 6: Endocrine System Histology and function of pituitary, thyroid, pancreas and adrenal Classification of hormones; Mechanism of Hormone action. Signal transduction pathways for Steroidal and Non steroidal hormones. Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system. Placental hormones	SB SDM			
C6P	Animal Physiology				
	List of Practical 1 .Recording of simple muscle twitch with electrical stimulation (or Virtual) 2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex) 3 .Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells 4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid 5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues	SM SB RM KM SDM PM	2	3	15x6=90
C7T	Fundamentals of Biochemistry				

	Unit 1: Carbohydrates Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosachharides Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis.	SM	4	6	15x6=90
	Unit 2: Lipids Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. Lipid metabolism: β -oxidation of fatty acids; Fatty acid biosynthesis.	RM			
	Unit 3: Proteins Amino acids Structure, Classification, General and Electro chemical properties of α -amino acids; Physiological importance of essential and non-essential amino acids Proteins Bonds stabilizing protein structure; Levels of organization Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids	SB			
	Unit 4: Nucleic Acids Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids. Types of DNA and RNA, Complementarity of DNA, Hypo-Hyperchromaticity of DNA Basic concept of nucleotide metabolism	PM			

	Unit 5: Enzymes Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action- Catalytic and Regulatory (Basic concept with one example each).	SDM			
	Unit 6: Oxidative Phosphorylation Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System.	KM			
C7P	Fundamentals of Biochemistry				
	List of Practical 1. Qualitative tests of functional groups in carbohydrates, proteins and lipids. 2. Paper chromatography of amino acids. 3. Quantitative estimation of Lowry Methods. 4. Demonstration of proteins separation by SDS-PAGE. 5. To study the enzymatic activity of Trypsin and Lipase. 6. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.	PM SB RM SDM	2	3	15x3=45
SEC1 T	Apiculture				
	Unit 1: Biology of Bees History, Classification and Biology of Honey Bees Social Organization of Bee Colony.	SM	4	5	15x5=75
	Unit 2: Rearing of Bees Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth Bee Pasturage Selection of Bee Species for Apiculture Bee Keeping Equipment Methods of Extraction of Honey (Indigenous and Modern)	SB			
	Unit 3: Diseases and Enemies Bee Diseases and Enemies Control and Preventive measures.	PM			

	Unit 4: Bee Economy Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc.	RM			
	Unit 5: Entrepreneurship in Apiculture Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens.	SDM			
GE T-3	Aquatic Biology				
	Unit 1: Aquatic Biomes Brief introduction to the aquatic biomes: Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine benthic zone and coral reefs.	PM	4	6	15x6=90
	Unit 2: Freshwater Biology Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico– chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity, dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes (Nitrogen, Sulphur and Phosphorous). Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill- stream fishes.	RM KM			
	Unit 3: Marine Biology Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.	SB			

	Unit 4: Management of Aquatic Resources Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD .	SM SDM			
GE3 P	Aquatic Biology Lab				
	List of Practical 1. Determine the area of a lake using graphimetric and gravimetric method. 2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem. 3. Determine the amount of Turbidity/transparency, Dissolved Oxygen, and Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body. 4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance. 5. A Project Report on a visit to a Sewage treatment plant/Marine bio-reserve/Fisheries Institute.	PM RM KM SM SB SDM	2	2	15x2=30
SEM IV					
C8T:	Comparative Anatomy of Vertebrates				
	Unit 1: Integumentary System Structure, function and derivatives of integument in amphibian, birds and mammals.	PM	4	6	15x6=90
	Unit 2: Skeletal System Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches	SM			
	Unit 3: Digestive System Comparative anatomy of stomach; dentition in mammals.	PM			

	Unit 4: Respiratory System Respiratory organs in fish, amphibian, birds and mammals.	SB			
	Unit 5: Circulatory System General plan of circulation, Comparative account of heart and aortic arches.	RM			
	Unit 6: Urinogenital System Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri.	RM			
	Unit 7: Nervous System Comparative account of brain, Cranial nerves in mammals.	KM			
	Unit 8: Sense Organs Classification of receptors, Brief account of olfactory and auditory receptors in vertebrate.	SDM			
C8P	Comparative Anatomy of Vertebrates				
	List of Practical 1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs. 2. Study of disarticulated skeleton of Toad, Pigeon and Guineapig. 3. Demonstration of Carapace and plastron of turtle. 4. Identification of mammalian skulls: One herbivorous (Guineapig) and one carnivorous (Dog) animal. 5. Dissection of Tilapia: Circulatory system, Brain, pituitary, urinogenital system.	PM RM SB	2	3	15x6=90
C9T	Animal Physiology				
	Unit 1: Physiology of Digestion Structural organisation and functions of Gastrointestinal tract and Associated glands; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes.	PM	4	6	15x6=90

	Unit 2: Physiology of Respiration Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning.	SB			
	Unit 3: Physiology of Circulation Components of Blood and their functions; Structure and functions of hemoglobin Haemostasis; Blood clotting system, Fibrinolytic system Haemopoiesis; Basic steps and its regulation Blood groups; ABO and Rh factor.	SM			
	Unit 4: Physiology of Heart Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses Cardiac Cycle and cardiac output Blood pressure and its regulation.	RM			
	Unit 5: Thermoregulation & Osmoregulation Physiological classification based on thermal biology. Thermal biology of endotherms. Osmoregulation in aquatic vertebrates. Extrarenal osmoregulatory organs in vertebrates.	KM			
	Unit 6: Renal Physiology Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid- base balance.	SDM			
C9P	Animal Physiology				
	List of Practical 1. Determination of ABO Blood group. 2. Enumeration of red blood cells and white blood cells using haemocytometer 3. Estimation of haemoglobin using Sahli's haemoglobinometer. 4. Preparation of haemin and haemochromogen crystals. 5. Recording of blood pressure using a sphygmomanometer.	KM RM PM SB	2	3	15x6=90

C10T:	Immunology				
	Unit 1: Overview of Immune System Basic concepts of health and diseases, Historical perspective of Immunology, Cells and organs of the Immune system.	KM	4	6	15x6=90
	Unit 2: Innate and Adaptive Immunity Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).	PM			
	Unit 3: Antigens Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes.	SM			
	Unit 4: Immunoglobulins Structure and functions of different classes of immunoglobulins, Antigen- antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production.	RM			
	Unit 5: Major Histocompatibility Complex Structure and functions of MHC molecules. Structure of T cell Receptor and its signalling, T cell development & selection	SB			
	Unit 6: Cytokines Types, properties and functions of cytokines.	RM			
	Unit 7: Complement System Components and pathways of complement activation.	SM			
	Unit 8: Hypersensitivity Gell and Coombs' classification and brief description of various types of hypersensitivities.	KM			
	Unit 9: Immunology of diseases Malaria, Filariasis, Dengue and Tuberculosis	SDM			
	Unit 10: Vaccines Various types of vaccines. Active & passive immunization (Artificial and natural).	SDM			
C10P	Immunology Lab				

	List of Practical 1. Demonstration of lymphoid organs. 2. Histological study of spleen, thymus and lymph nodes through slides/ photographs 3. Preparation of stained blood film to study various types of blood cells. 4. ABO blood group determination. 5. Demonstration of ELISA	PM RM SB SM	2	3	15x6=90
SEC2T	: Sericulture				
	Unit 1: Introduction Sericulture: Definition, history and present status; Silk route Types of silkworms, Distribution and Races Exotic and indigenous races Mulberry and non-mulberry Sericulture	KM	4	6	15x6=90
	Unit 2: Biology of Silkworm Life cycle of Bombyx mori Structure of silk gland and secretion of silk	SB			
	Unit 3: Rearing of Silkworms Selection of mulberry variety and establishment of mulberry garden Rearing house and rearing appliances. Disinfectants: Formalin, bleaching powder, RKO Silkworm rearing technology: Early age and Late age rearing Types of mountages Spinning, harvesting and storage of cocoons.	PM SM			
	Unit 4: Pests and Diseases Pests of silkworm: Uzi fly, dermestid beetles and vertebrates Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial Control and prevention of pests and diseases	RM			
	Unit 5: Entrepreneurship in Sericulture Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture Visit to various sericulture centres.	SDM			
GE4T	: Environment and Public Health				

	Unit 1: Introduction Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment.	RM	4	6	15x6=90
	Unit 2: Climate Change Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health	SM			
	Unit 3: Pollution Air, water, noise pollution sources and effects, Pollution control	SB			
	Unit 4: Waste Management Technologies Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants.	KM SDM			
	Unit 5: Diseases Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid, filariasis	PM			
GE4P:	Environment and Public Health Lab				
	List of Practical To determine pH, Cl, SO ₄ , NO ₃ in soil and water samples from different locations.	KM PM	2	3	15x3=45
SEM V					
C11T	Molecular Biology				
	Unit 1: Nucleic Acids Salient features of DNA and RNA. Watson and Crick Model of DNA	RM	4	6	15x6=90
	Unit 2: DNA Replication Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres	PM			

	Unit 3: Transcription Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	SB			
	Unit 4: Translation Mechanism of protein synthesis in prokaryotes, Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation	SM			
	Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA	SM			
	Unit 6: Gene Regulation Regulation of Transcription in prokaryotes: lac operon and trp operon; Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors, miRNA mediated gene silencing, Genetic imprinting	KM			
	Unit 7: DNA Repair Mechanisms Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair	SDM			
	Unit 8: Molecular Techniques PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing	RM			
C11P	Molecular Biology (Lab)				

	List of Practical 1. Demonstration of polytene and lampbrush chromosome from photograph 2. Isolation and quantification of genomic DNA using spectrophotometer (A260 measurement) 3. Agarose gel electrophoresis for DNA	RM KM	2	3	15x6=90
C12T:	Genetics				
	Unit 1: Mendelian Genetics and its Extension Principles of inheritance, Incomplete dominance and co-dominance, Epistasis Multiple alleles, Lethal alleles, Pleiotropy, Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance.	KM	4	6	15x6=90
	Unit 2: Linkage, Crossing Over and Chromosomal Mapping Linkage and Crossing Over, molecular basis of crossing over, Measuring Recombination frequency and linkage intensity using three factor crosses, Interference and coincidence	SB SDM			
	Unit 3: Mutations Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagens	RM			
	Unit 4: Sex Determination Mechanisms of sex determination in Drosophila Sex determination in mammals Dosage compensation in Drosophila & Human	SM			
	Unit 5: Extra-chromosomal Inheritance Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamydomonas, Kappa particle in Paramecium Shell spiralling in snail	SB			
	Unit 6: Recombination in Bacteria and Viruses Conjugation, Transformation, Transduction, Complementation test in Bacteriophage	PM			

	Unit 7: Transposable Genetic Elements Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, LINE, SINE, Alu elements in humans	KM			
C12P	Genetics (Lab)				
	List of Practical 1. Chi-square analyses 2. Linkage maps based on conjugation 3. Identification of chromosomal aberration in Drosophila and man from photograph 4. Pedigree analysis of some human inherited traits	RM SB SM	2	3	15x6=90
DSE1T	Fish and Fisheries				
	Unit 1: Introduction and Classification General description of fish Feeding habit, habitat and manner of reproduction Classification of fish (up to Subclasses)	PM	4	6	15x6=90
	Unit 2: Morphology and Physiology Types of fins and their modifications; Locomotion in fish; Hydrodynamics; Types of Scales, Use of scales in Classification and determination of age of fish; Gills and gas exchange; Swim Bladder: Types and role in Respiration, buoyancy; Osmoregulation in Elasmobranchs; Reproductive strategies (special reference to Indian fish); Electric organ, Bioluminescence	PM			
	Unit 3: Fisheries Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and Gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations	SDM			

	Unit 4: Aquaculture Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish; Management of finfish hatcheries; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish, Fishery by-products	SDM			
	Unit 5: Fish in research Transgenic fish Zebrafish as a model organism in research	SM			
DSE1P	Fish and Fisheries (Lab)				
	List of Practical 1. Morphometric and meristic characters of fishes 2. Study of Petromyzon, Myxine, Pristis, Chimaera, Exocoetis, Hippocampus, Gambusia, Labeo, Heteropneustes, Anabas 3. Study of different types of scales (through permanent slides/ photographs). 4. Study of crafts and gears used in Fisheries 5. Water quality criteria for Aquaculture: Assessment of pH, conductivity, Total solids, Total dissolved solids 6. Study of air breathing organs in Channa, Heteropneustes, Anabas and Clarias 7. Project Report on a visit to any fish farm/ pisciculture unit/Zebrafish rearing Lab.	KM PM SDM	2	3	15x6=90
DSE2T:	Animal Biotechnology				
	Unit 1: Introduction Organization of prokaryotic and eukaryotic genome, Concept of genomics	SDM	4	6	15x6=90

	Unit 2: Molecular Techniques in Gene manipulation Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics). Restriction enzymes: Nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting DNA sequencing: Sanger method Polymerase Chain Reaction, DNA Finger Printing and DNA micro array	SM RM			
	Unit 3: Genetically Modified Organisms Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock out mice	SB SDM			
	Unit 4: Culture Techniques and Applications Animal cell culture, expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia)	KM			
DSE2P:	Animal Biotechnology (Lab)				

	List of Practical 1. Genomic DNA isolation from E. coli 2. Plasmid DNA isolation (pUC 18/19) from E. coli 3. Restriction digestion of plasmid DNA. 4. Construction of circular and linear restriction map from the data provided. 5. Calculation of transformation efficiency from the data provided. 6. To study following techniques through photographs a. Southern Blotting b. Northern Blotting c. Western Blotting d. DNA Sequencing (Sanger's Method) e. PCR f. DNA fingerprinting 7. Project report on animal cell culture	KM RM PM SB SDM SM	2	3	15x6=90
SEM VI					
C13T	Developmental Biology				
	Unit 1: Introduction Basic concepts: Phases of Development, Cell cell interaction, Differentiation and growth, Differential gene expression.	RM	4	6	15x6=90
	Unit 2: Early Embryonic Development Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal): Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers.	SM SB			
	Unit 3: Late Embryonic Development Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta).	PM			
	Unit 4: Post Embryonic Development Development of brain and Eye in Vertebrate. Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each).	KM			

	Unit 5: Implications of Developmental Biology 8 Class Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Amniocentesis.	SDM			
C13P:	Developmental Biology Lab				
	List of Practical 1. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages). 2. Study of the developmental stages and life cycle of Drosophila from stock culture. 3. Study of different sections of placenta (photomicrograph/ slides). 4. Project report on Drosophila culture/chick embryo development.	SB KM RM	2	3	15x6=90
C14T	Evolutionary Biology				
	Unit-1: Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, volution of eukaryotes.	RM	4	6	15x6=90
	Unit-2: Historical review of Evolutionary concepts, Lamarkism, Darwinism and Neo Darwinism	SM			
	Unit-3: Geological time scale, Fossil records of Hominids (from Australopithacus to Homo sapiens), evolution of horse. Neutral theory of molecular evolution, Molecular clock.	RM			
	Unit-4: Sources of variations: Heritable variations and their role in evolution	SM			

	Unit-5: Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application Of law to biallelic Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, types of selection, selection coefficient, mode of selection heterozygous superiority).Genetic Drift mechanism (founder's effect, bottleneck phenomenon). Role of Migration and Mutation in changing allele frequencies.	SB			
	Unit-6: Species concept, Isolating mechanisms, modes of speciation. Adaptive radiation /macroevolution (exemplified by Galapagos finches).				
	Unit-7: Extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction.	KM			
	Unit-8: Origin and Evolution of Man, Unique Hominin characteristics contrasted with primate characteristic Molecular analysis of human origin.	PM			
	Unit-9: Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Convergent & Divergent evolution.	SDM			
C14P	Evolutionary Biology Lab				
	List of Practical 1. Study of fossils from models/ pictures 2. Study of homology and analogy from suitable specimens 3. Study and verification of Hardy-Weinberg Law by chi square analysis 4. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.	RM SM SB PM	2	3	15x6=90
DSE3T:	Parasitology				
	Unit-1: Introduction to Parasitology Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector Host parasite relationship	KM	4	6	15x6=90

	Unit-2: Parasitic Protists Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani.	SM			
	Unit-3: Parasitic Platyhelminthes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia sajinata	PM			
	Unit-4: Parasitic Nematodes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti and Trichinella spiralis, Brugia malayi; Nematode plant interaction; Gall formation.	RM			
	Unit-5: Parasitic Arthropods Biology, importance and control of ticks (Soft tick Ornithodoros, Hard tick Ixodes), mites (Sarcoptes), Lice (Pediculus), Flea (Xenopsylla) and Bug (Cimex).	SB			
	Unit-6: Parasite Vertebrates Brief account of Cookicutter Shark, Hood Mocking bird, Vampire bat.	SDM			
DSE3P	Parasitology Lab				

	List of Practical: 1. Study of life stages of <i>Giardia intestinalis</i> , <i>Trypanosoma gambiense</i> , <i>Leishmania donovani</i> through permanent slides/micro photographs. 2. Study of adult and life stages of <i>Schistosoma haematobium</i> , <i>Taenia sajinata</i> through permanent slides/micro photographs. 3. Study of adult and life stages of <i>Ancylostoma duodenale</i> , <i>Brugia malayi</i> and <i>Trichinella spiralis</i> through permanent slides/micro photographs. 4. Study of plant parasitic root knot nematode, <i>Meloidogyne</i> from the soil sample. 5. Study of <i>Pediculus humanus</i> , <i>Xenopsylla cheopis</i> and <i>Cimex lectularius</i> through permanent slides/ photographs. 6. Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry]. 7. Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product]. Submission of a brief report on parasitic vertebrates.	KM RM PM SB SDM SM	2	3	15x6=90
DSE4T:	Wild Life Conservation and Management				
	Unit-1: Introduction to Wild Life Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.	RM	4	6	15x6=90
	Unit-2: Evaluation and management of wild life Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation. Standard evaluation procedures: remote sensing and GIS.	SM			
	Unit-3: Management of habitats Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity Restoration of degraded habitats	PM			

	Unit-4: Population estimation Population density, Natalty, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.	SB			
	Unit-5: Aims and objectives of wildlife conservation Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation.	KM			
	Unit-6: Management planning of wild life in protected areas Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbation.	SDM			
	Unit-7: Man and Wildlife Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population.	SB+PM			
	Unit-8: Protected areas National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.	RM+SM			
DSE4P	Wild Life Conservation and Management Lab				

	List of Practical 1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna. 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 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 for flora and fauna. 5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment. 6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences).	KM RM PM SB SDM SM	2	2	15x4=60
--	---	-----------------------------------	---	---	---------

Nutrition (Honours)

course	syllabus	Allotted teachers	Credits & marks	Class allotted per week	T
CC1	C1 T1: Basic Nutrition (Theory) <ol style="list-style-type: none"> 1. Concept and definition of terms Nutrition, Malnutrition and Health: Brief history of nutritional science. Scope of nutrition. 2. Minimum Nutritional Requirements and RDA : Formulation of RDA and Dietary Guidelines: Reference Man and Reference Woman. 3. Body Composition and Changes through the life cycle. 4. Energy in Human Nutrition: Idea of energy and its unit, energy balance, Assessment of energy requirements, Deficiency and Excess, Determination of energy in food, B.M.R & influencing factors, S.D.A. 5. Energy and other nutritional requirement of adult male and female engaged in different types of work (Sedentary, moderate, heavy). 6. Food as source of nutrients, function of food, definition of nutrition, nutrients and energy, adequate, optimum and good nutrition, malnutrition. 7. Nutrition- Fitness, Athletics and sports. 8. Food Guide- Basic food groups, How to use food guide (according to RDA). 9. Interrelationship between nutrition and health- Visible symptoms of goods health. 10. Function of nutrients- Carbohydrate, dietary fibre, protein, fat, vitamins, minerals, anti-oxidants, water. 11. Effect of cooking and heat processing on the nutritive value of foods. 12. Processed supplementary foods 13. Food sanitation in hygiene 	M. Samanta	04 & 40	04	04 5-
	C1 P1: Basic Nutrition (Practical) <ol style="list-style-type: none"> 1. Use and care of kitchen equipment. 2. Weights and measures standards; household measures of raw and cooked foods. 3. Food preparation and classifying recipes as good, moderate or poor, sources of specific nutrients, Amount of ingredients to be in standard recipea) Portion size b) Beverages: tea, coffee, cocoa, fruit juice, milk, milkshakes. c) Cereals and flour mixtures- basic preparation and there nutritive value- Boiled rice and rice pulao, chapatti, parantha, sandwiches, pastas, pancakes, cookies and cakes. 4. Vegetables and fruits: Simple salad, dry vegetables, curries, fruits preparation using fresh and dried stewed fruit, fruit salad. 5. Milk and milk products: Porridges, curds, anner and their commonly made preparations, milk based simple desserts and puddings, custard, kheer, ice-cream. 	R.Jana	02&20	04	04 5-

	<p>6. Meat- Cut of meats Meat preparations, Fish, poultry, hard and soft cooked, poached, scrambled, fried omelette, egg-nogs.</p> <p>7. Soups: Basic, clear and cream soups.</p> <p>8. Snacks: pakoras, cheese toast, upma, poha, peanut, chikki, ti and laddo</p>				
CC2	<p>C2 T2: Food Science and food commodity</p> <p>1. Basic concept on Food, Nutrients, Nutrition.</p> <p>2. Classification of Food, Classification of Nutrients.</p> <p>3. Carbohydrates - Definition, Classification, Structure and properties. Monosaccharides - glucose, fructose, galactose. Disaccharides - Maltose, lactose, sucrose. Polysaccharides - Dextrin, starch, glycogen, resistance starch.</p> <p>4. Lipids - Definition, Classification & Properties. Fatty acids - composition, properties, types.</p> <p>5. Proteins - Definition, Classification, Structure & properties. Amino acids - Classification, types, functions.</p> <p>6. Carbohydrates - Sources, daily requirements, functions. Effects of too high - too low carbohydrates on health. Digestion & Absorption. Blood glucose and effect of different carbohydrates on blood glucose. Glycemic Index. Functional role of Sugars in food, Fermentation of Sugar.</p> <p>7. Proteins - Sources, daily requirements, functions. Effect of too high - too low proteins on health. Digestion & absorption. Assessment of Protein quality (BV, PER, NPU). Factors affecting protein bioavailability including anti-nutritional factors.</p> <p>8. Lipids - Sources, daily requirements, functions. Digestion & Absorption. Role & nutritional significances of PUFA, MUFA, SFA, W-3 fatty acid. 9. Dietary Fibre - Classification, sources, composition, properties & nutritional significance.</p> <p>10. Minerals & Trace Elements, Bio-Chemical and Physiological Role, bio-availability & requirements, sources, deficiency & excess (Calcium, Sodium, Potassium Phosphorus, Iron, Fluoride, Zinc, Selenium, Iodine, Chromium).</p> <p>11. Vitamins - Bio-Chemical and Physiological Role Physiological role, bio-availability and requirements, sources, deficiency & excess.</p> <p>12. Water - Functions, daily requirements, Water balance.</p> <p>13. Sensory characteristics of food</p>	P.Bera	02&20	02	02 5-
	<p>14 Food behaviour, modification of food behavior</p> <p>15. Cereals and Millets: Cereal products, breakfast cereals, fast foods. Structure, processing, storage, use in various preparations, variety, selection and cost.</p> <p>16. Pulses and Legumes: Production (in brief), structures, selection and variety. Storage, processing and use in different preparations. Nutritional aspects and cost.</p> <p>17. Milk and Milk-products: Composition, classification, selection quality and cost, processing, storage and uses in different preparations. Nutritional aspects, shelf - life and spoilage.</p> <p>18. Eggs: Production, grade, quality, selection, storage and spoilage, cost, nutritional aspects and use in different preparations.</p> <p>19. Meat, Fish and Poultry: Types, selection, purchase, storage, uses, cost, spoilage of fish poultry and meat, uses and preparations.</p> <p>20. Vegetables and Fruits: Types, selection, purchase, storage, availability. Cost</p>	Dr.A.Giri	02&20	02	02 5-

	<p>of use and nutritional aspects of raw & processed products and use in different preparations.</p> <p>21. Sugar and Sugar products: Types of natural sweeteners, manufacture, selection, storage and use as preserver, stages in sugar cookery.</p> <p>22. Fats and Oils: Types and sources (animal and vegetable), processing, uses in different preparations, storage, cost and nutritional aspects.</p> <p>23. Raising and Leavening agents: Types, Constituents, Uses in cookery and bakery, Storage.</p> <p>24. Food Adjuncts: Spices, Condiments, Herbs, Extracts, Concentrates, Essences, Food Colours. Origin, classification, Description, uses, Specifications, procurements and Storage.</p> <p>25. Convenience Foods: Role, types, advantages, uses, cost and contribution to diet.</p> <p>26. Salt: Types and uses.</p> <p>27. Beverages: Tea; Coffee. Chocolate and Cocoa Powder-Processing, cost and nutritional aspects, other beverages-Aerated beverages, juices.</p> <p>28. Preserved Products : Jams, Jellies, Pickles, Squashes, Syrups types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.</p> <p>29. Food Standards : ISI, Agmark, FPO, MPO, PFA. 30. New food: fast food, junk food, GM food, Free food</p> <p>31. Food, preservation, food processing, food adulteration and food storage.</p>				
--	---	--	--	--	--

Nutrition (Honours); semester-II

course	syllabus	Allotted teachers	Credits & marks	Class allotted per week	Total class
CC3	<p>C3T Nutritional Biophysics and biochemistry</p> <p>1. Biochemistry: Definition, objectives, scope and interrelationship between biochemistry and other biological science.</p> <p>2. Biophysics- general idea of biophysics in nutrition</p> <p>3. Basic process and nutritional importances of Diffusion,Osmosis, Absorption, Viscosity, Surface tension, Colloids.</p> <p>4. Principles of Thermodynamics and its importance in nutrition.</p> <p>5. Acid, Base, Buffer, pH and Acid-Base balance. 6. Molecular aspects of transport; Passive diffusion, facilitated diffusion, active transport.</p> <p>7. Enzymes: Definition, types and classification of enzymes, definition and types of coenzymes. specificity of enzymes, Isozymes, enzyme Kinetics including factors affecting enzyme action, velocity of enzyme catalyzed reactions, enzyme inhibition. 8. Intermediary metabolism: a) Carbohydrate Metabolism, Glycolysis, TCA cycle & energy generation, gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation. b) Lipids : Oxidation and biosynthesis of fatty acids (saturated & mono-unsaturated) : Synthesis and utilization of ketone bodies, Ketosis, fatty livers. c) Proteins : General reaction of amino acid metabolism, urea cycle.</p>	P.Jana	04&40	04	04X15=60

	<p>9. Lipoproteins : Types, composition, role and significance in disease (in brief)</p> <p>10. Introduction to Nucleic acids: Structure, replication, transcription, genetic code (in brief) elementary knowledge of biosynthesis of proteins.</p> <p>11. Fluid, Electrolytes and Acid-Base balance brief.</p>				
	<p>C3P Nutritional Biophysics and biochemistry(Practicals)</p> <p>1. To study the general properties of urease and salivary amylase.</p> <p>2. Preparation of buffer of particular PH (Phosphate buffer, tris buffer)</p> <p>3. Determination of strength of KMNO₄ using primary standard (oxalic acid).</p> <p>4. Electrophoresis</p> <p>5. Dialysis</p>	P.Bera	02&20	04	04X15=60
CC4	<p>C4T: HUMAN PHYSIOLOGY</p> <p>1. Cell structure and function</p> <p>2. Blood cells: Haemoglobin, Blood groups, Coagulation factors, Anaemia.</p> <p>3. Skeletal System: bones, joints and bone deformities in brief.</p> <p>4. Cardiovascular System: Cardiac cycle, Cardiac output, Blood pressure, Hypertension, Radial Pulse</p> <p>5. Lymphatic System: Lymph glands and its function, Splen- Structure and functions.</p> <p>6. Respiratory System:- Ventilation, functions, Lungs volume and capacities.</p> <p>7. Gastrointestinal System: a. Structure of various parts of the GI tract b. Digestion and absorption of Carbohydrate, protein and fat. (Digestion and absorption of Carbohydrate, protein and fat repeated in CC2T 6, 7, 8)</p> <p>8. Endocrinology: List of endocrine glands, Hormones their secretion and function (in brief)</p> <p>9. Excretory System: Structure of Nephron, formation of urine.</p> <p>10. Central Nervous System: Parts, Sliding filament theory, neuromuscular junction, wallerian degeneration, Motor Nervous System- Upper motor Nervous System and lower motor Nervous System. Sensory Nervous System, Sympathetic and Parasympathetic nervous system.</p> <p>11. Skin: Structure and function of skin</p> <p>12. Reproductive System: a. Structure and functions of male and female reproductive organs, Menstrual cycle, Puberty, Menopause, fertilization and development of fertilized ovum, placenta and its function.</p> <p>13. Special senses: Structure and function of eye and ear, common diseases in eye and ear (in brief).</p>	T.K.Giri	04&40	04	04X15=60
	<p>C4 P: HUMAN PHYSIOLOGY (Practicals)</p> <p>1. Identification of prepared Slides: (a) Lungs, (b) Supra Renal Gland, (c) Thyroid, (d) Pituitary (e) Testis, (f) Ovary, (g) Kidney, (h) Liver, (i) Pancreas, (j) Small Intestine, (k) Large Intestine, (l) Spinal cord, (m) Cerebellum.</p> <p>2. Preparation of blood film and identification of white blood cells, Differential count.</p> <p>3. Estimation of Haemoglobin.</p> <p>4. Determination of Bleeding time and clotting time of blood, Blood grouping.</p>	T.K.Giri	02&20	04	04X15=60

	5. Measurement of Blood pressure and Pulse Rate.				
	6. Elicitation of Reflexes and jerks.				
	7. Estimation of haemoglobin, RBC, WBC, TLC, DLC and ESR.				

Nutrition (Honours); semester-III

course	syllabus	Allotted teachers	Credits & marks	Class allotted per week	Total class
CC5	<p>CC5T: Family meal management and meal planning</p> <p>1. Nutrition during Pregnancy: Physiology of pregnancy, factors (nonnutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, nutritional factors affecting breast feeding. Deficiency of nutrients and impact- energy, iron, folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements- nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes and Adolescent Pregnancy.</p> <p>2. Nutrition during Lactation: Physiology of Lactation: Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.</p> <p>3. Nutrition during infancy: Infant physiology relevant to feeding and care. Breast feeding - colostrums, its composition and importance in feeding. Initiation of breast-feeding and duration of breast-feeding, Advantages of exclusive breast-feeding, Nutritional and other advantages of breast-feeding. Introduction of complementary foods, initiation of management of weaning, breast feeding etc. Bottlefeeding circumstances under which bottle-feeding is to be given. Care and sterilization of bottles. Preparation of formula. Mixed feeding, breast feeding and artificial feeding. Teething and management of problems.</p> <p>4. Nutrition to toddlers / preschool/school going children or adolescent.</p> <p>5. Management of preterm and low birth weight children – their special needs.</p> <p>6. Growth and development from infancy to adulthood: Importance of nutrition for ensuring adequate development, Preventions of growth faltering. Growth assessment by Height, Weight, BMI, Skin fold thickness, Waist Hip Ratio.</p> <p>7. Geriatric nutrition – Dietary requirement, Geriatric health problems, Nutritional care.</p> <p>8. Sports Nutrition- nutritional demand on different sports and dietary recommendations.</p> <p>9. Space Nutrition- Body composition changes in space, special diet in space persons.</p>	R.Jana	04&40	04	04X15=60

	<p>10. Meal planning for the family</p> <p>11. Indian meal pattern- vegetarian and non- vegetarian</p> <p>12. Food faddism and the faulty food habits</p> <p>13. Nutritive value of common Indian recepies.</p>				
	<p>C5P: Family meal management and meal planning (practical)</p> <p>1. Planning and preparation of balanced diet for a pregnant women</p> <p>2. Diet during complication of pregnancy</p> <p>3. Planning and preparation of balanced diet for a lactating women</p> <p>4. Preparation of weaning food</p> <p>5. Planning and preparation of balanced diet for a pre-school children</p> <p>6. Planning and preparation of balanced diet for school going child. Preparation of packed lunch</p> <p>7. Planning and preparation of balanced diet for adolescents</p> <p>8. Planning and preparation of balanced diet for adult men and women of different Physical activity and economic status.</p> <p>9. Planning and preparation of balanced diet for senior citizen</p>	K.Dash	02&20	04	04X1 5=60
CC6	<p>C6T: Community Nutrition and Nutritional Epidemiology</p> <p>1. Concept of community, types of community, factors affecting health of Community.</p> <p>2. Nutritional Anthropometry, Biochemical tests and Biophysical methodology - Merits, Limitations</p> <p>3. Diet Survey: Need and importance, methods of dietary survey- Merits and Limitations. Family food security.</p> <p>4. Clinical Signs: Merits, Limitations, Need and importance, identifying signs of PEM, vitamin A deficiency, Vit.-D deficiency and iodine deficiency, Classify clinical sign according to WHO.</p> <p>5. Nutritional problem in the community</p> <p>6. National Nutritional Intervention Programme to combat malnutrition</p> <p>7. Food availability, factors affective food availability and its consumption.</p> <p>8. Infection and Immunization: Importance and Schedule of Vaccination of Children, Adult and foreign travelers. Full and partial immunization. Role of community for universal vaccination implementation</p> <p>9. Principles of Epidemiology: Concept of disease, rate of a disease in a population (attack rate, morbidity rate, mortality rate, incidence and prevalence rate).</p> <p>10. Dietary Exposure-National, Household, Institution and Individual level (NHFS and NNMB) 11. Biomarkers and nutrient intakes.</p> <p>12. Epidemiological methods: descriptive studies, analytical studies and experimental studies.</p> <p>13. Study of the epidemiologic approach – time, place, person distribution. Determinants of disease. Vital statistics and their significance.</p> <p>14. Demography- Demography cycle and its applications. Socio-demographic and psychosocial variables.</p>	M.Samanta	04&40	04	04X1 5=60

	<p>15. Public health hazards from contaminated foods 16. Comparison with norms, standards, Z-scores.</p> <p>17. Interpretation of the nutritional assessment data and its significance</p> <p>18. Determining Validity and Reliability</p> <p>19. Sources of errors for different methods of measurement relating to nutritional exposures. 20. Malnutrition and Infection vicious cycle-UNICEF conceptual model of Malnutrition.</p>				
	<p>C6P: Community Nutrition and Nutritional Epidemiology (Practical)</p> <p>1. Diet and nutrition surveys a. Identification of vulnerable and risk groups b. Diet survey for breast feeding and weaning practices of specific groupsc. Use of anthropometric measurement of children and adolescent girls and boys</p> <p>2. Preparation of visual aids to highlight community nutrition, nutritional awareness, nutritional surveillance.</p> <p>3. Field visit toa. Observe the working of nutrition and health oriented programmes (survey based result). b. Hospitals to observe nutritional deficiencies</p>	P.Jana	02&20	04	04X1 5=60
CC7	<p>C7T: Basic Dietetics</p> <p>1. Role of dietician: The hospital and community 2. Basic Concepts of diet therapy</p> <p>3. Principle of diet therapy and therapeutic nutrition for changing needs</p> <p>4. Routine Hospital Diets: Regular, light, soft, fluid, parenteral and enteral feeding</p> <p>5. Diets for febrile conditions, infections and surgical conditions. 6. Diet for gastrointestinal disorders- Constipation, diarrhoea, peptic ulcer</p> <p>7. Diet for Renal Diseases- Nephritis, Nephrotic syndrome, Renal failure.</p> <p>8. Diet for obesity and different cardiovascular disorders</p> <p>9. Diet for diabetes mellitus</p> <p>10. Nutrition in cancer</p> <p>11. Nutrition in Immune system dysfunction (AIDS &Allergy)</p> <p>12. Nutrition support in metabolic disorder</p> <p>13. Nutrition in burn and surgery</p> <p>14. Nutrition- Addictive behaviour in anorexia nervosa, bulimia and alcoholism</p> <p>15. Nutrient Drug interaction</p> <p>16. Feeding infants and children's- problems in feeding children in hospital</p> <p>17. Nutrition and diet clinics- Nutrition education in general, Patients check-up and dietary counselling, educating the patient and follow up.</p>	P.Bera	04&40	04	04X1 5=60
	<p>C7P: Basic Dietetics (Practical)</p> <p>1. Planning and preparation of normal diets.</p> <p>2. Planning and preparation of fluid diets.</p> <p>3. Planning and preparation of soft/semi solid diets.</p> <p>4. Planning and preparation of high and low calorie diets.</p> <p>5. Planning and preparation of diets for diabetes mellitus 6. Planning and preparation of diet for hypertension and atherosclerosis</p> <p>7. Planning the preparation of diets for nephritis and nephrotic syndrome 8.</p>	P.Bera	02&20	04	04X1 5=60

	Planning and preparation of diets for Peptic Ulcers. 9. Low and medium cost diets for PEM, anaemia and vitamin A deficiency				
SEC 1	SEC1T: Biostatistics and Bioinformatics Theory: 1. Data and Data Types: Primary data and Secondary Data. 2. Measures of Central Tendency: Mean, Median, Mode. 3. Dispersion: Range, Standard Deviation. 4. Hypothesis Testing: Chi-square Test, Student't' test, Analysis of Variance (ANOVA). 5. Bioinformatics and Health Informatics: Concept and applications. 6. Nucleic acid and Protein Data Bases, Nutrient data bases. 7. Sequence similarity searching by BLAST, Principle, features and types of BLAST, Significance of Multiple Sequence Alignments, Phylogenetic Tree.	T.K.Giri	2&40	02	02X 15= 30

Nutrition (Honours); semester-IV

cours e	syllabus	Allotted teachers	Credits & marks	Class allotted per week
CC8	C8T: Diet and Diseases 1. Inborn error of metabolism – Lactose Intolerance, Galactosamia, Phenylketonuria and its dietary management. 2. Etiology, symptoms, diagnostic tests and dietary management of intestinal diseases: Diarrhea, Steatorrhoea, Diverticular disease, Inflammatory bowel disease, Ulcerative Colitis, Flatulence, Constipation, Irritable Bowel Syndrome, Haemorrhoids. 3. Etiology, symptoms, diagnostic tests and dietary management of Malabsorption syndrome, Celiac sprue, tropical sprue, Intestinal brushborder deficiencies (Acquired disaccharide intolerance), Protein losing enteropathy. RUTF. 4. Disease of the liver, Exocrine Pancreas and Biliary System. Liver function tests, application of diet therapy and nutritional care in liver disease. Dietary care and management in Viral Hepatitis, Cirrhosis of liver, Wilson's diseases. Dietary care and management in diseases of Gall Bladder and Pancreas Cholelithiasis, Cholecystitis, Cholecystectomy, Pancreatitis. 5. Anaemias: Pathogenesis and dietary management - Nutritional Anaemias, Sickle Cell Anaemias, Thalassemia, Anaemia resulting from Acute Haemorrhage. 6. Arthritis and gout: Etiology, symptoms, diagnostic tests and dietary management.	R.Jana	04&40	04
	C8P: Diet and Diseases (Practical) 1. Planning and preparation of diet for diarrhoea patient. 2. Planning and preparation of diet for Steatorrhoea patient.	P.Jana	02&20	04

	<p>3. Planning and preparation of diet for Diverticular disease patient.</p> <p>4. Planning and preparation of diet for Ulcerative Colitis patient.</p> <p>5. Planning and preparation of diet for Flatulence patient.</p> <p>6. Planning and preparation of diet for Constipation patient.</p> <p>7. Planning and preparation of diet for Irritable Bowel Syndrome patient.</p> <p>8. Planning and preparation of diet for Haemorrhoids patient.</p> <p>9. Planning and preparation of diet for Celiac sprue patient.</p> <p>10. Planning and preparation of diet for Viral Hepatitis patient.</p> <p>11. Planning and preparation of diet for Cirrhosis of liver patient.</p> <p>12. Planning and preparation of diet for Cholelithiasis patient.</p> <p>13. Planning and preparation of diet for Pancreatitis patient.</p> <p>14. Planning and preparation of diet for Anaemia patient.</p> <p>15. Planning and preparation of diet for Thalassemia patient.</p>			
CC9	<p>C9T: Food Microbiology</p> <p>1. Introduction to microbiology and its relevance to everyday life. General characteristics of bacteria, fungi, virus, protozoa and algae.</p> <p>2. Cultivation of microorganisms: Nutritional requirements of microorganisms, types of media used, methods of isolation.</p> <p>3. Growth of microorganisms: Growth curve, effect of environmental factors in growth of microorganism – pH, water activity, oxygen availability, temperature and others.</p> <p>4. Primary sources of microorganisms in foods, physical and chemical methods used in destruction of micro organisms in foods - sterilisation and disinfection.</p> <p>5. Food Spoilage: Contamination of micro organisms in the spoilage of different kinds of foods, such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and milk products, canned foods.</p> <p>6. Assessing the microbiological quality of food: indicator organisms, microbiological standards, principles of GMP & HACCP in food processing. Safety management at household and industrial level.</p> <p>7. Foodborne infections: Bacterial food infections-Salmonellosis, Shigellosis and Listeriosis. Food poisoning (Staphylococcal and Botulism) - Symptoms, mode of transmission and methods of prevention, Concept of aflatoxin intoxication.</p> <p>8. Beneficial effect of microorganisms-concept of probiotics and related factors</p> <p>9. Environmental microbiology: Water and water borne diseases, air and air borne diseases, soil and soil borne diseases, sewage and diseases.</p> <p>10. Waste product handling: Planning for waste disposal- solid wastes and liquid wastes.</p> <p>11. Fermented Foods- Dietary different fermented products, importance of fermented foods</p>	M.Samant a	04&4 0	04
	<p>C9P: Food Microbiology (Practical)</p> <p>1. Study of equipments in a microbiology lab.</p>	M.Samant a	02&2 0	04

	<p>2. Preparation of different culture media.</p> <p>3. Staining of bacteria with gram staining.</p> <p>4. Microbiological examination of milk (Methylene blue reduction test)</p> <p>5. Preparation of traditional Indian fermented food and its quality checking e.g. testing of physical, chemical and nutritional properties.</p>			
CC10	<p>C10T: Food processing and Preservation</p> <p>1. Significance, principles of different methods of food processing: thermal processing Cooking (moist heat, dry heat, combination method of cooking), blanching, pasteurization, sterilization, canning.</p> <p>2. Principles of microwave cooking and solar cooking.</p> <p>3. Principle of freezing, changes occurring during freezing. Types of freezing - slow freezing, quick freezing. Food preservation by drying and dehydration, differences between sun drying and dehydration (i.e. mechanical drying), types of driers used in the food industry.</p> <p>4. Preservation by Irradiation: Units of radiation, kinds of ionizing radiations used in food irradiation. Mechanism of action, concept of cold sterilization.</p> <p>5. Principle and methods of making pickles, jam and jellies from different vegetables / fruits.</p> <p>6. Principle and methods of preparation of food from cereals.</p> <p>7. Principle and methods of preparation of meat, fish, poultry and egg products.</p>	P.Bera	04&40	04
	<p>C10P: Food processing and Preservation</p> <p>1. Milk cookery: Experimental milk cookery. Preparation of selected common recipes.</p> <p>2. Egg cookery: Experimental cookery on eggs-boiled eggs, poached eggs, Omelettes and custards. Preparation of selected common recipes.</p> <p>3. Vegetables Cookery: a. Different methods of cooking vegetables – effect of shredding, dicing, acid and alkali, pressure cooking, steaming with and without lid. e.g. Potato, beetroot, carrot and greens. Recipes with Vegetables</p> <p>4. Fruits: Prevention of browning on fruits. Preparation of selected common recipes.</p> <p>5. Estimation of Sodium, Potassium, Calcium and Iron in different food stuffs.</p> <p>6. Estimation of vitamin C content of food by biochemical method. B: Visit to a food processing industry.</p>	P.Bera	02&20	04
SEC2	<p>SEC2T: Women Health & Nutrition</p> <p>1. Factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients, specially energy, iron folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements, specially - nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes. Adolescent pregnancy.</p> <p>2. Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.</p>	K.Dash	2&40	02

Nutrition (Honours); semester-V

course	syllabus	Allotted teachers	Credits & marks	Class allotted per week	Total class
CC11	CC11T: Public Health and Hygiene 1. Food adulteration: common, adulterants, and health hazards. Food standards and food laws. National and International; PFA, FSSAI, HACCP, ISO Certification; Consumer guidance society, Consumer rights, Consumer court, Central facilities for assessing food adulteration, Role of food inspectors. 2. Community Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water/portability and tests for portability, community, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal. 3. Food Borne Disorders: Food borne infections- Typhoid, Para typhoid, cholera, infective hepatitis, amoebiasis - Food borne intoxications- Disorders caused by; Natural toxins, chemical toxins and Microbiological toxins in food- Lathyrism, staphylococcal intoxication, Botulism, clostridium perfringens, Mycotoxins. 4. Food handling and Public Health: Preventing food borne illness and the spread of communicable disease; Sanitation of food serving institution; environmental sanitation, hygienic in food handling and personal hygiene of food handler. 5. Air & health- Indices of thermal comfort, Pollution a) Sources b) Pollutants c) Monitoring d) Effects e) Prevention & control. 6. Mental health- Health & diseases, Concept of a) Normality b) Mental health, Magnitude of the problem, Prevention of mental diseases, Alcohol related & drug related problems, mental health services in India. 7. Health care delivery system: Patterns of health care delivery, History of development of health care delivery system in India, Reports of different committees, Three-tier health care delivery system, Primary health center, Subcentre, CHV, Urban health infrastructure. 8. Demography & Population Control: Introduction, Definition, Demographic cycle, Population Pyramid, Fertility, Factors affecting fertility, Indicators of fertility, Population explosion as a public health problem, Approaches for population control, Family planning methods.	P.Bera	04&40	04	04X15=60
	C11P: Public Health and Hygiene List of Practical Assignment programme on public health, nutrition and disease – covering any one of the following fields 1. Protein under nutrition and its recovery. 2. Vitamin or Mineral under nutrition and its recovery. 3. Dietary management of non-communicable disease.	K.Dash	02&20	04	04X15=60

	<p>4. Dietary management of growing child.</p> <p>5. Impact of nutrition education on awareness development in the field of personal health.</p>				
CC12	<p>C12T: Research Methodology</p> <p>1. Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, Criteria of Good Research, Types of Research– Fundamental research, Applied Research, Action research, Qualitative Research, Quantitative Research, Historical research.</p> <p>2. Defining the Research Problem : Scientific Problem, Formation of scientific Problem, criteria of good research problem</p> <p>3. The Review of Literature: Meaning of Review of Literature, Need and importances of Review of Literature, Objectives of Review of Literature</p> <p>4. The Research Hypotheses: Definitions of Hypothesis, Functions of Hypothesis, types of Hypothesis, Characteristics of a Good Hypothesis</p> <p>5. Sampling – Criteria, Design, Characteristics of good sampling, types of sampling method. 6. Methods of Data Collection: Primary and secondary data, Criteria of good data, Observation Method, Interview method, questionnaire and Schedules, Case Study Method.</p> <p>7. Experimental design – single and multi group experimental design, Quasi experimental Design</p> <p>8. Ethical issues in research: Code of Ethics in Research – Ethics and Research Process – Importance of Ethics in Research</p>	M.Samanta	04&40	04	04X15=60
	<p>C12P: Research Methodology</p> <p>A Project work on public health / nutritional biochemistry / nutritional survey to be submitted. Formulation of the Project:</p> <p>1. Meaning of scientific research and its methods. Formulation of project design.</p> <p>2. Types of project design- exploratory, descriptive, experimental, cross sectional or longitudinal.</p> <p>3. Methods: survey, case study, anthropological or experimental</p> <p>4. Tools and techniques: observation, interviewing, questionnaire schedules or rating scales</p> <p>5. Tabulation and interpretation: Tabular and graphic representation of data and its interpretation, bar diagram, pie diagram. Statistical procedures - variables, mean, standard deviation, test of hypothesis (t-test), chi-square test, degrees of freedom, null hypothesis, z-score.</p>	M.Samanta	02&20	04	04X15=60
DSE1	<p>DSE1T: Food Sanitation and Hygiene</p> <p>1. The relationship of micro organisms to sanitation. Role of microbiology – Environmental effects of microbial growth. Effects of micro- organisms on food degradation and food borne illnesses- bacteria, virus, molds, yeasts, and parasites</p> <p>2. Other food hazards – chemicals, antibiotics, hormones, metal contamination poisonous foods. 3. Food contamination- sources and transmissions. Water, air, sewage and soil as reservoirs of infection and ways of spread. Other agents of contamination - Humans, domestic</p>	K.Dash	04&40	04	04X15=60

	<p>animals, vermins, birds.</p> <p>4. Importance of personal hygiene of food handler - habits -clothes, illness. Education of food handler in handling and serving food.</p> <p>5. Safety in food procurement, storage, handling and preparation – control of spoilage – safety of left over foods.</p> <p>6. Cleaning methods – sterilization, and disinfection –products and methods –use of detergents, heat, chemicals, and tests for sanitizer strength.</p> <p>7. Control of infestation: rodent control- rats, mice; vector control- use of pesticides</p> <p>8. Food sanitation, control and inspection-planning and implementation of training programme for health personnel.</p>				
	<p>DSE1P: Food Sanitation and Hygiene (Lab)</p> <p>1. Study of personal and environmental hygiene habits of street food handlers. Intervention and result analysis. Project submission and presentation.</p> <p>2. Preservation of fruits and vegetables for later use-peas, carrots, cauliflower, chutney, soup, pickle, jam, jelly, marmalade, squash.</p>	K.Dash	02&20	04	04X15=60
DSE2	<p>DSE2T: Food Quality and Sensory Evaluation UNIT- 1: Introduction to quality attributes of food • Appearance, flavour, textural factors and additional quality factors.</p> <p>UNIT- 2: Gustation • Introduction and importance of gustation. • Structure and physiology of taste organs- tongue, papillae, taste buds, salivary glands. • Mechanism of taste perception. • Chemical dimensions of basic tastes- sweet, salt, sour, bitter and umami. • Factors affecting taste quality, reaction time, taste modification, absolute and recognition threshold. • Taste measurement- Electronic Tongue. • Taste abnormalities.</p> <p>UNIT- 3: Olfaction • Introduction, definition and importance of odour and flavor. • Anatomy of nose, physiology of odour perception. • Mechanism of odour perception. • Theories of odour classification, chemical specificity of odour. • Odour measurement techniques – historical perspective and emphasis on recent techniques-enose,etc .Merits and Demerits of each methods. • Olfactory abnormalities.</p> <p>UNIT- 4: Colour • Introduction and importance of colour. • Dimensions of colour and attributes of colour;appearance factors, gloss etc. • Perception of colour. • Colour Measurement: Munsell colour system, CIE colour system, Hunter colour system, spectrophotometry and colorimetry etc. • Colour abnormalities.</p> <p>UNIT- 5: Texture • Introduction, definition and importance of texture. • Phases of• Texture perception, receptors involved in texture perception. • Rheology of foods. • Texture classification. • Texture measurement – basic rheological models, forces involved in texture measurement and recent advances in texture evaluation. • Application of texture measurement in cereals, fruits and vegetables, dairy, meat and meat products. oral processing</p>	R.Jana	04&40	04	04X15=60
	<p>DSE2P: Food Quality and Sensory Evaluation</p> <p>1. Training of sensory panel.</p> <p>2. To perform recognition and sensitivity tests for four basic tastes.</p>	R.Jana	02&20	04	04X15=60

	<p>3. To perform analytical and affective tests of sensory evaluation</p> <p>4. Recognition tests for various food flavors.</p> <p>5. Sensory evaluation of milk and milk products. 6. Flavor defects in milk</p> <p>7. Extraction of pigments from various fruits and vegetables and study the effect of temperature and pH.</p> <p>8. Texture evaluation of various food samples- crispies / cookies/ biscuits/ snack foods.</p> <p>9. Textural measurement of various food products using Texture Analyzer.</p> <p>10. Measurement of colour by using Tintometer/ Hunter Colour Lab etc.</p> <p>11. Qualitative tests for hydrogenated fats, butter, ghee</p> <p>12. Platform tests for milk.</p> <p>13. Quality evaluation of various food stuffs- cereals, pulses, honey, jaggery, sugar, tea, coffee, etc</p>				
--	---	--	--	--	--

Nutrition (Honours); semester-VI

course	syllabus	Allotted teachers	Credits & marks	Class allotted per week	Total class
CC13	<p>CT13: Dietetics and Counselling</p> <p>Unit-I: Introduction to Psychology and counselling Introduction to psychology – Definition , Nature and Scope. Attention and perception – Types of attention and factors influencing attention , principles of perceptual organization and abnormalities in perception. Learning and memory- Types of learning, Types of memory, Forgetting and its causes. Motivation and emotion- Types of motives, types of emotions, emotional expression. Personality- nature and definition , factors influencing personality, Psycho analytic theory of personality. Nature and goals of counselling. Principles of counselling. Characteristics of a good counsellor. Ethical principles of counselling. Special areas of counselling: Educational, family, health, community and counselling of alcoholic, and drug addicts.</p> <p>Unit-II: Counselling Skills Approaches to counselling – i. Psycho analytic approach, ii. Behaviouristic, iii. Humanistic approach. Pre – Helping phase: i. Rapport building skills, ii. Attending and listening skills, Stage I skills: Empathy, respect, Genuineness and concreteness, Stage II skills: Advanced empathy, self disclosure, Immediacy and Confrontation. Stage III skills: Goal setting, Action plan Programme and Brainstorming.</p> <p>Unit-III: Basics of Diet Counseling Diet Counselling - meaning, significance, process, types. Goals of counselling, individuals, group and family counselling. Basic sequence in counselling. Materials needed for counselling – models, charts, posters, AV aids, Hand outs etc. Communication process in counselling and linguistics in clinical dietary practices, problems in communication. Role of Counsellor & Counsee. Techniques of obtaining relevant information- 24 Hour Dietary recall, List of food likes and dislikes, Lifestyle. Dietician as a part of medical team and research team. Impact of counselling on health and disease of individuals – discussion of hospital case studies. Processes involved in dietary counseling Managing resources of the communicator/counselor. Designing of counseling plans – goals & objectives, evaluation instruments. Implementation: facilitating self-management of disease condition. Evaluation:</p>	K.Dash	04&40	04	04X15=60

<p>evaluating adherence to dietary changes. Counseling approaches after evaluation.</p> <p>Unit-IV: Practical consideration in giving dietary advice and counselling a) Factors affecting and individual food choice. b) Communication of dietary advice c) Consideration of behaviour modification d) Motivation.</p> <p>Unit-V: Counselling and educating patient a) Introduction to nutrition counselling, b) Determining the role of nutrition counsellor, c) Responsibilities of the nutrition counselor , d) Practitioner v/s client managed care, e) Conceptualizing entrepreneur skills and behavior , f) Communication and negotiation skills.</p> <p>Unit-VI: Teaching aids used by dietitians Charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.</p> <p>Unit-VII: Diet Counselling at Hospital and Community level Role of counselling in hospital. Role of counselling in community. Organizing health camps and patient feedback – at hospital level. Organizing health camps and patient feedback – at community level. Dietary counseling through the life span - Diet counselling plans for obese people, Diabetics, CVD, dyslipidemia, cancer risk prevention, renal diseases, liver disorders mother and child care, Prenatal and pregnant women, Lactating women Childhood nutrition problems like, SAM, weight management, vitamin and mineral deficiencies, School children, adolescents, young adults, fitness, weight management, eating disorders. Geriatric counselling. Patient follow up / home visits,</p> <p>Unit-VIII: Computer application a) Execution of software packages. b) Straight line, frequency table, bar diagram, pie chart, Preparation of dietary charts for patients. c) Statistical computation- mean, median, standard deviation, conclusion and regression test.</p> <p>Unit-IX: Computer application in dietetic management a) Use of computers by dietician, b) Dietary computations, c) Dietetic management ,d) Education/ training , e) Information storage, f) Administrations , g) Research</p> <p>Unit -X: Nutritional/medicinal role of traditional foods: Traditional food beliefs, role of Ayurveda, Naturopathy, Yoga and other traditional medicines in disease management.</p>				
<p>C13P: Dietetics and Counselling (Practical)</p> <ol style="list-style-type: none"> 1. Computer application for collection of data of different diseases. Submitting computed data. 2. Preparations of teaching aids in the field of nutrition. 3. Preparation of case history of a patient and feeding of information in the hard disc. 4. Understanding the use of conventional and non-conventional methods of counseling i. Face to face counseling. ii. Use of software for counseling e.g Dietcal. iii. Use of any one Diet App for counseling and assessing food intake. 5. Planning Nutrition counseling sessions and identifying ways to adhere to dietary changes for the following conditions: Lactation counseling, SAM. Eating disorders. Overweight / Obesity in School children, adolescent and adults. Metabolic syndrome. Diabetes- Gestational Diabetes. Renal disease, Liver disorders. 6. Organizing health camps and patient feedback – both at hospital level and community level. 7. Project planning for any one disease. 	K.Dash	02&20	04	04X15=60

CC14	<p>C14T: Entrepreneurship development, Enterprise management and Entrepreneurship for small catering</p> <p>Unit-I: Entrepreneurship development Entrepreneurship - concept, definition, need and significance of entrepreneurship development in India, entrepreneurship growth process, barriers, entrepreneurship education model. Entrepreneur- their characteristics, types, gender issues, role demands and challenges. Entrepreneurial motivation. Challenges faced by Women Entrepreneurs</p> <p>Unit- II: Enterprise Planning and Launching Types of enterprises classification based on capital, product, location, ownership pattern and process. Sensing business opportunities and assessing market potential; market research. Appraising of project and feasibility</p> <p>Unit-III: Enterprise Management and Networking a. Organization and Management - Principles of management. Functions of management/ manager. b. Managing Production: Organizing Production; input- output cycle. Ensuring Quality c. Managing marketing: Understanding markets and marketing. Functions of marketing. 4Ps of marketing (same as marketing mix). d. Financial Management: Meaning of Finance. Types and sources of Finance. Estimation of project cost. Profit Assessment. Networking of Enterprises. Importance of Financial Management. Budgets and Budgeting process. Cost concepts</p> <p>Unit - IV: Personnel management Functions of a personnel manager, Factors to consider while planning the kind and number of personnel: Menu, type of operations, Type of service, Job description and job specification</p> <p>Unit-V: Food service units, Menu planning, Food production process, Space and equipment 1. Food service units: Origin of Food Service units. Kinds of food service units. 2. Menu Planning: Importance of menu. Factors affecting menu planning, Types of menu. 3. Food Production Process: Food purchase and receiving, Storage. Quantity food production: Standardization of recipes, Recipe adjustments and portion control, Quantity food production techniques. Food service. Food hygiene and sanitation. 4. Space and Equipment: Types of kitchen areas, Flow of work and work area relationship. Equipment a) Factors affecting selection of equipment, b) Equipment needs for different situations</p> <p>Unit VI: Planning of a small food service unit a. Preliminary Planning: Survey of types of units, identifying clientele, menu, operations and delivery. b. Planning the set up: a) Identifying resources, b) Developing Project plan, c) Determining investments</p> <p>Unit-VII: Development of a business plan</p>	P.Jana	04&40	04	04X15=60
	<p>CC14P: Entrepreneurship development, Enterprise management and Entrepreneurship for small catering units (Practical)</p> <ol style="list-style-type: none"> 1. SWOT analysis with respect to entrepreneurial competencies through case profiling of successful entrepreneurs and enterprises. 2. Achievement Motivation lab-development of entrepreneurial competencies. 3. Survey of an institution facilitating entrepreneurship development in India. 4. Preparation of business plan. 5. Market survey for food items both raw and processed. Survey of food service units. 6. Standardization of a recipe. 7. Preparing Quick Foods for scaling up for quantity production. 8. Planning menus for the following: a. Packed meals for office employees. b. 	T.K.Giri	02&20	04	04X15=60

	<p>Nutritious Tiffin for school children. c. School/college canteens.</p> <p>9. Demonstration of a specialized cuisine.</p> <p>10. Develop a checklist for good hygiene practices.</p>				
DSE3	<p>DSE3T: Nutrition communication for Health promotion</p> <p>Course Contents:</p> <p>Unit-I: Dietary guidelines for nutrition and health related concerns National and international guidelines and their role in nutrition promotion. Critical appraisal of the current guidelines.</p> <p>Unit-II: Nutrition and behaviour inter-relationship Food and health behaviour, models/ theories of health behaviour, food choices, strategies for intervention at the ecological and individual level.</p> <p>Unit-III: Social and Behaviour Change Communication for nutrition and health promotion a. Concept and objectives of communication for behaviour change b. Planning of communication strategies for social and behaviour change programme, c. Communication needs analysis, stakeholders in nutrition promotion, developing nutrition education plan, identifying communication strategies/ approaches for nutrition and health promotion (e.g. social marketing), designing nutrition and health messages, selecting communication channels, developing and field testing of communication materials, designing training strategies for trainers and their capacity building. d. Implementing social and behaviour change communication intervention: an overview e. Evaluation of social and behaviour change communication programmes</p> <p>Unit-IV: Nutrition Advocacy a. Meaning, types, tools and techniques and advocacy planning. b. Role of advocacy in nutrition policy formulation, preparation of policy briefs.</p> <p>Unit V Ethics in nutrition and health communication a. Significance of ethics in nutrition and health communication. b. Ethical Principles and concerns</p>	M.Samanta	04&40	04	04X15=60
	<p>DSE3P: Nutrition communication for Health promotion (Practical)</p> <p>1. Planning of communication strategies for public health nutrition problems among vulnerable groups in the community -field testing of messages, materials and methods.</p> <p>2. Review of communication strategies being used in any one public health nutrition programme in the community.</p>	M.Samanta	02&20	04	04X15=60
DSE4	<p>DSE4T: Sea food and Dairy Technology</p> <p>Course Contents: Technology of Sea food:</p> <p>Unit-I: Introduction. Status of fishery industry in India.</p> <p>Unit-II: Chilling and Freezing of fish. Relationship between chilling and storage life, MAP, general aspects of freezing, freezing systems (air blast freezing, plate or contact freezing spray or immersion freezing, freezing on board, onshore processing, changes in quality in chilled and frozen storage, thawing.</p> <p>Unit-III: Fish Curing and Smoking - Drying and salting of fish, water activity and shelf-life, salting process, salting methods (brining, pickling, kench curing, gaspe curing), types of salts, dried and salted fish products- pindang, fishwood, dried shrimp. Preservation by smoking, smoke production, smoke components, quality, safety and nutritive value of smoked fish, processing and equipment, pre-smoking processes, smoking process control. Traditional chimney kiln, modern mechanical fish smoking kiln, examples of smoked and dried products.</p>	Dr.A.Giri	04&40	04	04X15=60

<p>Unit-IV: Canning of fish: Principles of canning, classification based on pH groupings, effect of heat processing on fish, storage of canned fish, pre-process operations, post process operations, cannery operations for specific canned products.(Tuna,Mackerel,Sardine).</p> <p>Unit-V: Fishery by-products - Surimi- Introduction, fish muscle proteins, the surimi process, traditional and modern surimi production lines, quality of surimi products, comparision of surimi and fish mince products. Fish protein concentrates (FPC), fish protein extracts (FPE), fish protein hydrolysis (FPH)</p> <p>Unit-VI: Fermented fish- Flowchart of Indigenous products- Fish sauce and Paste</p> <p>Unit-VII: Concept of other Sea foods - Crabs, lobsters, prawns, shrimps, shell-fish. Technology of milk and milk products</p> <p>Unit-VIII: Physical properties of milk : Color, taste, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, OR, electrical conductivity.</p> <p>Unit-IX: Lactose - Lactose (alpha and beta forms and their differences) Significances of lactose in dairy industry.</p> <p>Unit-X: Milk fat: Composition and structure, factors affecting melting point, boiling point, solubility and Refractive Index, fat constants (saponification value, iodine value, RM value, Polenske value, peroxide value). Chemical reactions of fat (hydrolysis, auto-oxidation), condition favouring autooxidation, prevention, measurement of auto-oxidation.</p> <p>Unit-XI: Protein and Enzymes - General structure, amphoteric nature, difference between casein and serum protein, different types of casein (acid and rennet), uses of casein, fractionation of protein. Enzymes- catalase, alkaline phosphatase, lipases and proteases.</p> <p>Unit-XII: Market milk industry and milk products: Systems of collection of milk Reception, Platform testing- Various stages of processing, Filtration, Clarification • Homogenization • Pasteurization • Description and working of clarifier, cream separator, homogenizer and plate heat exchanger. Flow diagram of following milk products - Butter, ghee, flavored milk, yoghurt, dahi, shrikhand, ice-cream, condensed milk, milk powder, channa, paneer, cheese (cheddar).</p>				
<p>DSE4P: Sea food and Dairy Technology (Practical)</p> <p>1. Perform platform tests in milk.(Acidity, COB, MBRT, specific gravity, SNF)</p> <p>2. Estimate milk protein by Folin method.</p> <p>3. Estimate milk fat by Gerber method.</p> <p>4. Preparation of flavoured milk. Pasteurization of milk.</p> <p>5. Prepare casein and calculate its yield.</p> <p>6. Quality evaluation of fish/prawn.</p> <p>7. Subjective evaluation of Fresh Fish.</p> <p>8. Cut out examination of canned fish.(Sardine, Mackerel, Tuna)</p> <p>9. Fish product formulation/canning</p>	Dr.A.Giri	02&20	04	04X15=60

Department of Botany

Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
DSC-1A(CC)	Biodiversity (Microbes, Algae, Fungi and Archegoniate) Unit 1: Microbes Viruses – Discovery, general structure, replication	TANUS HREE	06 = (4T+2P)	02	02×1

-1) :	<p>(general account), DNA virus (T phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.</p> <p>Unit 4: Introduction to Archegoniate Unifying features of archegoniates, Transition to land habit, Alternation of generations.</p> <p>Unit 5: Bryophytes General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of Sphagnum.</p> <p>Unit 6:</p> <p>Pteridophytes General characteristics, classification, Early land plants (Cooksonia and Rhynia). Classification (up to family), morphology, anatomy and reproduction of Selaginella, Equisetum and Pteris. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.</p>	DE	(CA=15+ ESE=60) TOTAL- 75		5=30
	<p>Unit 2: Algae General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus, Polysiphonia. Economic importance of algae</p> <p>Unit 3: Fungi Introduction - General characteristics, ecology and significance, range of thallus organization, cell wall composition, nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of Rhizopus (Zygomycota) Penicillium, Alternaria (Ascomycota), Puccinia, Agaricus (Basidiomycota); Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance</p> <p>Unit 4: Gymnosperms General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of Cycas and Pinus. (Developmental details not to be included). Ecological and economical importance.</p>	MANAS KHALU A		04	04×1 5=60
DSC1P (C1P) :	<p>Biodiversity (Microbes, Algae, Fungi and Archegoniate(Practical)</p> <p>1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle. 2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule. Gram staining</p> <p>2. Marchantia- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides). 11. Funaria- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.</p> <p>3. 15. Cycas - morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide). 16. Pinus - morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).</p>	TANUS HREE DE	02	01	15×1 =15
	<p>4. Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Fucus* and Polysiphonia through temporary preparations and permanent slides. (* Fucus - Specimen and permanent slides) 4. Rhizopus and Penicillium: Asexual stage from temporary mounts and sexual structures through permanent slides. 5. Alternaria:</p>	MANAS KHALU A		01	15×1 =15

	Specimens/photographs and tease mounts. 6. Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts. 7. Agaricus: Specimens of button stage and full grown mushroom; Sectioning of gills of Agaricus. 8. Lichens: Study of growth forms of lichens (crustose, foliose and fr				
	5. Selaginella - morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide). 13. Equisetum - morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide). 14. Pteris - morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporary slides), t.s. rhizome, w.m. prothallus with sex organs and young sporophyte (permanent slide).				
Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
DSC-1B (CC-2):	Plant Ecology and Taxonomy Unit 1: Introduction Unit 2: Ecological factors Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes. Unit 3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types. Unit 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous Unit 5: Phytogeography Principle biogeographical zones; Endemism	T.DE	06= (4T+2P) (CA=15+ ESE=60) TOTAL- 75	02	02×1 5=30
	Unit 6 Introduction to plant taxonomy Identification, Classification, Nomenclature. Unit 7: Identification Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access Unit 8:Taxonomic evidences from palynology, cytology, phytochemistry and molecular data. Unit 9: Taxonomic hierarchy Ranks, categories and taxonomic groups Unit 10: Botanical nomenclature Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations. Unit 11: Classification Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series). Unit 12: Biometrics, numerical taxonomy and cladistics Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences)	M.KHA LUA		02	02×1 5=30
	PRACTICAL:Plant Ecology and Taxonomy: 1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter. 2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test. 3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats. a. Study of morphological adaptations of hydrophytes and xerophytes (four each). b. Study of biotic interactions of the following: Stem parasite (Cuscuta), Root parasite (Orobanch), Epiphytes, Predation (Insectivorous plants) 4. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)	M.KHA LUA		01	1×15 =15
	5. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution	T.DE		01	1×15 =15

	<p>law</p> <p>6. 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): Brassicaceae - Brassica, Alyssum / Iberis; Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae - Solanum nigrum, Withania; Lamiaceae - Salvia, Ocimum; Liliaceae - Asphodelus / Lilium / Allium.</p> <p>7. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book)</p>				
--	--	--	--	--	--

Sem-III

Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
DSC 1CT(C 3T) :	Plant Anatomy and Embryology: Unit 1: Meristematic and permanent tissues Unit 4: Adaptive and protective systems Unit 6: Pollination and fertilization	T. DE	06=(4T+2P) (CA=15+ESE=60) TOTAL-75	02	15×2=30
	Unit 2: Organs Unit 3: Secondary Growth Unit 5: Structural organization of flower Unit 7: Embryo and endosperm Unit 8: Apomixis and polyembryony	M.KHA LUA		03	15×3=45
DSC1C P(C3P) :	Plant Anatomy and Embryology(Practical): 1. Study of meristems through permanent slides and photographs. 2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photograph) 2. 6. Adaptive anatomy: Xerophyte (Nerium leaf); Hydrophyte (Hydrilla stem). 3. 11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).	T. DE		01	15×1=15
	4. Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides). 4. Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides). 5. Leaf: Dicot and Monocot leaf (only Permanent slides). 5. 7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides). 8. Types of ovules: anatropous, orthotropous, circumscissile, amphitropous/campylotropous. 9. Female gametophyte: Polygonum (monosporic) type of Embryo sac Development (Permanent slides/photographs). 10. Ultrastructure of mature egg apparatus cells through electron micrographs. 6. 12. Dissection of embryo/endosperm from developing seeds. 7. 13. Calculation of percentage of germinated pollen in a given medium	M.KHA LUA		02	15×2=30

Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
SEC-1:	<p>Biofertilizers:</p> <p>Unit 1:General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.</p> <p>Unit 4: Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.</p>	T.DE	O2 (10+40) = 50	02	15×2 =30
	<p>Unit 2:Azospirillum: isolation and mass multiplication – carrier based inoculant, associative effect of different microorganisms. Azotobacter: classification, characteristics – crop response to Azotobacter inoculum, maintenance and mass multiplication. Unit 3:Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.</p> <p>Unit 5:Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting – field Application.</p>	M.KHA LUA		01	15×1 =15

Sem-V

Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
DSE1T :	<p>Economic Botany and Biotechnology</p> <p>Unit 1: Origin of Cultivated Plants Concept of centres of origin, their importance with reference to Vavilov's work Unit 2: Cereals Wheat - Origin, morphology, uses U nit 3: Legumes General account with special reference to Gram and soybean U nit 4: Spices General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses) U nit 5: Beverages Tea (morphology, processing, uses) U nit 6: Oils and Fats General description with special reference to groundnut Unit 7: Fibre Yielding Plants General description with special reference to Cotton (Botanical name, family, part used, morphology and uses</p>	T.DE	06=(4T +2P) (CA=1 5+ ESE=6 0) TOTAL-75	03	15×3 =45
	<p>Unit 8: Introduction to biotechnology U nit 9: Plant tissue culture Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications 15 Unit 10: Recombinant DNA Techniques Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy</p>	M.KHA LUA		02	15×2 =30
DSE1P :	<p>Economic Botany and Biotechnology(Practical):</p> <ol style="list-style-type: none"> 1. Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests 2. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE. 	M.KHA LUA		01	15×1 =15
	<p>2. Familiarization with basic equipments in tissue culture. 3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.</p>	T.DE		01	15×1 =15

Sem-III
PAPER- GE3

Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
DSEIT :	Economic Botany and Biotechnology Unit 1: Origin of Cultivated Plants Concept of centres of origin, their importance with reference to Vavilov's work Unit 2: Cereals Wheat - Origin, morphology, uses U nit 3: Legumes General account with special reference to Gram and soybean U nit 4: Spices General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses) U nit 5: Beverages Tea (morphology, processing, uses) U nit 6: Oils and Fats General description with special reference to groundnut Unit 7: Fibre Yielding Plants General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)	T.DE	06=(4T +2P) (CA=15+ ESE=60) TOTAL-75	03	15×3 =45
	Unit 8: Introduction to biotechnology U nit 9: Plant tissue culture Micropropagation ; haploid production through androgenesis and gynogenesis; brief account of embryo & endosperm culture with their applications 15 Unit 10: Recombinant DNA Techniques Blotting techniques: Northern, Southern and Western Blotting, DNA Fingerprinting; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR and Reverse Transcriptase-PCR. Hybridoma and monoclonal antibodies, ELISA and Immunodetection. Molecular diagnosis of human disease, Human gene Therapy	M.KHA LUA		02	15×2 =30
DSEIP :	Economic Botany and Biotechnology(Practical): 1. Study of economically important plants : Wheat, Gram, Soybean, Black pepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests 2. 4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.	M.KHA LUA		01	15×1 =15
	2. Familiarization with basic equipments in tissue culture. 3. Study through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation.	T.DE		01	15×1 =15

Sem-VI
PAPER- DSE-2:

Course	Unit	Name of teacher	Credit & Marks	Class allotted per week	Total class
DSE-2:	<p>Genetics and Plant Breeding:</p> <p>Unit 1: Heredity 1. Brief life history of Mendel 2. Terminologies 3. Laws of Inheritance 4. Modified Mandelian Ratios: 2:1- lethal Genes; 1:2:1- Co - dominance, incomplete dominance;- 9:7; 9:4:3; 13:3; 12:3:1. 5. Chi Square 6. Pedigree Analysis 7. Cytoplasmic Inheritance: Shell Coiling in Snail, Kappa particles in Paramecium, leaf variegation in Mirabilis jalapa, Male sterility. 8. Multiple allelism 9. Pleiotropism 10. Chromosome theory of Inheritance.</p> <p>Unit 5: Plant Breeding Introduction and objectives. Breeding systems: modes of reproduction in crop plants. Important achievements and undesirable consequences of plant breeding. Unit 6: Methods of crop improvement Introduction: Centres of origin and domestication of crop plants, plant genetic resources; Acclimatization; Selection methods: For self pollinated, cross pollinated and vegetatively propagated plants; Hybridization: For self, cross and vegetatively propagated plants – Procedure, advantages and limitations. Unit 7: Quantitative inheritance Concept, mechanism, examples. Monogenic vs polygenic Inheritance. Unit 8: Inbreeding depression and heterosis History, genetic basis of inbreeding depression and heterosis; Applications. Unit 9: Crop improvement and breeding Role of mutations; Polyploidy; Distant hybridization and role of biotechnology in crop improvement. DSE2P: Genetics and PI</p>	M.KHALU A	06=(4T+2P) (CA=15+ESE=60) TOTAL-75	03	15×3=45
	<p>Unit 2: Sex-determination and Sex-linked Inheritance</p> <p>Unit 3: Linkage and Crossing over Linkage: concept & history, complete & incomplete linkage, bridges experiment, coupling & repulsion, recombination frequency, linkage maps based on two and three factor crosses. Crossing over: concept and significance, cytological proof of crossing over. Unit 4: Mutations and Chromosomal Aberrations Types of mutations, effects of physical & chemical mutagens. Numerical chromosomal changes: Euploidy, Polyploidy and Aneuploidy ; Structural chromosomal changes: Deletions, Duplications, Inversions & Translocations</p>	T.DE		02	15×2=30
DSE2P :	<p>Genetics and Plant Breeding(Practical):</p> <p>1. Mendel's laws through seed ratios. Laboratory exercises in probability and chisquare. 2. Chromosome mapping using point test cross data. 3. Pedigree analysis for dominant and recessive autosomal and sex linked traits. 4. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).</p> <p>2. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge</p>	M.KHALU A		02	15×2=30
	<p>6. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes through photographs.</p> <p>7. Hybridization techniques - Emasculation, Bagging (For demonstration only). 8. Induction of polyploidy conditions in plants (For demonstration only)</p>	T.DE		01	15×1=15

Department of Physiology (UG)
2021-2022

Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Topic /Unit	Allotted Teacher Name	Class allotted per week	Total Class
Semester -I Core Course (CC)	C1T : Cellular Physiology, Biophysical Principles,	75	06	Membrane physiology: Diffusion, Osmosis, Dialysis, Ultrafiltration, Surface tension, Adsorption, Absorption, pH and buffers, Colloids. Enzymes –	Biswadyuti Bera	4	4x 15 = 60
	Biochemistry and metabolism				Biswadyuti Bera & Sujaya Mahaptra		
	Digestive system				Sujaya Mahaptra		
C1P : Practical:	1. Fresh tissue experiments: 2. Identificatin of Slide		Credits 02	Examination & staining of fresh tissue: Bone, cartilage, lung, trachea, spleen, lymph etc .	Biswadyuti Bera Sujaya Mahaptra	6	6X15=90

Semester-II Core Course (CC)	DSC1BT: Blood, body fluid and immune System, Cardiovascular System and Respiratory System	75	06	Blood & Body fluids: Immune System Cardiovascular system: Respiratory System:	Sujaya Mahaptra Biswadyuti Bera & Sujaya Mahaptra Biswadyuti Bera	4	4X15=60
DSC1BP: Practical	Haematology: Human Experiment:				Sujaya Mahaptra Biswadyuti Bera	4	4X15=60

Semester-III Core Course (CC)	DSC-1C (CC-3): Nerve – Muscle Physiology, Nervous system, Skin and Body Temperature Regulation	75	06	DSC1CT: Nerve – Muscle Physiology, Nervous system, Skin and Body Temperature Regulation	Sujaya Mahaptra Biswadyuti Bera	4	4x15=60
DSC1CP: Practical				Staining of nerve fibers Nodes of Ranvier Grip strength, Body temperature etc. Superficial &	Biswadyuti Bera	2	2x15=30

	<u>Neurologic-alexperim-ents:</u>			Deep reflex, Reaction time by Stick drop Test etc. Study of kymograph, Calculation of work done by muscle etc.	Sujaya Mahaptra Biswadyuti Bera		
	Demonstration:						

Semester-IV Core Course (CC)	Sensory Physiology, Endocrinology and Reproductive Physiology, Renal Physiology	75	6	Olfaction and Gustation: Audition & Equilibrium: Vision: Hypothalamo - Hypophyseal axis: Pituitary gland: Thyroid gland: Parathyroid gland: Adrenal Cortex: Adrenal Medulla: Pancreas: Reproductive Physiology: Testis: Ovary: Oestrus and menstrual cycles Renal Physiology: Structure and functions of kidney.	Sujaya Mahaptra Biswadyuti Bera Sujaya Mahaptra Biswadyuti Bera	4	15x4=60
DSC1DP: Practical	Staining and identification of kidney & Ureter, etc			Staining and identification of kidney & Ureter, etc Study of Estrous cycle	Biswadyuti Bera Sujaya Mahaptra		

Demonstration:				etc Effect of Oxitocin on uterine contraion etc.			
Semester-V Core Course (CC)	DSE1AT: Environmental Physiology	75	06	Ecosystem Environment: Environmental Pollutions Environmental managem -ent:	Biswadyuti Bera Sujaya Mahaptra	3	3x15=45
DSE1AP:	(experimental) (Demonstration)			Environmen -tal temperature measurement,BOD &COD ,total alkalinity , Light intensity,De-trmi. sound level. Kymographic recording of Hg & Pb etc.	Sujaya Mahaptra Biswadyuti Bera		
SEC- 3:	Maternal & child nutrition			Unit – I Unit – II Unit – III Unit – IV	Biswadyuti Bera Sujaya Mahaptra	2	2x15=30
Semester VI	Microbiology, Immunity & Biotechnology			Microbiology: Immunity and vaccination: Biotechnology:	Sujaya Mahaptra Biswadyuti Bera	4	4x15=60
DSE1BP:	Practical			Study disinfection, sterilization, Gram Staining, isolation of DNA etc.	Sujaya Mahaptra Biswadyuti Bera	3	3x15=45

Semester – I Generic Elective Syllabus	GE-1T1 Blood and Immune System and Cardiovascular system	75	6	A. Blood and Immune System B. Cardiovascular system	Sujaya Mahaptra Biswadyuti Bera	4	4x15=60
GE-1P1:	Practical			A. TC, DC, Hæmin - Crystal, blood group. etc B. HR, BP, Step test. etc	Sujaya Mahaptra Biswadyuti Bera	2	2x15=30

Generic Elective	GE 2 T :	75	06	Embryology Gametogenesis: Fertilization: Cleavage: Blastula formation: Gastrulation: Organogenesis:	Sujaya Mahaptra Biswadyuti Bera	4	4x15=60
	GE2 P:			H & E Staining	Biswadyuti Bera	1	1x15
Semester- III <u>Core Course (CC):</u>	GE-3T	75	06	Community & public health	Biswadyuti Bera Sujaya Mahaptra	4	4x15=60
GE-3P:	GE3 P: Practical			Community and Public Health	Biswadyuti Bera	1	1x15

Semester- IV(cc):	GE-4T	75	06	A. Nerve Muscle physiology, B. Nervous System, C. Special sense	Biswadyuti Bera Sujaya Mahaptra	3	3x15=45
GE-4P:	GE4 P: Practical			Isolation & Staining of nerve, Grip Strength Visual acuity Test	Sujaya Mahaptra Biswadyuti Bera	2	2x15=30

Department of Geography
2021-2022

Course	Course Content/ Syllabus	Credit	Teacher	CA/wk	Total
SEM1					
C1T	<u>C1T: Geotectonics and Geomorphology</u>	6			
	<u>Unit 1:</u>	2			
	1. Earth's tectonic and structural evolution with reference to geological time scale		RP	2	30
	2. Earth's interior with special reference to seismology. Isostasy: Models of Airy and Pratt		SS	2	30
	3. Plate Tectonics: Processes at constructive, conservative, destructive margins and hotspots; resulting landforms		SS	2	30
	4. Folds and Faults—origin and types		SB	2	30
	<u>Unit 2:</u>	4			
	1. Degradational processes: Weathering, mass wasting and resultant landforms		SD	2	30
	2. Processes of entrainment, transportation and deposition by different geomorphic agents. Role of humans in landform development.		IBC	2	30
	3. Development of river network and landforms on uniclinal and folded structures		SB	2	30
	4. Landforms on igneous rocks with special reference to Granite and Basalt		SB	2	30
	5. Karst landforms: Surface and sub-surface. Coastal processes and landforms.		RP	2	30
	6. Glacial and fluvio-glacial processes and landforms; fluvio-glacial landforms		MR	2	30
	7. Aeolian and fluvio-aeolian processes and landforms; fluvio-aeolian processes		MR	2	30
	8. Models on landscape evolution: Views of Davis, Penck, King and Hack		IBC	2	30
	<u>C2T: Cartographic Techniques</u>	04			
	1. Maps: Classification and types. Components of a map.		SS	2	30
	2. Concept and application of scales: Plain, comparative, diagonal and vernier		RP	2	30

	3. Coordinate systems: Polar and rectangular. Concept of geoid and spheroid		MR	2	30
	4. Concept of generating globe. Grids: angular and linear systems of measurement		IBC	2	30
	5. Bearing: Magnetic and true, whole-circle and reduced.		SD	2	30
	6. Map projections: Classification, properties and uses. Concept and significance of UTM projection.		IBC	2	30
	7. Basic concepts of surveying and survey equipment: Prismatic compass, dumpy level, theodolite, Abney level, clinometer.		SB	2	30
	8. Survey of India topographical maps: Reference scheme of old and open series. Information on the margin of maps		SD	2	30
	C2P : Cartographic Techniques Lab	2			
	1. Graphical construction of scales: Plain, comparative, diagonal and vernier		RP SS	2	30
	2. Construction of projections: Polar Zenithal Stereographic, Simple conic with two standard parallels, Bonne's, Cylindrical Equal Area, and Mercator's.		IBC	2	30
	3. Delineation of drainage basin from Survey of India topographical map. Construction and interpretation of relief profiles (superimposed, projected and composite), relative relief map, slope map (Wentworth), and stream ordering (Strahler) on a drainage basin.		SD MR	2	30
	4. Correlation between physical and cultural features from Survey of India topographical maps. using transect chart		SB	2	30

Course	Course Content/ Syllabus	Credits	Teacher	CA/wk	Total
SEM2	CC-3: Human Geography	6			
C3T					
	Unit I: Nature and Principles	2			
	1. Nature and scope and recent trends. Elements of Human Geography		IBC	1	15
	2. Approaches to the study of Human Geography; Resource, Locational, Landscape, Environmental		MR	1	15
	3. Evolution of humans. Concept of race and ethnicity		IBC	1	15
	4. Space, society and cultural regions (language and religion)		IBC	1	15
	Unit :II: Society, Demography and Ekistics	4			15
	1. Evolution of human societies: Hunting and food gathering, pastoral nomadism, subsistence farming, industrial and urban societies		SS	1	15
	2. Human adaptation to environment: Eskimo, Masai, Jarwa, Gaddi, Santhals.		SD	1	15
	3. Population growth and distribution, population composition; demographic transition model		SB	1	15
	4. Population-Resource regions (Ackerman)		MR	1	15
	5. Human population and environment with special reference to development-environment conflict		SD	1	15
	6. Social morphology and rural house types in India		SB	1	15
	7. Types and patterns of rural settlements		RP	1	15
	8. Types and patterns of urban settlements		RP	1	15
	C4 T: Cartograms and Thematic Mapping	04			
CC4	1. Concepts of rounding, scientific notation, logarithm and anti-logarithm, natural and log scales		SS	1	15

	2. Diagrammatic representation of data: Line, Bar, and Circle		RP	1	15
	3. Representation of point data: Isopleths.		MR	1	15
	4. Representation of area data: Dots, proportional circles and choropleth		IBC	1	15
	5. Preparation and interpretation of large scale thematic maps: Geomorphological maps		IBC	1	15
	6. Preparation and interpretation of large scale thematic maps: Climatological maps		SD	1	15
	7. Preparation and interpretation of large scale thematic maps: Land use land cover maps		SB	1	15
	8. Preparation and interpretation of large scale thematic maps: Socio-economic maps		MR	1	15
	C4 P: Cartography lab	02			
	1. Traverse survey using Prismatic Compass		SD	2	30
	2. Levelling by Dumpy Level and Prismatic Compass		SB	2	30
	3. Thematic maps: Proportional squares, pie diagrams with proportional circles, dots and spheres		IBC	2	30
	4. Thematic maps: Choropleth, isoline map, chorochromatic map		MR	2	30
			RP	2	30
			SS	2	30

Course	Course Content/ Syllabus	Credit	Teacher	CA/wk	Total
SEM3					
CC5	Climatology:	Credit 06			
	Unit I: Elements of the Atmosphere:	Credit 02			
	1. Nature, composition and layering of the atmosphere,		SB	1	15
	2. Isolation: controlling factors. Heat budget of the atmosphere.		SB	1	15
	3. Temperature: horizontal and vertical distribution. Inversion of temperature: types,causes and consequences.		RP	1	15
	4. Greenhouse effect and importance of ozone layer.		RP	1	15
	Unit II: Atmospheric Phenomena and Climatic Classification:	Credit 04			
	1. Condensation: Process and forms. Mechanism of precipitation: Bergeron-Findeisentheory, collision and coalescence. Forms of precipitation.		SS	1	15
	2. Air mass: Typology, origin, characteristics and modification.		SS	1	15
	3. Fronts: warm and cold; frontogenesis and frontolysis.		SD	1	15
	4. Weather: stability and instability; barotropic and baroclinic conditions.		MR	1	15
	5. Circulation in the atmosphere: Planetary winds, jet stream, index cycle		IBC	1	15
	6. Tropical and mid-latitude cyclones		SD	1	15
	7. Monsoon circulation and mechanism with reference to India		IBC	1	15
	8. Climatic classification after Köppen, Thornthwaite and Oliver		MR	1	15
	C6T: Statistical Methods in Geography:	Credit 04			
	Unit I	Credit 02			
	1. Importance and significance of Statistics in Geography. Discrete and continuous data, population and samples, scales of measurement (nominal, ordinal, interval and ratio), sources of data		RP SS	1 1	15 15
	2. Collection of data and formation of statistical tables		SD	1	15
	3. Sampling: Need, types, and significance and methods of		SS	1	15

CC7	random sampling				
	4. Theoretical distribution: frequency, cumulative frequency, normal and probability		MR	1	15
	Unit II	Credit 02			
	1. Central tendency: Mean, median, mode, partition values		MR	1	15
	2. Measures of dispersion range, mean deviation, standard deviation, coefficient of variation		SB	1	15
	3. Association and correlation: Rank correlation, product moment correlation		IBC	1	15
	4. Regression (linear and non-linear) and time series analysis (moving average)		IBC	1	15
	C6 P – Statistical Methods in Geography:	Credit 02			
	1. Construction of data matrix with each row representing an aerial unit (districts /blocks / <i>mouzas</i> / towns) and corresponding columns of relevant attributes.		RP	2	30
	2. Based on the above, a frequency table, measures of central tendency and dispersion would be computed and interpreted.		SD	2	30
	3. Histograms and frequency curve would be prepared on the dataset.		MR	2	30
	From the data matrix a sample set (20%) would be drawn using, random, and systematic and stratified methods of sampling and locate the samples on a map with a short note on methods used.		SS	2	30
	4. Based on of the sample set and using two relevant attributes, a scatter diagram and regression line would be plotted and residual from regression would be mapped with a short interpretation.		SB IBC	2 2	30 30
		Credit 06			
	C7T: Geography of India:				
	Unit I: Geography of India	Credit 04			
	1. Tectonic and stratigraphic provinces, physiographic divisions		IBC	1	15
	2. Climate, soil and vegetation: Characteristics and classification		MR	1	15
	3. Population: Distribution, growth, structure and policy		SB	1	15
	4. Distribution of population by race, caste, religion, language, tribes and their correlates		SB	1	15

	5. Agricultural regions. Green revolution and its consequences		MR	1	15
	6. Mineral and power resources distribution and utilisation of iron ore, coal, petroleum, gas;		RP	1	15
	7. Industrial development: Automobile and information technology		SS	1	15
	8. Regionalisation of India: Physiographic (R. L. Singh), Socio-cultural (Sopher) and Economic (Sengupta)		IBC	1	15
	Unit II: Geography of West Bengal:	Credit 02			
	1. Physical perspectives: Physiographic divisions, forest and water resources		SS	1	15
	2. Population: Growth, distribution and human development		RP	1	15
	3. Resources: Mining, agriculture and industries		SD	1	15
	4. Regional Problem: Darjeeling Hills, Jangalmahal and Sundarban		SD	1	15
SEC-1	Coastal Management Coastal Management				
	Coastal Management Coastal Management	Credit 02			
	1. Components of a coastal zone. Coastal morphodynamic variables and their role in evolution of coastal forms.		SB	1	15
	2. Environmental impacts and management of mining, oil exploration, salt manufacturing, land reclamation and tourism.		MR SS	1 1	15 15
	3. Coastal hazards and their management using structural and non-structural measures: Erosion, flood, sand encroachment, dune degeneration, estuarine sedimentation and pollution		SD RP	1 1	15 15
	4. Principles of Coastal Zone Management. Exclusive Economic Zone and Coastal Regulation Zones with reference to India.		IBC	1	15

Course	Course Content/ Syllabus	Credit	Teacher	CA/wk	Total
SEM4	Regional Planning and Development	Credit 6			
CC8	Unit I: Regional Planning	Credit 2			
	1. Concept of regions: Types of regions and their delineation.		RP	1	15
	2. Types of planning, principles and objectives of regional planning, multi-level planning in India		IBC	1	15
	3. Tools and techniques of regional planning, need for regional planning in India		MR	1	15
	4. Metropolitan concept: metropolitan areas, and urban agglomerations		SS	1	15
	Unit II: Regional Development	Credit 4			
	1. Development: Meaning, growth versus development		RP	1	15
	2. Concept and strategies of regional development with reference to India		MR	1	15
	3. Theories and models for regional development: Growth pole model of Perroux; growth centre model in Indian context		SS	1	15
	4. Theories and models for regional development: Cumulative causation (Myrdal) and core periphery (Hirschman, Rostov and Friedman)		SD	1	15
	5. Changing concept of development, concept of underdevelopment; efficiency Equity debate		SB	1	15
	6. Indicators of development: Economic, social and environmental. Human development.		MR	1	15
	7. Regional development in India, regional inequality, disparity and diversity		IBC	1	15
	8. Need and measures for balanced development in India		IBC	1	15
	CC-9: Economic Geography	Credit 6			
	C9T: Economic Geography	Credit 2			
	Unit I: Concepts				
	1. Meaning and approaches to Economic Geography, new Economic Geography		IBC	1	15
	2. Concepts in Economic Geography: Goods and services, production, exchange and consumption		MR	1	15
CC9					

CC10	3. Concept of economic man, theories of choices		IBC	1	15
	4. Economic distance and transport costs		SS	1	15
	UnitII:EconomicActivities	Credit 4			
	1. Concept and classification of economic activities		RP	1	15
	2. Factors affecting location of economic activity with special reference to agriculture(VonThunen), and industry (Weber).		SS	1	15
	3. Primary activities: Subsistence and commercial agriculture, forestry, fishing and mining		SD	1	15
	4. Secondary activities: Manufacturing (cotton textile, iron and steel), concept of manufacturing regions, special economic zones and technology parks		SB	1	15
	5. Tertiary activities: transport, trade and services		SB	1	15
	6. Agricultural systems: Case studies of tea plantation in India and mixed farming in Europe		RP	1	15
	7. Transnational sea-routes, railways and highways with reference to India		SD	1	15
	8. International agreements and trade blocs: GATT and OPEC		MR	1	15
	CC-10:EnvironmentalGeography	Credit 06			
	C10T:EnvironmentalGeography	Credit04			
	1. Geographers' approach to environmental studies		RP	1	15
	2. Perception of environment in different stages of civilization		SD	1	15
	3. Concept of holistic environment and system approach		SB	1	15
	4. Ecosystem: Concept, structure and functions		MR	1	15
	5. Environmental pollution and degradation: Land, water and air		SS	1	15
	6. Space-time hierarchy of environmental problems: Local, regional and global		IBC	1	15
	7. Urban environmental issues with special reference to waste management		IBC	1	15
	8. Environmental programmes and policies – Global, national and local levels		MR	1	15
	C10: Environment Geography Lab	Credit 02			

	<i>A Project File, comprising one exercise each is to be submitted</i>				
	1. Preparation of questionnaire for perception survey on environmental problems		IBC	2	30
	2. Preparation of check list for Environmental Impact Assessment of an urban/ industrial project		MR	2	30
	3. Quality assessment of soil using field kit: pH and NPK		SB	2	30
	4. Interpretation of air quality using CPCB/ WBPCB data		SS	2	30
SEC 2	SEC-2: Research Methods	Credit 02			
	1. Geographic Enquiry: Definition and Ethics; Literature Review; Framing Research Questions, Objectives and Hypothesis; Preparing Sample Questionnaires and inventories		IBC	1	15
	2. Data Collection: Type and Sources of Data; Methods of data Collection; Data Input and Editing		RP	1	15
			SS	1	15
	3. Data Analysis: Qualitative and Quantitative Analysis; Techniques Data Representation		MR	1	15
	4. Structure of a Research Report: Preliminaries; Text; Citation, Notes, References, Bibliography and Abstract and Keywords.		SB	1	15
			SD	1	15

Course	Course Content/ Syllabus	Credits	Teacher	CA/wk	Total
SEM 5		Credits 06			
CC-11	CC-11: Field Work and Research Methodology				
	C11T: Field Work and Research Methodology	Credits 04			
	Unit I: Research Methodology	Credits 02			
	1. Research in Geography: Meaning, types and significance		RP	1	15
	2. Literature review and formulation of research design		SD	1	15
	3. Defining research problem, objectives and hypothesis. Research materials and methods		MR	1	15
	4. Techniques of writing scientific reports: Preparing notes, references, bibliography, abstract and keywords		SS	1	15
	Unit II: Fieldwork	Credits 02			
	1. Fieldwork in Geographical studies – Role and significance. Selection of study area and objectives. Pre-field preparations. Ethics of fieldwork		IBC	1	15

	2. Field techniques and tools: Observation (participant, non participant), questionnaires (open, closed, structured, non-structured). Interview with special reverence to focused group discussions.		IBC	1	15
	3. Field techniques and tools: Landscape survey using transects and quadrants, constructing a sketch, photo and video recording.		SB	1	15
	4. Positioning and collection of samples. Preparation of inventory from field data. Post-field tasks.		SS	1	15
	C11P: Research Methodology and Field Work Lab : Practical Record	Credits 02			
	Field report based on primary data collected form field survey and secondary data collected from different sources for either a rural area (<i>mouza</i>) or an urban area (municipal ward) based on cadastral or municipal maps to study specific problems.		IBC, MR, SB, RP, SS, SD	6	90
CC12	C12T: Remote Sensing and GIS	Credits 04			
	Unit I: Remote Sensing	Credits 02			
	1. Principles of Remote Sensing (RS): Types of RS satellites and sensors		RP	1	15
	2. Sensor resolutions and their applications with reference to IRS and Landsatmissions, image referencing schemes and data acquisition.		SD	1	15
	3. Preparation of False Colour Composites from IRS LISS-3 and Landsat TM andOLI data.		SS	1	15
	4. Principles of image interpretation. Preparation of inventories of landuse land cover(LULC) features from satellite images.		SB	1	15
	Unit II: Geographical Information Systems and Global Navigation Satellite System	Credits 02			
	1. GIS data structures: types (spatial and non-spatial), raster and vector		MR	1	15
	2. Principles of preparing attribute tables, data manipulation and overlay analysis		IBC	1	15
	3. Principles of GNSS positioning and waypoint collection		IBC	1	15
	4. Transferring of waypoints to GIS. Area and length calculations from GNSS data.		MR	1	15
	C12 P: Remote Sensing and GIS Lab	Credits 02			

	1. Georeferencing of maps and images, Image enhancement. Preparation of reflectance libraries of LULC features across different image bands of IRS L3 or Landsat OLI data, Image classification, post-classification analysis and class editing, Digitisation of features. Data attachment, overlay and preparation of thematic map		MP	6	90
DSC1	DSE-1: Hydrology and Oceanography	Credits 06			
	Hydrology	Credits 02			
	1. Systems approach in hydrology. Global hydrological cycle: Its physical and biological role		RP	1	15
	2. Run off: controlling factors. Infiltration and evapotranspiration. Run off cycle		MR	1	15
	3. Drainage basin as a hydrological unit. Principles of water harvesting and watershed management		SS	1	15
	4. Groundwater: Occurrence and storage. Factors controlling recharge, discharge and movement.		SD	1	15
	Oceanography	Credits 04			
	1. Major relief features of the ocean floor: characteristics and origin according to plate tectonics.		SS	1	15
	2. Physical and chemical properties of ocean water		MR	1	15
	3. Water mass, T-S diagram		SD	1	15
	4. Air-Sea interactions, ocean circulation, wave and tide.		SB	1	15
	5. Ocean temperature and salinity : Distribution and determinants.		IBC	1	15
	6. Coral reefs: Formation, classification and threats.		RP	1	15
	7. Marine resources: Classification and sustainable utilisation		IBC	1	15
	8. Sea level change: Types and causes		SD	1	15
DSE-2	DSE-2: Resource Geography	Credits 06			
	Resource Geography Unit I	Credits 03			
	1. Natural Resources: Concept and classification		SB	1	15
	2. Approaches to Resource Utilization: Utilitarian, Conservational, Community based adaptive		SD	1	15

	3. Significance of Resources: Backbone of Economic growth and development		IBC	1	15
	4. Pressure on resources. Appraisal and Conservation of Natural Resources		RP	1	15
	5. Problems of resource depletion—global scenario (forest, water, fossil fuels).		MR	1	15
	6. Sustainable Resource Development		SS	1	15
	Unit II	Credits 03			
	1. Distribution, Utilisation, Problems and Management of Metallic Mineral Resources: Iron ore, Bauxite, copper		MR	1	15
	2. Distribution, Utilisation, Problems and Management of Non-Metallic Mineral resources: Limestone, Mica, Gypsum		SB	1	15
	3. Distribution, Utilisation, Problems and Management of Energy Resources: Conventional and Non-Conventional		SS	1	15
	4. Contemporary Energy Crisis and Future Scenario		IBC	1	15
	5. Politics of Power resources		IBC	1	15
	6. Limits to Growth and Sustainable Use of Resources; Concept of Resource sharing		SB	1	15

Course	Course Content/ Syllabus	Credit	Teacher	CA/wk	Total
SEM 6 CC-13	CC-13T :Evolution of Geographical Thought	Credits 06			
	Unit I: Nature of Pre Modern Geography	Credit 04			
	1. Development of Geography and contributions of Greek, Chinese, and Indian geographers.		MR	1	15
	2. Impact of 'DarkAge' on Geography and Arab contributions		RP	1	15
	3. Geography during the Age of 'Discovery' and 'Exploration' (Contributions of Portuguese Voyages, Columbus, Vasco da Gama, Magellan, Thomas Cook)		IBC	1	15
	4. Transition from Cosmography to Scientific Geography (Contributions of Bernard Varenus and Immanuel Kant); Dualism and Dichotomies (General vs. Particular, Physical vs. Human, Regional vs. Systematic, Determinism vs. Possibilism, Ideographic vs. Nomeothetic)		SS	1	15

	Unit II: Foundation of Modern Geography and Recent Trends	Credits 2			
	1. Evolution of Geographical thoughts in Germany, France, Britain and United States of America.		RP	1	15
	2. Contributions of Humboldt and Ritter		SD	1	15
	3. Contributions of Richthofen, Hettner and Ratzel		SB	1	15
	4. Schools of geographical thought: French ,British and American;		MR	1	15
	5. Trends of Geography in the post World War-II period		SB	1	15
	6. Evolution of Geography in India: formative periods, establishments and emerging trends		SD	1	15
	7. Quantitative Revolution and its impact, behaviouralism, systems approach, radicalism, feminism		RP SS	1 1	15 15
	8. Towards Post Modernism: Changing concept of space in geography. Geography in the 21st Century		IBC	1	15
CC14	CC-14: Disaster Management	Credits 06			
	Unit I : Disaster Management	Credit 02			
	1. Classification of hazards and disasters.		RP	1	15
	2. Approaches to hazard study: Risk perception and vulnerability assessment. Hazard paradigms.		IBC	1	15
	3. Responses to hazards: Preparedness, trauma and aftermath. Resilience and capacitybuilding.		IBC	1	15
	4. Hazards mapping: Data and techniques.		MR	1	15
	Unit II: Disaster Case Studies	Credits 02			
	1. Earthquake: Factors, consequences and management		SB	1	15
	2. Landslide: Factors, consequences and management		MR	1	15
	3. Cyclone: Factors, consequences and management		SD	1	15
	4. Fire: Factors, consequences and management		SB	1	15
	C14P: Disaster Management based Project Work	Credits 2	IBC, MR, SB, RP, SD, SS	6	90
DSE-3	DSE-3T: Population Geography	Credits 06			

	Unit I	Credits 02			
	1. Development of Population Geography as a field of specialization. Relation between population geography and demography. Sources of population data, their level of reliability and problems of mapping.		IBC	1	15
	2. Population distribution: density and growth. Classical and modern theories in population distribution and growth, Demographic transition model.		SS	1	15
	3. World patterns determinants of population distribution and growth. Concept of optimum population.		SB	1	15
	4. Population distribution, density and growth profile in India.		SB	1	15
	Unit II	Credits 04			
	1. Population Composition and Characteristics– Age-Sex Composition; Rural and Urban Composition; Literacy.		MR	1	15
	2. Measurements of fertility and mortality. Concept of cohort and life table		IBC	1	15
	3. Population composition of India. Urbanisation, Occupational structure.		MR	1	15
	4. Migration: Causes and types		RP	1	15
	5. National and international patterns of migration with reference to India.		RP	1	15
	6. Population and development: population-resource regions. Concept of human development index and its components.		SS	1	15
	7. Population policies in developed and less development countries.		SD	1	15
	8. Contemporary Issues – Ageing of Population; Declining Sex Ratio; Population and environment dichotomy, HIV/AIDS.		SD	1	15
DSE-4	DSE-4T: Urban Geography	Credits 06			
	Unit I	Credits 03			
	1. Urban Geography: nature and scope, different approaches and recent trends in urban geography		RP	1	15
	2. Origin of urban places in Ancient, Medieval, Modern and Post-Modern periods-factors, stages, and characteristics.		MR	1	15
	3. Theories of Urban Evolution and Growth: Hydraulic Theory, Economic Theory		IBC	1	15
	4. Aspects of urban places: Location, site and situation, Size and Spacing of Cities: The Rank Size Rule, The Law of the Primate City		SS	1	15
	5. Urban Hierarchies : Central Place Theory; August Loch's theory of Market Centres		SD	1	15
	6. Patterns of urbanisation in developed and developing countries		SB	1	15
	Unit II	Credits 03			

	1. Ecological processes of urban growth; Urban fringe; City-Region		IBC	1	15
	2. Theories of city structure-concentric zone theory, sector theory, multiple nuclei theory		SS	1	15
	3. Urban Issues: problems of housing, slums, civic amenities (water and transport)		RP	1	15
	4. Patterns and trends of urbanization in India		SB	1	15
	5. Policies on urbanization. Urban change/landscape in post-liberalized period in India		MR	1	15
	6. Case studies of Delhi, Kolkata, and Chandigarh with reference to land use		SD	1	15

Department of Economic (Hons.)

2021-2022

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
CC-1	Introductory Microeconomics Exploring the subject matter of Economics Why study economics? Nature, scope and method of economics; the economic themes: scarcity and efficiency; thinking like an economist: the question of what to produce, how to produce and how to distribute output; production possibility curve, positive and normative economics, marginal benefits and marginal costs; opportunity cost (private and social); the basic competitive model; prices, property rights, the role of property rights in markets and profits; incentives and information; rationing; opportunity sets; economic systems; reading and working with graphs.	PB	6	3	3×15 = 45
	Supply and Demand: How Markets Work, Markets and Welfare Elementary theory of demand: determinants of household demand, market demand, and shifts in the market demand curve Elementary theory of supply: factors influencing supply, derivation of the supply curve, and shifts in the supply curve The elementary theory of market price: determination of equilibrium price in a competitive market; the effect of shifts in demand and supply; the excess demand function: Existence, uniqueness, and stability of equilibrium; consumer surplus, producer surplus and efficiency of competitive markets (graphical approach); the idea of market failure; Elasticities and their applications. Government intervention and their impact on market equilibrium and efficiency:- controls on prices (Price ceilings and price floors); indirect taxation.	BM		3	3×15 = 45
	The Households Theory of consumer behaviour – cardinal and ordinal utility approach; Indifference curve and its properties; The consumption decision - budget constraint, consumption and income and price changes, demand for all other goods and price changes; description of preferences- most preferred bundle and its properties; consumer's optimum choice; income and substitution effects; Marshallian and compensated demand curves; Price consumption curve, income consumption curve, and Engel curve; Homothetic tastes; labour supply and savings decision - choice between leisure and consumption.	PB		3	3×15 = 45
	The Firm and Perfect Market Structure Defining a firm- firm's legal forms; profit maximization hypothesis; Contractual theories and organizational theories of firms (concepts only); Behaviour of profit maximizing firms and the production process; short run costs and output decisions; costs and output in the long run. Imperfect Market Structure Monopoly and anti-trust policy; measuring monopoly power; government policies towards competition; various types of imperfect	PP		3	3×15 = 45

	<p>competition.</p> <p>Input Markets Theory of rent-Ricardo, Marshall, and Modern theory of rent; Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); demand for labour; input demand curves; shifts in input demand curves, competitive labour markets; labour market and public policy.</p>				
CC-2	<p>Mathematical Methods in Economics-I</p> <p>Preliminaries Logic and proof techniques; sets and set operations; relations; functions and their properties; number systems. Convex sets; geometric properties of functions: convex functions, their characterizations, properties and applications; further geometric properties of functions: quasi-convex functions, their characterizations, properties and applications; limit and continuity.</p> <p>Functions of one real variable Continuous functions of different types and their graphs- quadratic, polynomial, power, exponential, and logarithmic; Derivatives of first and second order and their properties; convex, concave and linear function. Application in economics- concept of marginal.</p> <p>Single variable optimization Local and global optima; Geometric characterizations; characterizations using calculus; Applications in Economics- profit maximization and cost minimization.</p> <p>Integration of functions Integration of different types of functions; Methods of Substitution and by parts; Applications in economics- obtaining total from the marginal.</p> <p>Difference Equations Finite difference; Equations of first and 2nd orders and their solutions; Application in Economics- Cobweb model.</p>	PB	6	3	3×15 = 45
	<p>Elementary Probability Theory Sample space and events; Probability axioms and properties; counting techniques; conditional probability; Bayes' rule and independence of events; Random variable and probability distributions- Discrete and continuous. Expectation of a random variable.</p>	AD		1	1×15 = 45
(CC-3)	<p>Introductory Macroeconomics</p> <p>National income accounting, unemployment, and open economy issues Macroeconomic data- National Income accounting and cost of living; Concept of Growth-role of savings, investment, and financial intermediation; Open Economy- Balance of Payments, exchange rates, and capital flow; Concept of unemployment- Types and their characteristics; Growth accounting and Solow residual.</p> <p>Money and Inflation Monetary system- definitions of money and determinants of money supply – money multiplier and central bank's role in controlling money supply; quantity theory of money; inflation and its costs.</p> <p>The Closed Economy in the Short Run Theory of aggregate demand- components and their interrelations - crowding out- Factors causing shift in the function; Theory of aggregate supply- determinants of supply and shift factors; Interaction of aggregate demand and supply.</p>	BM	6	3	3×15 = 45

CC-4	<p align="center">Mathematical Methods in Economics-II</p> <p>Matrix Algebra</p> <p>Matrix: its elementary operations; different types of matrix; Rank of a matrix; Determinants and inverse of a square matrix; solution of system of linear equations; Eigen values and Eigen vectors. System of nonlinear equations- Jacobian determinant and existence of solution.</p> <p>Function of several variables</p> <p>Continuous and differentiable functions: partial derivatives and Hessian matrix. Homogeneous and homothetic functions. Euler's theorem, implicit function theorem and its application to comparative statics problems. Economic applications- theories of consumer behaviour and theory of production.</p> <p>Multi-variable optimization</p> <p>Optimization of nonlinear functions: Convex, concave, and quasi-concave functions; Unconstrained optimization; Constrained optimization with equality constraints- Lagrangian multiplier method; role of Hessian determinant; Inequality constraints and Kuhn-Tucker Conditions; Value function and Envelope theorem; Economic applications – consumer behaviour and theory of production.</p> <p>Optimization of linear function: Linear programming; concept of slack and surplus variables (graphical solution only) concept of convex set.</p> <p>Differential Equations</p> <p>Solution of Differential equations of first order and second order; Economic application- price dynamics in a single market-multimarket supply demand model with two independent markets. Qualitative graphic solution to 2x2 linear simultaneous differential equation system- phase diagram, fixed point and stability.</p>	PB	6	3	3×15 = 45
CC-5	<p>Intermediate Microeconomics – I</p> <p>Consumer Theory</p> <p>Cardinal utility; Preference: ordering and properties of ordinal utility; existence of utility functions, different utility functions and their properties, compensating and equivalent variation, Slutsky equation; consumption-leisure choice and labour supply; choice under uncertainty (expected utility and risk aversion), inter-temporal choice and savings decision; revealed preference approach.</p> <p>Production and Costs</p> <p>Technology- general concept of production function; returns to factor and returns to scale, isoquants and diminishing rate of factor substitution – elasticity of substitution –some examples of technology (fixed proportion, perfect substitute, Cobb– Douglas Production Function, CES Production Function), General concept of homogenous and homothetic production function and their properties; production with one and more variable inputs; isocost line and firms equilibrium and expansion paths; short run and long run costs; cost curves in the short run and long run; relation between short run and long run costs.</p> <p>Competitive Equilibrium</p> <p>Short run and long run equilibrium; determination of the supply curve of the firm and the industry: with reference to external economies and diseconomies of scale.</p>	PP	6	3	3×15 = 45

	Input market in perfect competition Derived demand for input, marginal product and marginal revenue product, input demand for competitive firm and competitive industry, returns to scale and product exhaustion.				
CC-6:	Intermediate Macroeconomics – I Income Determination in the short-run Simple Keynesian System: Multipliers; equilibrium in both closed and open economy and stability; autonomous expenditure, balanced budget, and net exports; paradox of thrift. IS-LM Model - equilibrium, stability and comparative statics; effects of fiscal and monetary policies, real balance effects; IS-LM in the open economy under fixed and flexible exchange rate with perfect and imperfect capital mobility (Mundell-Fleming model). Aggregate Demand and Aggregate Supply Derivation of aggregate demand assuming price flexibility; Derivation of aggregate supply curves both in the presence and absence of wage rigidity; equilibrium, stability, and comparative statics-effects of monetary and fiscal policies; Unemployment and its causes- possible solutions, including real balance effect and wage cut policy. Inflation, Unemployment and Expectations Inflation and unemployment trade-off- Short run and long- run Phillips curve under adaptive expectations-outcome under rational expectations (non-rigorous).	BM & PB	6	3+3	6×15 = 90
CC- 7	Statistical Methods for Economics Descriptive Statistics Presentation of Data; Frequency Distribution; Measures of central tendency, Dispersion, Moments, Skewness and Kurtosis; Bivariate Frequency Distribution- correlation and regression. Univariate Probability Distribution Discrete distribution-Binomial, Poisson; Continuous Distributions-Uniform, Normal, Exponential (Properties of each distribution; mean and variance). Jointly Distributed Random Variables Density function of Bivariate normal distribution and obtaining means, variances, and correlation coefficients. Sampling Concept of sampling and random sampling. Principal steps in a sample survey; methods of sampling;-SRSWR, SRSWOR, Stratified sampling. Sampling vs non-sampling error Index Number Price and quantity index number; Different formula; Tests for an ideal index application-Cost of living index; Real GDP Estimation Parameters and statistics; Point estimation-Properties of a good estimator; Maximum Likelihood Method and the method of moments; Estimation of population parameters using SRSWR and SRSWOR; Interval estimation.	PB & AD	6	3+3	6×15 = 90
SEC-1	Data Analysis	PB		2	2×15

	UNIT 1 1. Sources of data. Population census versus sample surveys. Random sampling. 2. Frequency distribution and summary Statistics. UNIT 2 Analysis of Indian Data: Economic Survey, RBI Bulletin on currency and finance, ASIDATA, Foreign Trade Statistics, NSS Consumer surveys.		2		= 30
--	---	--	---	--	------

CC-8	Intermediate Microeconomics – II General Equilibrium, Efficiency, and Welfare a) Exchange Economy, Consumption Allocation and Pareto Optimality; Edgeworthbox and contract curve; Equilibrium and efficiency under pure exchange. b) Pareto efficiency with production: concepts of PPF, SIC, and resource allocation; Perfect competition, Pareto efficiency and market failure (externalities and publicgood); property right and Coase Theorem. Market Structure and Game Theory a) Monopoly; pricing with market power; degree of monopoly; price discrimination- different degrees; multiplant monopoly; peak-load pricing; two-part tariff; monopolistic competition. b) Oligopoly and game theory (Cooperative and Non-cooperative static games; simultaneous move and sequential move games; non- cooperative games of perfect information; the Prisoner's dilemma, Nash equilibrium in pure and mixed strategies; Backward induction solutions and SPNE); Applications of game theory in oligopolistic markets (Cournot Equilibrium, Bertrand Equilibrium, StacklebergEquilibrium) ; concept of collusion and cartels; Solution by backward induction. Input Market under Imperfect Competition Monopsony, bilateral monopoly in labour market; Externalities; public goods and marketswith asymmetric information.	PB, BM & PP	6	3+3+3	3×15 = 45 3×15 = 45 3×15 = 45
------	---	-------------	---	-------	--

CC-9	Intermediate Macroeconomics – II Schools of Macroeconomic Thoughts Classical System: Say's law and quantity theory; Friedman's restatement; classical dichotomy and neutrality of money; Keynesian vs classical system; basic tenets of New Classical and New Keynesian System. Macroeconomic Foundations Consumption: Keynesian consumption function; Fisher's theory of optimal intertemporal choice; life-cycle and permanent income hypotheses; Dusenberry's relative income hypothesis; rational expectations and random-walk of consumption expenditure. Investment: MEC and MEI- Jorgenson's neo-classical theory- Acceleration principle-fixed and variable. Demand for money: Regressive expectations and Tobin's portfolio	PB, BM & PP	6	3+3+3	3×15 = 45 3×15 = 45 3×15 = 45
------	--	-------------	---	-------	--

	<p>choice models; Baumol's inventory theoretic money demand</p> <p>Monetary Policy Government debt and Ricardian equivalence; high-powered money; money multiplier analysis; monetary policy – OMO, Bank rate, variable reserve ratio, repo and reverse repo.</p> <p>Economic Growth Harrod- Domar model and Solow one sector growth models; golden rule; dynamic efficiency, technological progress and elements of endogenous growth theory.</p>				
--	--	--	--	--	--

CC-10	<p>Introductory Econometrics</p> <p>Nature and Scope of Econometrics</p> <p>Definition and Scope of Econometrics; Importance of Error Term.</p> <p>Statistical Concepts Sampling Distributions- χ^2, t- and F-distributions and their application in testing of hypothesis; Defining hypothesis; Distribution of test-statistics; testing hypotheses related to population parameters; Type I and Type II errors; power of a test.</p> <p>Classical Linear Regression Model: Two Variable Case The model and the role of disturbance term ; Estimation of model by method of ordinary least squares (OLS); Gauss-Markov theorem, Reverse Regression, properties of estimators; goodness of fit; testing of hypotheses and confidence intervals; scaling and units of measurement; prediction and forecasting, Problems in OLS Method</p> <p>Violations of Classical Assumptions: Consequences, Detection and Remedies Problems of Multi-collinearity, Heteroscedasticity, and Auto correlation; Consequences of applying OLS under Heteroscedasticity and Autocorrelation and their detection– Durbin- Watson Test, Glesjer Test, Goldfeld-Quandt Test.</p> <p>Specification Problem Omission of a relevant variable; inclusion of an irrelevant variable; tests of specification errors.</p>	PB, BM & PP	6	3+3+3	<p>3×15 = 45</p> <p>3×15 = 45</p> <p>3×15 = 45</p>
SEC-2	<p>Research Methodology</p> <p>Unit 1: Understanding the nature of research. Formulating the research topic Review of Literature</p> <p>Unit 2 Approaches to research and research strategy Research Ethics Using Secondary data Using Primary data- collecting data through observations/ interviews/ questionnaire</p> <p>Unit 3 Sample Selection Methods Analyzing Data Writing Project Report – Referencing Styles</p>	PB	2	2	<p>2×15 = 30</p>
CC-11	<p>International Economics</p> <p>Basics of trade theory</p> <p>Arbitrage as basis and direction of trade; fundamental sources of</p>	PB & PP	6	3+3	<p>3×15 = 45</p> <p>3×15</p>

	<p>cross-country price differences and arbitrage; concept of comparative advantage; externalities, regulation and perverse comparative advantage; International equilibrium; offer curves, ToT and stability; Gains from Trade (GFT) Theorem; Concepts of Production possibility Frontier and Community Indifference curves; Illustration of GFT; Decomposition of GFT; Substitution possibilities and magnitude of GFT.</p> <p>Technology and Trade (Ricardian Model): Comparative versus Absolute Advantage, One-factor economy, production possibility frontier, relative demand and relative supply, terms of trade; Trade in Ricardian world, Determination of intermediate ToT, Complete specialization & GFT</p> <p>Factor Endowment & Trade (Heckscher-Ohlin-Samuelson Model): H-O theorem and physical vs. price definitions of factor abundance; Properties of the HO model: Factor intensity ranking, one-to-one correspondence between commodity price ratio & factor price ratio (Stolper-Samuelson theorem), One to one correspondence between endowment ratio and production proportion (Rybczysky's theorem); Proof of HO theorem; Taste bias and invalidation of HO theorem; Empirical studies- Leontief Paradox; Effects of trade on factor price and income distribution, factor price equalization, factor intensity reversal & factor price equalization.</p> <p>Trade Policy: Partial Equilibrium Analysis: Tariff - cost-benefit, Quota, Quota- Tariff equivalence & non-equivalence, effects of tariff, quota, subsidy and voluntary export restraint; General Equilibrium Analysis- distinction between large and small economy, welfare effects of a tariff on small country and large country, Offer curve and ToT, Tariff ridden offer curve, Tariff war, Optimum tariff for large economy, Metzler's Paradox.</p> <p>Balance of Payments & Exchange Rate: Balance of Payment accounts in an open economy; Determination of National Income, Transfer problem, Introduction of foreign Country & repercussion effect - open economy multiplier with & without repercussion effect; Fixed & Flexible Exchange Rate: adjustment of demand and supply of Foreign Exchange, Effect of devaluation, Effects of exchange rate on domestic prices and ToT, Marshall-Lerner Condition, J-Curve effect.</p>				= 45
CC-12	<p>Public Economics Nature and Scope of Public Economics Definition and Scope of Public Economics; Externalities, Market Failure and Government Intervention; Coase Theorem; Public Expenditure to finance Development.</p> <p>Theory of Public Good Overview of Public Good; Characteristics of Pure Public Good; Distinction between Pure Public Good and Private Good; Market Failure in case of Pure Public Good; Optimal provision of Public Goods; Private Provision and Public Provision of Public Goods; Lindahl Equilibrium, Voting Equilibrium.</p> <p>Taxation: Classification of Taxes; Canons of Taxation; Benefit Principle; Equal Sacrifice Principle; Ability to Pay Principle; Incidence and Burden of Taxes; Effects of taxation on income distribution, work efforts, and on</p>	BM	6	3	3×15 = 45

	<p>savings; the Laffer curve; Optimal Taxation</p> <p>Public Expenditure and Public Debt: Meaning and Classification of Public Expenditure; government budget and its types; government expenditure and tax multipliers, balanced budget multiplier; Fiscal Federalism in India; Meaning of Public Debt; Sources of Public Borrowings: internal and external borrowing; Effects of Public Debt.</p>				
DSE-1	<p>Economics of Health and Education</p> <p>Role of Health and Education in Human Development</p> <p>Importance in poverty alleviation; health and education outcomes and their relationship with macroeconomic performance.</p> <p>Microeconomic Foundations of Health Economics</p> <p>Demand for health; uncertainty and health insurance market; alternative insurance mechanisms; market failure and rationale for public intervention; equity and inequality.</p> <p>Evaluation of Health Programs</p> <p>Costing, cost effectiveness and cost-benefit analysis; burden of disease.</p> <p>Health Sector in India: An Overview</p> <p>Health outcomes; health systems; health financing.</p> <p>Education: Investment in Human Capital</p> <p>Rate of return to education: private and social; quality of education; signaling or human capital; theories of discrimination; gender and caste discrimination in India.</p> <p>Education Sector in India: An Overview</p> <p>Literacy rates, school participation, school quality measures.</p>	PP & PB	6	3+3	<p>3×15 = 45</p> <p>3×15 = 45</p>
DSE 2	<p>Money and Financial Markets</p> <p>Introduction to money and Banking</p> <p>Concept, functions, measurement; theories of money supply determination.</p> <p>Financial Institutions, Markets, Instruments and Financial Innovations</p> <ol style="list-style-type: none"> 1. Role of financial markets and institutions; problem of asymmetric information –adverse selection and moral hazard; financial crises. 2. Money and capital markets: organization, structure and reforms in India; role of financial derivatives and other innovations. <p>Financial Markets and Interest Rates Behaviour</p> <p>Determination; sources of interest rate differentials; theories of term structure of interest rates; interest rates in India.</p> <p>Banking System</p> <ol style="list-style-type: none"> 1. Balance sheet and portfolio management; Multiple Deposit Creation, Determinants of the Money Supply. 2. Indian banking system: Changing role and structure; banking sector reforms. <p>Central Banking and Monetary Policy</p> <p>Functions, balance sheet; goals, targets, indicators and instruments of monetary control; monetary management in an open economy; current monetary policy of India.</p>	BM	6	3	<p>3×15 = 45</p>

CC13	<p>Indian Economy</p> <p>Economic Development since Independence</p> <p>Major features of the economy at independence; Planning: Evolution of India's development goals and strategies -Structural constraints and Indian development strategy: Debates between Growth and distribution, Public sector vs. Private sector, Consumer goods vs. Capital goods, Import substitution vs. Export promotion ; growth and development under different policy regimes—goals, constraints, institutions and policy framework; an assessment of performance—sustainability and regional contrasts; structural changes, savings and investment including the saving-investment paradox.</p> <p>Population and Human Development</p> <p>Demographic trends and issues; education; health and malnutrition.</p> <p>Growth and Distribution</p> <p>Trends and policies in poverty including Sen's Entitlement Analysis; inequality and unemployment.</p> <p>Economic Reforms in India</p> <p>Monetary, Fiscal, and Trade Policy Reforms.</p>	BM	6	3	3×15 = 45
CC-14	<p>Development Economics</p> <p>Meaning of Economic Development</p> <p>Income Approach and Capability Approach, construction and interpretation of HDI; international variations in development measures; comparing development trajectories across nations and within them. Dependency school of development.</p> <p>Economic Growth</p> <p>An overview and policy implications of one sector growth models- Harrod- Domar, and Solow; Sources of economic growth, international comparisons.</p> <p>Poverty and Inequality</p> <p>Inequality axioms; a comparison of commonly used inequality measures; Gender Inequality, connections between inequality and development; poverty measurement, HPI; poverty traps and path dependence of growth processes.</p> <p>Political Institutions and the State</p> <p>Definition of institutions, Evolution of Political and Economic Institutions; The determinants of democracy; alternative institutional trajectories and their relationship with economic performance; within-country differences in the functioning of state institutions; state ownership and regulation; government failures and corruption.</p>	PP	6	3	3×15 = 45
DSE-3	<p>Environmental Economics</p> <p>Introduction</p> <p>What is environmental economics; review of microeconomics and welfare economics.</p> <p>The Theory of Externalities</p>	PB	6	3	3×15 = 45

	<p>Pareto optimality and market failure in the presence of externalities; property rights and the Coase theorem.</p> <p>The Design and Implementation of Environmental Policy Overview; Pigouvian taxes and effluent fees; tradable permits; choice between taxes and quotas under uncertainty; implementation of environmental policy.</p> <p>International Environmental Problems Trans-boundary environmental problems; economics of climate change; trade and environment.</p> <p>Measuring the Benefits of Environmental Improvements Non-market values and measurement methods; risk assessment and perception.</p> <p>Sustainable Development Concepts; measurement.</p>				
DSE-4	Project Work	PP	6	3	3×15 = 45
GE-1	<p>Introductory Microeconomics</p> <p>Exploring the subject matter of Economics Why study economics? Scope and method of economics; the economic problem: scarcity and choice; the question of what to produce, how to produce and how to distribute output; science of economics; the basic competitive model; prices, property rights and profits; incentives and information; rationing; opportunity sets; economic systems; reading and working with graphs.</p> <p>Supply and Demand: How Markets Work, Markets and Welfare Markets and competition; determinants of individual demand/supply; demand/supply schedule and demand/supply curve; market versus individual demand/supply; shifts in the demand/supply curve, demand and supply together; how prices allocate resources; elasticity and its application; controls on prices; taxes and the costs of taxation; consumer surplus; producer surplus and the efficiency of the markets.</p> <p>The Households The consumption decision - budget constraint, consumption and income/price changes, demand for all other goods and price changes; description of preferences (representing preferences with indifference curves); properties of indifference curves; consumer's optimum choice; income and substitution effects; labour supply and savings decision - choice between leisure and consumption.</p> <p>The Firm and Perfect Market Structure Behaviour of profit maximizing firms and the production process; short run costs and output decisions; costs and output in the long run.</p> <p>Imperfect Market Structure Monopoly and anti-trust policy; government policies towards competition; imperfect competition.</p> <p>Input Markets Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); demand for labour; input demand curves; shifts in input demand curves; competitive labour markets; and labour markets and public policy.</p>	PP, BM & PB	6	1+1+1	1×15 =15 1×15 =15 1×15 =15
GE-2	Introductory Macroeconomics	PP, BM	6	1+1+1	1×15

	<p>Introduction to Macroeconomics and National Income Accounting Basic issues studied in macroeconomics; measurement of gross domestic product; income, expenditure and the circular flow; real versus nominal GDP; price indices; national income accounting for an open economy; balance of payments: current and capital accounts</p> <p>Money Functions of money; quantity theory of money; determination of money supply and demand; credit creation; tools of monetary policy.</p> <p>Inflation Inflation and its social costs; hyperinflation.</p> <p>The Closed Economy in the Short Run Classical and Keynesian systems; simple Keynesian model of income determination; IS-LM model; fiscal and monetary multipliers.</p>	& PB			<p>=15</p> <p>1×15 =15</p> <p>1×15 =15</p>
GE-3	<p>Money and Banking</p> <p>Money Concept, functions, measurement; theories of money supply determination.</p> <p>Financial Institutions, Markets, Instruments and Financial Innovations</p> <ol style="list-style-type: none"> 1. Role of financial markets and institutions; problem of asymmetric information –adverse selection and moral hazard; financial crises. 2. Money and capital markets: organization, structure and reforms in India; role of financial derivatives and other innovations. <p>Interest Rates Determination; sources of interest rate differentials; theories of term structure of interest rates; interest rates in India.</p> <p>Banking System</p> <ol style="list-style-type: none"> 1. Balance sheet and portfolio management. 2. Indian banking system: Changing role and structure; banking sector reforms. <p>Central Banking and Monetary Policy Functions, balance sheet; goals, targets, indicators and instruments of monetary control; monetary management in an open economy; current monetary policy of India.</p>	PP, BM & PB	6	1+1+1	<p>1×15 =15</p> <p>1×15 =15</p> <p>1×15 =15</p>
GE-4	<p>Public Finance</p> <p>Combinatorial Mathematics</p> <ol style="list-style-type: none"> 1. Overview of Fiscal Functions, Tools of Normative Analysis, Pareto Efficiency, Equity and the Social Welfare. 2. Market Failure, Public Good and Externalities. 3. Elementary Theories of Product and Factor Taxation (Excess Burden and Incidence). <p>Issues from Indian Public Finance</p> <ol style="list-style-type: none"> 1. Current Issues of India's Tax System. 2. Working of Monetary and Fiscal Policies. 3. Analysis of Budget and Deficits 4. Fiscal Federalism in India 5. State and Local Finances 	PP, BM & PB	6	1+1+1	<p>1×15 =15</p> <p>1×15 =15</p> <p>1×15 =15</p>

Department of Bengali
2021-2022

Course	Course content/Syllabus	Credit/Marks	Allotted Teachers	Class allotted per week L-T-P	Total class
SEM-I	বাংলা ভাষার উদ্ভব ও পরিচয়				
CC - 1	ক। বাংলা ভাষার উদ্ভব, বাংলা ভাষার বিভিন্ন স্তর, বাংলা শব্দ ভান্ডার খ। শব্দার্থ তত্ত্ব, ধ্বনি পরিবর্তনের কারণ ও সূত্র, বাংলা পদ গ। বাংলা কারক ও বিভক্তি, বাংলা লোক ভাষা ও বাংলা উপভাষা	06	RK BS SS	02-0-0 01-1-0 02-0-0	6X15= 90
SEM - 1	বাংলা সাহিত্যের ইতিহাস প্রাচীন ও মধ্যযুগ				
CC - 2	ক। সৃজ্যমান বাংলার প্রকীর্ণ নিদর্শন, চর্যাপদ, শ্রীকৃষ্ণকীর্তন, চৈতন্যচরিত সাহিত্য, অনুবাদ সাহিত্য খ। বৈষ্ণব পদাবলী সাহিত্য, মঙ্গলকাব্যধারা গ। আরাকান রাজসভার সাহিত্য, শাক্ত পদাবলী ঘ। নাথ সাহিত্য, বাউল গীতি, বাংলা ভাষার বিভিন্ন	06	SS GB SU.S PRC	01-0-0 02-0-0 01-0-0 01-1-0	6X15=90

SEM - 1	বাংলা ভাষার বিভিন্ন স্তর ও বাংলা ভাষা চর্চা				
GE - 1	<p>ক। পৃথিবীর প্রধান প্রধান ভাষা বংশের সাধারণ পরিচয়, ইন্দো ইউরোপীয় ভাষা বংশের সাধারণ পরিচয়, বাংলা ভাষার উদ্ভবের ইতিহাস, বাংলা ভাষার বিভিন্ন স্তরের বৈশিষ্ট্য</p> <p>খ। বাংলা উপভাষা, বাংলা সাধু ও চলিত ভাষা, বাংলা বাক্যের গঠন (প্রথাগত), বাংলা শব্দভাণ্ডার</p> <p>গ। ধ্বনিপরিবর্তনের কারণ ও সূত্র, শব্দার্থ পরিবর্তনের কারণ ও সূত্রসমূহ</p>	06	PRC SJ GB	01-0-0 01-0-0 01-0-0	3X15=45
SEM - 1	বাংলা সাহিত্যের ইতিহাস ও বাংলা ভাষাতত্ত্ব				
DSC/GENERAL	<p>ক। প্রাচীন ও মধ্যযুগ - চর্যাগীতি, শ্রীকৃষ্ণকীর্তন, কুন্তিবাস, কাশীদাস, মুকুন্দরাম, ভারতচন্দ্র</p> <p>খ। উনিশ শতকের গদ্য - শ্রীরামপুর মিশন, ফোর্ট উইলিয়াম কলেজ, রামমোহন, বিদ্যাসাগর, প্যারীচাঁদ মিত্র, কালীপ্রসন্ন সিংহ, বঙ্কিমচন্দ্র</p> <p>গ। কবিতা - মধুসূদন, রবীন্দ্রনাথ, নজরুল, জীবনানন্দ</p> <p>ঘ। কথাসাহিত্য - বঙ্কিমচন্দ্র, রবীন্দ্রনাথ, শরৎচন্দ্র, বিভূতিভূষণ</p> <p>২। বাংলা ভাষার উদ্ভব, বাংলা ভাষার স্তরসমূহের বৈশিষ্ট্য, শব্দার্থের পরিবর্তন, বাংলা শব্দভাণ্ডার, ধ্বনিপরিবর্তন, বাংলা উপভাষা</p>	06	SU.S SU.S SJ SJ BS	01-0-0 01-0-0 01-0-0 01-0-0 01-0-0	5X15=75
SEM - 2	প্রাচীন ও মধ্যযুগের পদপাঠ				
	<p>ক। চর্যাপদ - ১, ২, ৫, ৭</p> <p>চর্যাপদ - ৮, ১০, ১৪, ২৪, ২৮</p> <p>খ। বৈষ্ণব পদাবলী (নির্বাচিত ৮টি পদ)</p> <p>বিদ্যাপতি - এ সখি হামারি দুখের নাই ওর;</p> <p>আজু রজনী হাম ভাগে পোহায়লুঁ</p> <p>চন্ডীদাস - যত নিবারিয়ে তায় নিবার না যায় রে;</p> <p>রাধার কি হইল অন্তরে ব্যথা</p> <p>জ্ঞানদাস - রূপ লাগি আঁখি বুঝে গুনে মনভোর</p>		RK SS GB	01-0-0 01-0-0 02-0-0	6X15=90

CC - 3	<p>গোবিন্দদাস - গগনহি নিমগণ দিনমণি কাঁতি; কণ্ঠক গাড়ি কমল সমপদতল</p> <p>বলরাম দাস - শ্রীদাম সুদাম দাম শুন ওরে বলরাম গ। শান্ত পদাবলী (নির্বাচিত আটটি পদ)</p> <p>রামপ্রসাদ সেন - ওহে প্রাণনাথ গিরিবর; গিরি, এবার আমার উমা; মা আমায় ঘুরাবি কত; কেবল আসার আশা</p> <p>কমলাকান্ত ভট্টাচার্য - ওরে নবমী নিশি; ওহে গিরিরাজ, গৌরী অভিমান; কি হলো নবমী নিশি; বারে বারে কহরাণি</p>	06	PRC	02-0-0	
SEM - 2	চৈতন্য জীবনী ও মঙ্গলকাব্য সাহিত্যপাঠ				
CC - 4	<p>ক। চৈতন্যভাগবত (আদিখন্ড) - বৃন্দাবন দাস খ। চণ্ডীমঙ্গল (আপেক্ষিকখন্ড) - মুকুন্দ চক্রবর্তী গ। অন্নদামঙ্গল - ভারতচন্দ্র</p>	06	<p>SU.S</p> <p>BS</p> <p>SJ</p>	<p>02-0-0</p> <p>02-0-0</p> <p>02-0-0</p>	<p>6X15=90</p>
SEM - 2	কাব্য সাহিত্যের ধারা ও বৈষ্ণব পদাবলী পাঠ				
GE - 2	<p>প্রাচীন ও মধ্যযুগের সাহিত্যের ধারা : চর্যাপদ, শ্রীকৃষ্ণকীর্তন, মঙ্গলকাব্য বৈষ্ণব পদাবলী</p> <p>আধুনিক কাব্য সাহিত্যের ধারা : মধুসূদন দত্ত, রবীন্দ্রনাথ ঠাকুর, জীবনানন্দ দাশ, নজরুল ইসলাম, সুধীন্দ্রনাথ দত্ত, অমিয় চক্রবর্তী, বিষ্ণু দে, শক্তি চট্টোপাধ্যায়</p> <p>বৈষ্ণব পদাবলী পাঠ : বিদ্যাপতি - চির চন্দন উড়ে হার না দিলা; এ সখি হামারি দুঃখের নাহি ওর</p> <p>চণ্ডীদাস - সই কেবা শুনাইলো শ্যাম নাম; এমন পিরিত কভু নাহি দেখি শুনি</p> <p>জ্ঞানদাস - রূপ লাগি আঁখি জুড়ে; বধু তোমার গরবে গরবিন হাম</p>	06	<p>SJ</p> <p>PRC</p> <p>GB</p>	<p>01-0-0</p> <p>02-0-0</p> <p>01-0-0</p>	<p>4X15=60</p>

	গোবিন্দ দাস - নিরদ নয়নে নির ঘন সিঞ্ঝনে; কন্টক গাড়ি কমল সম পদতল				
DSC - 1B(CC3)	বৈষ্ণব পদাবলী (আটটি নির্বাচিত পদ) শাক্ত পদাবলী (ছটি নির্বাচিত পদ) বীরাঙ্গনা কাব্য আধুনিক কবিতা সংকলন(দশটি নির্বাচিত কবিতা) বাংলা কবিতা পাঁচটি নির্বাচিত বাংলা ছোট গল্প পাঁচটি নির্বাচিত	06	GB SU.S SJ BS	01-0-0 01-0-0 01-0-0 01-0-0	4X15=60
AECC(Core)/MIL - 1	বাংলা কবিতা (পাঁচটি নির্বাচিত) বাংলা ছোটগল্প (পাঁচটি নির্বাচিত)	06	GB RK	02-0-0 02-0-0	4X15=60
SEM - 3	উনিশ ও বিশ শতকের প্রবন্ধ ও কাব্য সাহিত্যের ইতিহাস এবং আখ্যান সাহিত্য পাঠ				
CC - 5	ক। উনিশ ও বিশ শতকের প্রবন্ধসাহিত্যের ইতিহাস - শ্রীরামপুর মিশন, ফোর্ট উইলিয়াম কলেজ, রামমোহন, বিদ্যাসাগর, অক্ষয় কুমার দত্ত, ভূদেব মুখোপাধ্যায়, প্যারীচাঁদ মিত্র, কালীপ্রসন্ন সিংহ, বঙ্কিমচন্দ্র, বিবেকানন্দ ক। উনিশ ও বিশ শতকের প্রবন্ধ সাহিত্যের ইতিহাস - রবীন্দ্রনাথ, হরপ্রসাদ শাস্ত্রী, রামেন্দ্রসুন্দর ত্রিবেদী, অমূল্যচরণ বিদ্যাভূষণ, প্রমথ চৌধুরী, অন্নদাশঙ্কর রায়, সুনীতিকুমার চট্টোপাধ্যায়, সৈয়দ মুজতবা আলী, যোগেশচন্দ্র বিদ্যানিধি, বুদ্ধদেব বসু খ। উনিশ ও বিশ শতকের কাব্য সাহিত্যের ইতিহাস - ঈশ্বরগুপ্ত, মধুসূদন, রঙ্গলাল, হেমচন্দ্র, নবীনচন্দ্র, বিহারীলাল, রবীন্দ্রনাথ, সত্যেন্দ্রনাথ, মোহিতলাল খ। উনিশ ও বিশ শতকের কাব্য সাহিত্যের ইতিহাস - নজরুল, প্রেমেন্দ্র মিত্র, সুধীন্দ্রনাথ, বিষ্ণুদে, বুদ্ধদেব বসু, জীবনানন্দ, অমিয় চক্রবর্তী, সুভাষ মুখোপাধ্যায়, শক্তি চট্টোপাধ্যায়, শঙ্খ ঘোষ আখ্যান সাহিত্য পাঠ - শকুন্তলা - বিদ্যাসাগর	06	SJ SS BS SU.S GB	01-0-0 01-0-0 01-0-0 01-0-0 02-0-0	6X15=90
SEM - 3	ছন্দ অলংকার ও নির্বাচিত কবিতা পাঠ				
	ক। ছন্দ - দলবৃত্ত, মিশ্রকলাবৃত্ত, কলাবৃত্ত, পয়ার, ত্রিপদী, চৌপদী, সনেট, অমিত্রাক্ষর, গদ্যছন্দ পর্ব- পর্বঙ্গ, যতি, লয়, মাত্রা, ছেদ, ছন্দ নির্ণয়		PRC	02-0-0	6X15=90

CC - 6	খ। অলংকার – অনুপ্রাস,শ্লেষ,যমক, উপমা, রূপক, উৎপ্রেক্ষা, ব্যাজস্তুতি, সমাসোক্তি, অতিশয়োক্তি, সন্দেহ, অপহুতি, বিরোধভাস, বিষম, অলংকার নির্ণয়	06	PRC	02-0-0	
	গ। নির্বাচিত কবিতা পাঠ – আমরা- সত্যেন্দ্রনাথ দত্ত,সাম্যবাদী- কাজী নজরুল ইসলাম, দুঃখবাদী- যতীন্দ্রনাথ সেনগুপ্ত,ফ্রাইবুর্গের পথে- অমিয় চক্রবর্তী		BS	01-0-0	
	গ। নির্বাচিত কবিতা পাঠ- আট বছর আগের একদিন- জীবনানন্দ দাশ, শাস্বতী- সুধীন্দ্রনাথ দত্ত, অবনী বাড়ি আছে- শক্তি চট্টোপাধ্যায়		GB	01-0-0	
SEM - 3	প্রবন্ধ সাহিত্য পাঠ				
CC - 7	ক। বিবিধ প্রবন্ধ- বঙ্কিমচন্দ্র চট্টোপাধ্যায় – শকুন্তলা মিরন্দা ও দেশদিমোনা, গীতিকাব্য, বিদ্যাপতি ও জয়দেব, অনুকরণ, বাঙ্গালার ইতিহাস, বঙ্গদেশের কৃষক	06	RK	02-0-0	6X15=90
	খ। নির্বাচিত প্রবন্ধ পাঠ - ১। কৌতুক হাস্যের মাত্রা (পঞ্চভূত) - রবীন্দ্রনাথ ঠাকুর,২। জাত্য ভাষা এক স্থানীয় ভাষা (কি লিখি) - যোগেশ চন্দ্র রায় বিদ্যানিধি,৩। ভারতীয় সংস্কৃতির গোড়ার কথা- অমূল্যচরণ বিদ্যাভূষণ,৪। বই পড়া- প্রমথ চৌধুরী		RK	01-0-0	
	খ। নির্বাচিত প্রবন্ধ পাঠ - ৫। অপবিজ্ঞান- রাজশেখর বসু ৬। দেশপ্রেম বনাম জাতিপ্রেম - অনন্যদাশঙ্কর রায় ৭। রবীন্দ্রনাথ ও উত্তর সাধক- বুদ্ধদেব বসু		SU.S	01-0-0	
	গ। চরিত কথা-রামেন্দ্রসুন্দর ত্রিবেদী, ঈশ্বরচন্দ্র বিদ্যাসাগর,বলেন্দ্রনাথ ঠাকুর, বঙ্কিমচন্দ্র চট্টোপাধ্যায়, অধ্যাপক মক্ষমুলার, হর্মানহেলমহোলায়ংজ		SS	02-0-0	
	লিখন দক্ষতা বৃদ্ধি				

SEM - 3					
SEC - 1	ক। অফিসিয়াল পত্র লিখন, সংবাদপত্রের প্রতিবেদন, ভাবার্থ ও ভাব সম্প্রসারণ, সরকারি কাজের রিপোর্ট লিখুন	02	GB	01-0-0	2X14=28
	ক। বিজ্ঞাপনের খসড়া রচনা, বানানবিধি, প্রুফ সংশোধন, খ। বাংলা ভাষার কাজে কম্পিউটার শিক্ষা		BS	01-0-0	
SEM - 3	উপন্যাস ও ছোট গল্প পাঠ				
GE - 3	১। বিষবৃক্ষ - বঙ্কিমচন্দ্র চট্টোপাধ্যায়	06	PM	01-0-0	3X15=45
	২। পথের পাঁচালী - বিভূতিভূষণ বন্দ্যোপাধ্যায়		GB	01-0-0	
	৩। ছোট গল্প সংকলন - পোস্টমাস্টার - রবীন্দ্রনাথ ঠাকুর মহেশ - শরৎচন্দ্র চট্টোপাধ্যায় নিমগাছ - বনফুল ডাইনি - তারাশঙ্কর বন্দ্যোপাধ্যায় চিত্রচোর - সুবোধ ঘোষ		RK	01-0-0	
SEM - 3	বাংলা কথাসাহিত্য নাটক ও প্রবন্ধ				
DSC 1C (CC - 3)	১। ক। সাজাহান - দ্বিজেন্দ্রলাল রায়	06	SU.S	01-0-0	6X15=90
	১। খ। নির্বাচিত প্রবন্ধ (৫টি) - গীতিকাব্য - বঙ্কিমচন্দ্র চট্টোপাধ্যায় পিতামহ রামজয় তর্কভূষণ - বিদ্যাসাগর অপবিজ্ঞান - রাজশেখর বসু জাতীয় জীবন গঠনে সাহিত্যের স্থান - সুনীতিকুমার চট্টোপাধ্যায় আধুনিক যুগ ও রবীন্দ্রনাথ - অনন্যদাশংকর রায়		PRC	01-0-0	
	২। ক। বাংলা নির্বাচিত ছোট গল্প (৬টি) ফুলের মূল্য - প্রভাত কুমার মুখোপাধ্যায় চিকিৎসা সংকট - পরশুরাম চতুর্থ পানিপথের যুদ্ধ - সুবোধ ঘোষ		SU.S	01-0-0	

	মতিলাল পাদরী - কমল কুমার মজুমদার সুন্যদায়িনী -মহেশ্বেতা দেবী আত্মজা - বিমল কর		PRC	01-0-0	
	২।খ। পথের পাঁচালী - বিভূতিভূষণ বন্দ্যোপাধ্যায়		GB	01-1-0	
SEM - 3	লিখন নৈপুণ্য বৃদ্ধি				
SEC - 1	ক। ভাবার্থ ও ভাব সম্প্রসারণ খ। সংবাদপত্রের উপযোগী প্রতিবেদন রচনা গ। অনুচ্ছেদ রচনা	02	SJ	01-0-0	2X14=28
	ঘ। প্রাতিষ্ঠানিক পত্র লিখন ঙ। বিজ্ঞাপনের খসড়া রচনা		RK	01-0-0	
SEM - 4	উনিশ ও বিশ শতকের নাট্য ও কথা সাহিত্যের ইতিহাস এবং ছোট গল্প পাঠ				
CC - 8	ক। উনিশ ওবিশ শতকের নাট্য সাহিত্যের ইতিহাস ১। রামনারায়ণ তর্করত্ন - ক্ষীরোদপ্রসাদ বিদ্যাবিনোদ ২। রবীন্দ্রনাথ - মনোজ মিত্র	06	GB	01-0-0	6X15=90
			RK	01-0-0	
	খ। উনিশ বিশ শতকের উপন্যাস ও ছোটগল্পের ইতিহাস ১। উপন্যাস- বঙ্কিমচন্দ্র চট্টোপাধ্যায় – মহাশ্বেতা দেবী ২। ছোটগল্প - রবীন্দ্রনাথ ঠাকুর – আশাপূর্ণা দেবী গ। ছোটগল্প পাঠ (নির্বাচিত সাতটি গল্প)		SJ	01-0-0	
			BS	01-0-0	
			PRC	02-0-0	
SEM - 4	কাব্য পাঠ				
CC - 9	ক। বীরঙ্গনা কাব্য (নির্বাচিত ছটি পত্র) খ। বলাকা কাব্য (নির্বাচিত নটি কবিতা) গ। বনলতা সেন কাব্য (সমগ্র)	06	SJ	02-0-0	6X15=90
			BS	02-0-0	
			GB	02-0-0	
SEM - 4	উপন্যাস পাঠ				
CC - 10	ক। কপালকুণ্ডলা - বঙ্কিমচন্দ্র চট্টোপাধ্যায় খ। শেষের কবিতা - রবীন্দ্রনাথ ঠাকুর		SS	02-0-0	6X15=90

	গ। কবি - তারাশঙ্কর বন্দ্যোপাধ্যায়	06	PRC	02-0-0	
			SU.S	02-0-0	
SEM - 4	বাংলা গীতি সাহিত্য শিশুর সাহিত্য ও রম্য রচনার ধারা				
GE - 4	ক। বাংলা গীতি (সঙ্গীত সাহিত্য) ধারা খ। বাংলা শিশু সাহিত্যের ধারা - বিদ্যাসাগর - সুখলতা রাও গ। রম্য রচনার ধারা	06	BS PRC RK	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 4	বাংলা ভাষা ও সাহিত্য বিষয়ক প্রকল্প রচনা ও প্রকল্প পত্র উপস্থাপনা				
SEC - 2	ক। প্রকল্প রচনা খ। প্রকল্প পত্র উপস্থাপনা	02	GB BS	01-0-0 01-0-0	2X15=30
SEM - 4	সাহিত্য তত্ত্ব ও সাহিত্য নির্মাণ কলা				
DSC - 1D	ক। রস ও ধ্বনি খ। ছন্দ ও অলংকার ছন্দ অলংকার	06	PRC SU.S GB	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 4	বাংলা ধ্বনিতত্ত্ব ও রূপ তত্ত্ব				
SEC - 2	ক। স্বরধ্বনি, ব্যঞ্জনধ্বনি, ধ্বনি পরিবর্তনের সূত্র খ। উপসর্গ, প্রত্যয়, বিভক্তি	02	RK SJ	01-0-0 01-0-0	2X15=30
SEM - 4	উনিশ শতকের বাংলা প্রবন্ধ ও লোকসাহিত্য				
AECC CORE L - 2	ক। নির্বাচিত প্রবন্ধ খ। মহুয়া পালা	02	BS SJ	01-0-0 01-0-0	2X15=30
SEM - 5	নাট্য পাঠ				
CC - 11	ক। সধবার একাদশী - দীনবন্ধু মিত্র খ। সাজাহান - দ্বিজেন্দ্রলাল রায় গ। ডাকঘর - রবীন্দ্রনাথ ঠাকুর	06	SU.S BS SS	02-0-0 02-0-0 01-1-0	6X15=90

SEM - 5	কাব্যতত্ত্ব, পাশ্চাত্য সাহিত্য সমালোচনা তত্ত্ব ও সাহিত্যের রূপ রীতি				
CC - 12	ক। কাব্যজিজ্ঞাসা (রস ও ধ্বনি) – অতুল চন্দ্রগুপ্ত খ। ক্লাসিসিজম, রোমান্টিসিজম, সুরিয়ালিজম, রিয়ালিজম, সিম্বলিজম গ। মহাকাব্য, ট্রাজেডি, কমেডি ফার্স (প্রহসন) লিরিক, এলিজি, ওড, আঞ্চলিক উপন্যাস, মনস্তাত্ত্বিক উপন্যাস, ঐতিহাসিক উপন্যাস	06	PRC GB SJ	01-1-0 02-0-0 02-0-0	6X15=90
SEM - 5	সাহিত্য আন্দোলন সমালোচনা ও রূপরীতি				
DSE 1	ক। আন্দোলন – মডার্নিজম, পোস্ট মডার্নিজম, ফেমিনিজম, এক্সপ্রেশ্যনিজম, ইম্প্রেশ্যনিজম, অ্যাবসার্ডিজম খ। মিথ ক্রিটিসিজম, আর্কেটাইপলক্রিটিসিজম, হিস্টরিক্যালক্রিটিসিজম, কম্পারেটিভক্রিটিসিজম গ। রীতি – সনেট, ব্যালাড, চেতনা প্রবাহ মূলক উপন্যাস, আত্মজীবনীমূলক উপন্যাস, মেলোড্রামা, নৃত্যনাট্য, কাব্য নাট্য, নাট্যকাব্য	06	GB PRC SJ	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 5	বাংলা রঙ্গমঞ্চ, সাময়িক পত্র, অনুবাদ সাহিত্যের ইতিহাস				
DSE 2	ক। বাংলা রঙ্গমঞ্চের ইতিহাস খ। বাংলা সাময়িক পত্রের ইতিহাস গ। বাংলা অনুবাদ সাহিত্যের ইতিহাস	06	SKH SU.S BS	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 5	রবীন্দ্রনাথ ঠাকুর				
DSE 1A/GENERAL	১। ডাকঘর - রবীন্দ্রনাথ ঠাকুর ২। জীবনস্মৃতি - রবীন্দ্রনাথ ঠাকুর	06	SU.S SJ	02-0-0 02-0-0	4X15=60
SEM - 5	শৈলী, কাব্যশৈলী বিচার, গদ্যশৈলী ও নাট্যশৈলী বিচার				
SEC - 3	ক। শৈলী, কাব্যশৈলী বিচার খ। গদ্য শৈলী ও নাট্যশৈলী বিচার	02	SU.S	01-0-0	1X15=15
SEM - 5	শিশুর সাহিত্য ও গোয়েন্দা কাহিনী				
GE - 1	ক। রাজকাহিনী - অবনীন্দ্রনাথ ঠাকুর	06	BS	02-0-0	4X15=60

	খ। সে - রবীন্দ্রনাথ ঠাকুর		GB	02-0-0	
SEM - 6	লোকসাহিত্য				
CC - 13	১। লোক সাহিত্য ২। মহুয়া পালা ৩। বাংলার ব্রত	06	SJ SS BS	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 6	সংস্কৃত, ইংরেজি, ও প্রতিবেশী সাহিত্যের ইতিহাস				
CC - 14	১। সংস্কৃত সাহিত্যের ইতিহাস ২। ইংরেজি সাহিত্যের ইতিহাস ৩। অন্যান্য প্রতিবেশী সাহিত্যের ইতিহাস	06	PRC PRC SU.S	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 6	নাট্যসাহিত্য পাঠ				
DSE - 3	ক। সাজাহান – দ্বিজেন্দ্রলাল রায় খ। সাজানো বাগান গ। নির্বাচিত একাঙ্ক নাটক	06	GB SJ SS	02-0-0 02-0-0 02-0-0	6X15=90
SEM - 6	রবীন্দ্রসাহিত্য পাঠ				
DSE 4	ক। সে খ। মুক্তধারা গ। নির্বাচিত কবিতা	06	GB SS SU.S	02-0-0 02-0-0 02-0-0	6X15=90
DSE 1B/GENERAL	১। নির্বাচিত ছোট গল্প ২। রাধা - তারাক্ষর বন্দ্যোপাধ্যায়	06	RK GB	02-0-0 02-0-0	4X15=60
GE - 2	১। নির্বাচিত প্রবন্ধ ২। সাহিত্যের রূপ প্রীতি বিচার পদ্ধতি	06	SJ BS	01-0-0 01-0-0	2X15=30
SEC - 4	বিষয়ভিত্তিক আলোচনা ও আলোচনা পত্র উপস্থাপন	02	SU.S	01-0-0	1X15=15

**Department of English
2021-2022**

Paper	Course Content/ Syllabus	Credit/Marks	Allotted Teachers	Class allotted per Week
SEMESTER- I				
Honours				
CC-1T History of English Literature and English Language (6 credits)	A. History of Literature: Beginning to 20 th Century: Old English Poetry, Old English Prose, Chaucer	2	KB	1
	Development of Drama, Elizabethan Sonnets, University Wits, Shakespeare, the Jacobean, Milton, Dryden, Pope, Restoration Comedy of Manners, Eighteenth Century Novel & Prose, Pre-Romantic and Romantic Poetry		SG	1
	Victorian Poetry and Novels, Shaw & Wilde		RB	1
	Modernism, 20 th Century Novel, Poetry & Plays, The Wars and Literary developments up to the 1950s		TN	1
			SKB	1
	B. History of English Language: The influences: Greek, Latin	1	SG	1
	The influences: Scandinavian, French	1	TN	1
	C. Chaucer: <i>The Wife of Bath's Prologue</i>	2	DA	1
CC-2T British Poetry (Renaissance to 18th Century) (6 credits)	A. British Poetry: Sir Philip Sidney: 'Loving in Truth'	5	KB	1
	Edmund Spenser: Sonnet LXXV 'One day I wrote her name'			
	William Shakespeare: Sonnets 18 & 130		SG	1
	John Donne: 'Good Morrow', 'Batter My Heart'		SKB	1
	Milton: <i>Paradise Lost</i> Book - I		TN	1
	Pope: <i>Rape of the Lock</i> (first 3 cantos)		RB	1
	Marvell: 'To His Coy Mistress'		SKB	1
	Thomas Gray: 'Elegy Written in a Country Churchyard'		DA	1

	B.Rhetoric&Prosody	1	SKB	1
General				
GE-1 Academic Writing and Composition (6 credits)	1.Introduction to the Writing Process and Conventions of Academic Writing, 2. Study Skills including note making, note taking etc. 3. Writing in one's own words – Summarizing and Paraphrasing	3	TN	2
	4. Structuring an Argument: Introduction, Interjection, and Conclusion 5. Remedial Grammar 6. Citing Resources, Editing, Book and Media Review	3	SG	2
DSC-1A Poetry and Short Story (6 credits)	1. William Shakespeare: Sonnet 116 2. William Wordsworth: 'A Slumber did my Spirit Seal' 3. John Keats- 'La Belle Dame Sans Merci' a. Wilfred Owen- 'Strange Meeting' b. Katherine Mansfield : "The Fly"	5	RB	4
	H. E. Bates- "The Ox"	1	TN	1
AECC Core British Poetry-1 (6 credits)	Shakespeare: Shall I Compare Thee JohnDonne-BattermyHeart Milton :OnHis Blindness Pope:Odeon Solitude WilliamBlake: A Poison TreeWordsworth : To the Skylark Shelley: To aSkylark Keats:OdetoAutumn Rhetoricand Prosody	6	SG	6

AECC – Ability Enhancement Compulsory Course (2 credits)	Communication Skills a) Theory and Types of Communication b) Verbal and Non-verbal Communication c) Barriers and Strategies d) Workplace Communication e) Telephone Communication Speaking Skills: a) Inter-personal Communication b) Group Discussion c) Interview Reading Skills: a) Close Reading b) Comprehension c) Summary d) Paraphrasing e) Interpreting Graphs and Charts Writing Skills: a) Report Writing b) Making notes c) Letter writing d) Business Communication	2	TN, SG, KB, SKB (Each of teachers will be covering the whole syllabus with different Sem I streams of the college)	2
Semester- II				
Honours				
CC-3T	William Congreve: The Way of the World	2	RB	2

British Literature (fiction and non-fiction): 18th Century (6 credits)	Jonathan Swift: Gulliver's Travels (Books III and IV)	4	TN	2
	Addison and Steele: 'Sir Roger at Church		KB	2
	Laurence Sterne: The Life and Opinions of Tristram Shandy, Gentleman		DA	2
CC-4T British Romantic Literature (1798-1832) (6 credits)	William Blake: 'The Lamb', 'The Tyger	2	DA	1
	William Wordsworth: 'Tintern Abbey		KB	1
	Samuel Taylor Coleridge: 'Christabel' Part-1		TN	1
	Percy Bysshe Shelley: 'Ozymandias		SKB	1
	John Keats: 'Ode to a Nightingale		SKB	1
	Mary Shelley: Frankenstein	2	RB	2
	Jane Austen: Pride and Prejudice	2	SG	2
General				
GE-2T Media and Communication Skills (6 credits)	1. Introduction to Mass Communication 1. Mass Communication and Globalization 2. Forms of Mass Communication Topics for Student Presentations: a. Case studies on current issues Indian journalism b. Performing street plays c. Writing pamphlets and posters, etc. 2. Advertisement 1. Types of advertisements 2. Advertising ethics 3. How to create advertisements/storyboards Topics for Student Presentations: a. Creating an advertisement/visualization b. Enacting an advertisement in a group c. Creating jingles and taglines	4	TN	3
	Media Writing 1. Scriptwriting for TV and Radio 2. Writing News Reports and Editorials 3. Editing for Print and Online Media Topics for Student Presentations: a. Script writing for a TV news/panel discussion/radio programme / hosting radio programmes on community radio b. Writing news reports/book reviews/film reviews/TV program reviews/interviews c. Editing articles d. Writing an editorial on a topical subject 4. Introduction to Cyber Media and Social Media 1. Types of Social Media 2. The Impact of Social Media 3. Introduction to Cyber Media	2	SG	1
DSC-1B Essay, Drama & Novel	1. George Orwell – "Shooting an Elephant" 2. R. K. Narayan – "A Library without Books"	5	RB	4

(6 credits)	3. George Bernard Shaw – Arms and the Man 4. J. B. Priestley – An Inspector Calls			
	5. Ernest Hemingway – The Old Man and the Sea	1	TN	1
Semester III				
CC5T	Alfred Tennyson: ‘Ulysses’	1	SKB	1
British Literature: 19th Century (1832- 1900) (6 credits)	Robert Browning: ‘My Last Duchess’ ‘The Last Ride Together’	2	TN RB	2
	Mathew Arnold: ‘Dover Beach’	1	SG	1
	Charles Dickens: Hard Times	2	DA	2
CC6T: British Literature: The Early 20th Century (6 credits)	W.B. Yeats: ‘The Second Coming’, ‘The Wild Swans at Coole’	1	KB TN	1
	• T.S. Eliot ‘The Love Song of J. Alfred Prufrock’	1	RB	1
	• Joseph Conrad: The Secret Sharer	2	SKB	3
	Katherine Mansfield: ‘The Fly’	1	SG	1
CC7T American Literature (6 credits)	Robert Frost: ‘The Road not Taken’	6	DA	1
	Langston Hughes: ‘Harlem to be Answered’		KB	1
	Walt Whitman: ‘O Captain, My Captain’		SKB	1
	Edgar Allan Poe: ‘The Purloined Letter’		SS	1
	Mark Twain: The Adventures of Tom Sawyer		TN	2
	Tennessee Williams: A Streetcar Named Desire		RB	2
GE3	. Language: language and communication; language varieties: standard and nonstandard language;	2	SS	2

Language and Linguistics (6 credits)	language change. Mesthrie, Rajend and Rakesh M Bhatt. 2008. World Englishes: The study of new linguistic varieties. Cambridge: Cambridge University Press.			
	. Phonology and Morphology: Akmajian, A., R. A. Demers and R, M. Harnish, Linguistics: An Introduction to Language and Communication, 2nd ed. Fromkin, V., and R. Rodman, An Introduction to Language, 2nd ed. (New York: Holt, Rinehart and Winston, 1974) Chapters 3, 6 and 7	2	RB	2
	Syntax : categories and constituents phrase structure; maxims of conversation. Akmajian, A., R. A. Demers and R, M Harnish, Llinguistics: An Introduction to Language and Communication, 2nd ed. (Cambridge, Mass,: MIT Press, 1984; Indian edition, Prentice Hall, 1991) Chapter 5 and 6.	2	SKB	2
SEC1 Soft Skills (2 credits)	What is soft skill? Teamwork, Adaptability, Leadership, Problem solving Development of Sooft skills: Precis; Comprehension; Essays	2	SS	2
GENERAL				
DSC1C Contemporary India: women and empowerment (6 credits)	1. Social Construction of Gender: 1. Masculinity, Femininity 2. Patriarchy 3. Sex & Gender 4. Gender Socialization 5. Gender discrimination 6. Gender stereotyping Texts: (any one) Nivedita Menon : Sexualities: Issues in Contemporary Indian Feminisms (selections) Nivedita Menon : Gender and Politics in India (Selections)	1	RB	1
	2. History of Women's Movements in India (Pre- and Post-Independence): 1. Women and Nationalism 2. Women and Partition 3. Women and Political Participation Text: (any two) 1. "Letters to a Wife: Satyendranath Tagore's Letters to Jynadanandini Tagore" from Epistolary Cultures in 19 th century Bengal, Stree Samya, Kolkata, 2. Gholam Murshed "Chapter Four" from The Reluctant Debutante. 3. Urvashi Butalia 'Beginnings'	2	TN	2

	from The Other Side of Silence 4. Jashodhara Bagchi and Shubharanjan Dasgupta. The Trauma and The Triumph: Gender and Partition in Eastern India, Vol I ("Introduction")			
	<p>3. Women and Law:</p> <p>1. Women and the Indian Constitution 2. Personal Laws 3. Customary practices on inheritance and Marriage Text: (Selections from any one text) 1. Flavia Agnes. Ed. Women and Law in India: An Omnibus Comprising 2. Flavia Agnes. Enslaved Daughters (selections). 3. Sudhir Chandra. Hindu Women and Marriage Law 4. Monomoyee Basu. Law and Gender Inequality.</p>	2	KB	2
	<p>4. Women and Violence: 1. State interventions 2. Domestic violence 3. Female foeticide 4. Sexual harassment Texts: (any one) 1. Rokeya Sakhawat Hussain – Sultana's Dream 2. Bama Faustina Soosairaj – Karukku</p>	1	SS	1
SEC1 Soft Skills (2 credits)	<p>1. Teamwork 2. Emotional Intelligence 3. Adaptability 4. Leadership 5. Problem solving</p>	2	SS	2
AECC Core British Poetry-1 (6 credits)	<p>Alfred L. Tennyson: Break Break Break,</p> <p>Mathew Arnold – Buried Life</p> <p>Robert Browning: Porphyria's Lover</p> <p>T.S. Eliot: Preludes</p> <p>W.B. Yeats: The Lake Isle of Innisfree</p>			

	Auden:Muséede BeauxArts			
	DylanThomas:DonotgogentleintotheNight			
	SeamusHeaney:Digging			

SEMESTER IV					
HONOURS					
CC8T European Classical Literature (6 credits)	Homer: <i>TheIliad</i> ,tr.E.V.Rieu(Harmondsworth: Penguin,1985)(Book I).	2	KB	2	30
	Sophocles: <i>OedipustheKing</i> ,tr.RobertFaglesin <i>Sophocles:TheThreeThebanPlays</i> (Harmondsworth: Penguin, 1984).	1	TN	1	15
	Plautus: <i>PotofGold</i> ,tr.E.F.Watling(Harmondsworth:Penguin,1965).	2	SG	2	30
	Ovid Selections from <i>Metamorphoses</i> 'Bacchus', (Book III), 'Pyramus and Thisbe'(BookIV), tr. MaryM.Innes (Harmondsworth:Penguin, 1975).	1	SKB	1	15
CC9T Modern European Drama (6 credits)	HenrikIbsen: <i>Ghosts</i>	2	RB	2	30
	BertoltBrecht: <i>TheGoodWomanofSzechuan</i>	2	DA	2	30
	Beckett: <i>WaitingforGodot</i>	2	SS	2	30

CC10T Popular Literature (6 credits)	Lewis Carroll: <i>Through the Looking Glass</i>	2	RB	2	30
	Agatha Christie: <i>The Murder of Roger Ackroyd</i>	1	KB	1	15
	Shyam Selvadurai: <i>Funny Boy</i>	2	TN	2	30
	Sukumar Ray: <i>AbolTabol</i> (Translated by Sukanta Chowdhuri)/Autobiographical Notes on Ambedkar (For the Visually Challenged students)	1	SG	1	15
GE4T Gender&Human Rights (6 credits)	MeenaKandasamy“Aggression” TemsulaAo “LaburnumforMyHead”	2	TN	2	30
	Drama:ManjulaPadmanabhan <i>LightsOut</i>	2	SKB	2	30
	Essay:VirginiaWoolf“ProfessionsforWomen”, <i>Women’sRightsareHumanRights</i> .Section V“ <i>TheHumanRights Frameworkin Practice</i> ”	2	SKB	2	30
SEC2T Creative Writing (2 credits)	Unit 1: What is Creative Writing? Unit 2: The Art and Craft of Writing Unit 3: Modes of creative Writing Unit 4:	2	SS	2	30

	Writing for the Media Unit 5: Preparing for Publication				
GENERAL					
DSC1D Academic Writing and Composition (6 credits)	Introduction to the Writing Process: Conventions of Academic Writing, Writing in one's own words – Summarizing and Paraphrasing	2	RB	2	30
	Critical Thinking: Syntheses, Analyses, and Evaluation	2	TN	1	15
	Structuring an Argument: Introduction, Interjection, and Conclusion. Citing Resources, Editing, Book and Media Review	2	SS	1	15
SEC2 Creative Writing (2 credits)	Unit 1. What is Creative Writing? Unit 2. The Art and Craft of Writing Unit 3. Modes of Creative Writing Unit 4. Writing for the Media	2	SS	2	30

Semester- V					
HONOURS					
CC-11T Postcolonial Literatures (6 credits)	Poetry: Pablo Neruda: 'Tonight I can Write' 'The Way Spain Was'	2	TN	1	15
	Derek Walcott: 'A Far Cry from Africa' 'Names'		KB	1	15
	Mamang Dai: 'Small Towns and the River' 'The Voice of the Mountain'		DA	1	15

	Novel: Chinua Achebe: Things Fall Apart	2	RB	2	30
	Stories: Bessie Head: 'The Collector of Treasures'	2	SKB	1	15
	Ama Ata Aidoo: 'The Girl who can'		DA	1	15
CC-12T: Women's Writing (6 credits)	Poetry: Emily Dickinson: 'I cannot live with you', 'I'm wife; I've finished that'	2	RB	1	15
	Sylvia Plath: 'Daddy'		SKB	1	15
	Eunice De Souza: 'Advice to Women',		KB	1	15
			SG	1	15
	Fiction: Mahashweta Devi 'Draupadi', tr. Gayatri Chakravorty Spivak (Calcutta: Seagull,	1	RB	1	15
	Toni Morrison: Beloved	1	SS	1	15
	Non-Fiction: Baby Kamble: Our Wretched Life	2	DA	1	15
	Rassundari Debi Excerpts from Amar Jiban in Susie Tharu and K. Lalita, eds., Women's Writing in India, vol. 1 (New Delhi: OUP, 1989) pp. 191-2.		TN	1	15
DSE1T: Nineteenth Century European Realism (6 credits)	Fyodor Dostoyvesky: Crime and Punishment, tr. Jessie Coulson London: Norton, 1989).	3	KB	3	45
	Gustave Flaubert: Madame Bovary, tr. Geoffrey Wall (London: Penguin, 2002).	3	TN	3	45
DSE2T: World Literatures (6 credits)	V.S. Naipaul: Bend in the River (London: Picador, 1979)	2	RB	2	30
	Julio Cortazar: 'Blow-Up', in Blow-Up and other Stories (New York: Pantheon, 1985)	2	SKB	2	30
	Judith Wright: 'Bora Ring', in Collected Poems (Sydney: Angus & Robertson, 2002) p. 8.	2	SG	2	30
GENERAL					
DSE1A	Mahashweta Devi- 'Draupadi'	2	TN	2	30

Indian Literature in Translation (6 credits)	Vijay Tendulkar – Silence: The Court is in Session (Translation of Shantata: Court ChaluAhe)	2	SS	2	30
	Rabindranath Tagore – The Wife’s Letter (Translation of Steer Patra)	2	RB	2	30
GE1: Gender & Human Rights (6 credits)	Poetry: Meena Kandasamy “Aggression” Temsula Ao “Laburnum for My Head”	2	SKB	2	30
	Drama: Manjula Padmanabhan Lights Out	2	TN	2	30
	Essay: Virginia Woolf “Professions for Women”, Women’s Rights are Human Rights. Section V “The Human Rights Framework in Practice”	2	RB	2	30
SEC-3: Translation Studies (6 credits)	Introducing Translation: A brief history and significance of translation in a multi lingual and multicultural society like India	6	SS	6	
	Exercises in different Types/modes of translation: a. Semantic/Literal b. free sense/literary c. Functional/communicative d. Transcreation.				
	Introducing basic concepts and terms used in Translation Studies through relevant tasks: Equivalence, Language variety, Dialect, Idiolect, Register, Style, Mode, and Code mixing/Switching. b. Defining the process of translation (analysis, transference, restructuring) through critical examination of standard translated literary/non-literary texts				
SEMESTER VI					
HONOURS					
CC13T Indian Classical Literature (6 credits)	Kalidasa.AbhijnanaShakuntalam,tr.ChandraRajan,inKalidasa:TheLoomofTime(NewDelhi: Penguin, 1989).	2	RB	2	30
	Vyasa.‘The Dicing’ and‘The SequeltoDicing,’TheBookof the AssemblyHall’,‘TheTemptationofKarna’, BookV‘TheBookofEffort’,in <i>TheMahabharata</i> :tr.anded.J.A.B.vanBuitenen(Chicago :Brill,1975)pp.106–69.	2	TN	2	30

	Sudraka. Mrcchakatia, tr. M.M. Ramachandra Kale (New Delhi: Motilal Banarasidass, 1962).	2	SKB	2	30
CC14T Indian Writing in English (6 credits)	R.K.Narayan: <i>Swami and Friends</i>	6	SS	2	30
	H.L.V.Derozio: 'The Harp of India'		KB	1	15
	Kamala Das: 'Introduction'		SS	1	15
	Nissim Ezekiel: 'The Night of the Scorpion'		SG	1	15
	Mulk Raj Anand: 'Two Lady Rams'		KB	1	15
	Salman Rushdie: 'The Free Radio'		SG	1	15
	Girish Karnad: <i>Tughlaq</i>		DA	2	30
DSE3T Science Fiction and Detective Literature (6 credits)	Wilkie Collins: <i>The Woman in White</i>	3	SS	3	45
	Arthur Conan Doyle: <i>The Hound of the Baskervilles</i>	3	DA	3	45
DSE4T Partition Literature (6 credits)	Amitav Ghosh: <i>The Shadow Lines</i> .	2	RB	2	30
	Dibyendu Palit: 'Alam's Own House', tr. Sarika Chaudhuri, <i>Bengal Partition Stories: An Unclosed Chapter</i> , ed. Bashabi Fraser (London: Anthem Press, 2008) pp. 453–72.	1	SG	1	15
	Manik Bandhopadhyaya, 'The Final Solution', tr. Rani Ray, <i>Mapmaking: Partition Stories from Two Bengals</i> , ed. Debjani Sengupta (New Delhi: Srishti, 2003) pp.23–39.	1	SKB	1	15

	Sa'adat Hasan Manto, 'Toba Tek Singh', in <i>Black Margins: Manto</i> , tr. M. Asaduddin (New Delhi: Katha, 2003) pp. 212–20.	1	TN	1	15
	Jibananda Das, 'I Shall Return to This Bengal', tr. Sukanta Chaudhuri, in <i>Modern Indian Literature</i> (New Delhi: OUP, 2004) pp. 8–13.	1	KB	1	15
GENERAL					
DSE2T Partition Literature (6 credits)	1. Intizar Husain, <i>Basti</i> , tr. Frances W. Pritchett (New Delhi: Rupa, 1995). (10)	2	RB	2	30
	2. a) Manik Bandhopadhyaya, 'The Final Solution', tr. Rani Ray, <i>Mapmaking: Partition</i> (15) <i>Stories from Two Bengals</i> , ed. Debjani Sengupta (New Delhi: Srishti, 2003) pp. 23–39.	1	SS	1	15
	Sa'adat Hasan Manto, 'Toba Tek Singh', in <i>Black Margins: Manto</i> , tr. M. Asaduddin (New Delhi: Katha, 2003) pp. 212–20.	1	TN	1	15
	3.) Faiz Ahmad Faiz, 'For Your Lanes, My Country', in <i>In English: Faiz Ahmad Faiz</i> , (15) <i>A Renowned Urdu Poet</i> , tr. and ed. Riz Rahim (California: Xlibris, 2008) p. 138.	2	DA	2	30
GE2T Novel and Prose (6 credits)	Charles Dickens: <i>Oliver Twist</i>	2	SKB	2	30
	R.K. Narayan: <i>A Library without Books</i> Charles Lamb: <i>The Superannuated Man</i> Bertrand Russell: <i>The Functions of a Teacher</i>	2	SS	2	30
	a. Guy de Maupassant: <i>My Uncle Jules</i> b. O. Henry: <i>After Twenty Years</i>	2	TN	2	30

	c. Ismat Chughtai, 'Lihaaf'/'The sacred Duty'				
SEC-4: Business Communications (2 credits)	Cred 1. Introduction to the Essentials of Business Communication: Theory and Practice 2. Writing a project report 3. Citing References, using bibliographical and research tools 4. Writing minutes of meetings 5. E-Correspondence 6. Making oral presentations (Viva for internal assessment) 7. Spoken English for Business Communication (Viva for internal assessment)	2	SS	2	30

DEPARTMENT OF SANSKRIT

SESSION-2021-2022

Course	Course contents/syllabus	Allotted Teachers	Credits & Marks	Class allotted per week	Total Class
CC-1 C1T :	Classical Sanskrit Literature (Poetry) A. Raghuvaṃśam: Canto-I (Verse: 1- 25) Unit : IRaghuvaṃśam: Introduction (Author and Text), Appropriateness of title, Canto I, 1-10 Grammatical analysis, Meaning/translation, Explanation, content analysis, Characteristics of Raghu Clan. Unit: IIRaghuvaṃśam: Canto I (Verses 11-25) grammatical analysis, Meaning/translation, Explanation, Role of Dilīpa in the welfare of subjects.	S. Manna	06 (5+1+0) CA-05 + IA- 10+ESE- 60 =75	1	01x15= 15
	B. Kumarasambhavam: Canto-V (Verse: 1-30) Unit:IKumārasambhavam: Introduction (Author and Text), Appropriateness of title, Background of given contents. Text Reading Canto I Verses 1-15, (Grammatical analysis, Translation, and Explanation0), Poetic excellence and Plot. Unit: II Kumārasambhavam :TextReading Canto I Verses 16-30 (Grammatical analysis, Translation, Explanation), Penance of Pārvati, Poetic excellence, Plot.	M. Das		2	2X15=30
	C. Kirātārjunīyam: Canto - I (Verse: 1 - 25) Unit:IKirātārjunīyam: Introduction (Author and Text), Appropriateness of title, Background of given contents, Canto I Verses 1-16, Grammatical analysis, Translation, Explanation, Poetic excellence, thematic analysis. Unit: IIKirātārjunīyam: Verses 17-25, Grammatical analysis, Translation, Explanation, Poetic excellence, thematic analysis	M. Das			
	D. Nīṭisatakam: (Verse: 1- 20) 1st two Paddhatis Unit:INīṭisatakam: Verses (1-10) Grammatical analysis Translation, explanation. Unit:IINīṭisatakam: Verses (11-20) Grammatical	J. Maikap		1	01X15=15

	analysis Translation, explanation, thematic analysis bhartṛhari's comments on society				
	<p>E. Origin and Development of Mahākāvya and Gītikāvya</p> <p>Unit: I Origin and development of different types of Māhākāvya with special reference to Aśvaghoṣa, Kālidāsa, Bhāravi, Māgha, Bhatti, Śīharṣa.</p> <p>Unit: II Origin & Development of Sanskrit gītikāvayas with special reference to Kālidāsa, Bilhana, Jayadeva, Amarūk, Bhartṛhari and their works.</p>	A.D		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-2 C2T :	<p>Classical Sanskrit Literature (Prose)</p> <p>A. Sukanasopadesa(Ed. Prahlad Kumar)</p> <p>Unit: I Introduction-Author/Text, Text up to page 116 of Prahlad Kumar Up to the end of the Text.</p> <p>Unit: IISociety, Āyurveda and political thoughts depicted in Sukanāsopadeśa, logical meaning and application of sayings like, बाणीछछष्ट जगत्सवाम्, वाणीवाणीबभूव, पञ्चाननो बाण etc.</p>	AD	06 (5+1+0) CA-05 + IA- 10+ESE- 60 =75	02	02X15=30
	<p>B. Viśrutacaritam Upto 15th Para</p> <p>Unit: I Para 1 to 10-Introduction-Author, Text, Text reading (Grammar, Translation, and Explanation), Poetic excellence, plot, Timing of Action.</p> <p>Unit: II Para 11 to 15-Text reading (Grammar, Translation, and Explanation), Poetic excellence, plot, Timing of Action. Society, language and style of Dandin. Exposition of Saying, दण्डन पदलाणलल्यम्, कणवदाण्डी कणवदाण्डी कणवदाण्डी न सशय।</p>	SM		02	02X15=30
	<p>C. Origin and Development of prose, Important prose romances and fables. Origin and development of prose, Important prose romances and fables.</p> <p>Unit: I Origin and development of prose, important prose romances and fables</p> <p>Unit: II (i) Subandhu, Daṇḍin, Bāṇa, Ambikādatṭa Vyāsa. (ii) Pañcatantra, Hitopadeśa, Vetālapañcaviṃśatikā, Śimhāsanadvātriṃśikā, Puruṣaparīkṣā, Śukasaptati.</p>	SG		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
GE-1	A. Grammar and Composition Part I Unit: I Nominative forms of pronouns-asmaḍ, yuṣmaḍ,	AD	06	02	02X15=30

GE1T: Basic Sanskrit	<p>etatandtatin masculine, feminine and neuter.</p> <p>Nominative forms of 'a' ending masculine and neuter gender nouns withpath, khād, likhand similar simple verbs in present, past and future. Objective forms of the above nouns and pronouns in singular with more simple verbs.</p> <p>Unit: II Instrumental, dative, ablative forms of the above nouns and pronouns in singular, dual and plural instrumental, dative, ablative forms of all the words in this syllabus.</p> <p>Unit: III 'ā'and' ī'ending feminine words in nominative and accusative cases withloṭlakāra(imperative).</p> <p>Unit: IV 'ā'and' ī'ending feminine nouns in singular in Genitive/ possessive and locative cases, genitive and locative cases in singular in pronouns tat, etat, yat, kim</p> <p>Unit: V Masculine and Feminine nouns ending in'ī'and masculine nouns ending in'u' in various cases in singular.</p> <p>Unit: VI Masculine nouns ending in consonants-bhavat, guṇin, ātmanand Feminine nouns ending in consonants-vāk,Neuter nouns ending in consonants-jagat , manas</p>		(5+1+0) CA-05 + IA- 10+ESE- 60 =75		
	<p>B.Grammar and Composition Part II Unit: I Special Verb forms-in parasmaipada-past, present, future and imperative-kr, śrū</p> <p>Unit: II Special Verb forms-in parasmaipada-past, present, future and imperative jñā .</p> <p>Special Verb forms-in parasmaipada-past, present, future and imperative dā.</p>	AD		01	01X15=15
	<p>Unit: IIIātmanepada-sev, labh</p> <p>Unit: IV Phonetic changes-visarga sandhi vowel sandhis.</p> <p>Unit: V Participles - śatr ,śānac, ktavatu, kta. Pratyayas- ktvā, lyap, tumun. Active - passive structures in lakāra- (third person forms only) and pratyayas.</p>	JM		01	01X15=15
	<p>C.Literature</p> <p>Unit: I Gita Chapter XII</p>	MD		02	02X15=30

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSC-1A :	<p>Sanskrit Poetry: A.Raghuvamśam Unit - I Introduction (Author and Text) Canto-I (Verses 1-10) Meaning/translation, Explanation, Story, Characteristics of Raghu Clan, Characteristics of Dilīpa. Unit: II Canto-I (Verses: 11-25) Meaning/translation, Explanation, Role of Dilīpa for the welfare of the subjects. Appropriateness of title, Background of given contents.</p>	SM	06 (5+1+0) CA-05 + IA- 10+ESE-60 =75	02	02X15=30
	<p>B.Sisupalvadham Unit: I Introduction (Author and Text),</p>	MD		01	01X15=15

	<p>Appropriateness of title, Background of given contents. Canto II, Verses 26-37, Grammar, Translation, Explanation, Poetic excellence, thematic analysis.</p> <p>Unit II</p> <p>Verses 42-56, Grammar, Translation, Explanation, Poetic excellence, thematic analysis. ceelesmeefvle \$e³ees iegCee: ceslesceelesieleb Jel³e:,leeJeod Yee YeejJesYeejfjefle³eeJevceelem³e veeso³e</p>				
	<p>C.Nitisatakam</p> <p>Unit: I</p> <p>Verses (1-10) Translation, explanation.</p> <p>Unit II</p> <p>Verses (11-20) Translation, explanation, Social experiences of Bhartṛhari, Types of Fool.</p>	JM		01	01X15=15
	<p>D.History of Sanskrit Poetry.</p> <p>Unit I</p> <p>Aśvaghoṣa, Kālidāsa, Bhāravi, Māgha, Śriharṣa, Jayadeva, Bhart_hari and their works.</p> <p>Unit II</p> <p>Origin and Development of Different types of Mahakavya and Gītikāvya with special reference to the following Poets and their works.</p>	SG		02	02X15=30

Course	Course Contents	Allotted Teachers	Credits&Marks	Class allotted per week	Total class
CC-3 C3T :	<p>Critical Survey of Sanskrit Literature</p> <p>A. Vedic Literature</p> <p>Unit-I Samhita (R.k, Yajuh,, Sama, Atharva) time, subject-matter, religion & Philosophy, social life.</p> <p>Unit- II Brahmana, Aranyaka, Upanisad, Vedanga (Brief Introduction).</p>	SG	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	02	02X15=30
	<p>B. Ramayana</p> <p>Unit- I Ramayana-time, subject-matter, Ramayana as an Ādikāvya.</p> <p>Unit- II Ramayana as a Source Text and its Cultural Importance</p>	AD		02	02X15=30
	C. Mahabharata Unit-I Mahabharata and its Time, Development, and subject				

	<p>matter.</p> <p>Unit- II Mahabharata :Encyclopaedic nature, as a Source, Text, Cultural Importance.</p>				
	<p>D. Puranas</p> <p>Unit-I Puranas : Subject matter, Characteristics.</p> <p>Unit- II Puranas: Social, Cultural and Historical Importance.</p>				
	<p>E. General Introduction to Vyakarana, Darsana and Sahitvasastra.</p> <p>Unit-I General Introduction to Vyakarana -Brief History of Vyakaranasastra.</p> <p>Unit- II General Introduction to Darsana-Major schools of indian Philosophy Carvaka, Bauddha, Jaina, Sankhya-yoga, Nyaya-Vaisesika, Purvamimarhsa and Uttara mimamsa and Uttar Mimamsa.</p> <p>Unit-III General Introduction to Poetics-Six major Schools of Indian Poetics-Rasa, Alamkara, Riti. Dhvani,Vakrokti and Aucitya</p>	JM		02	02x15=30

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-4 C4T :	<p>Self Management in the Gita</p> <p>Gita : Cognitive and emotive apparatus.</p> <p>Unit-I</p> <p>Hierarchy of indriya. manas. buddhi and atman 11.42; xv. 7</p> <p>Role of the atman -XV. 7: XV.9</p> <p>Mind as a product of prakrti VII.4</p> <p>Properties of three gu1)as and their impact on the mind-XIII. 5-6; XIV.5-8, 11-13; XIV.17</p>	MD	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02x15=30
	<p>Gita : Controlling the Mind</p> <p>Unit-I</p> <p>Confusion and conflict. Nature of conflict I. I; IV .16; 1.45; II.6</p> <p>Causal factors -Ignorance -II.41;</p>	MD		02	02x15=30

	<p>Indriya -II.60, Mind -II.67; Rajoguna - III.36-39; XVI.21; Weakness of mind- 11.3: IV.5</p> <p>Unit-II</p> <p>Means of controlling the mind, Meditation- difficulties- procedure VI.I.14, Balanced life-III.8; VI.16-17, Diet control-XVII. 8-10, Physical and mental discipline -XVII. 14-19, VI. 36.</p>				
	<p>Gita :Self Management through devotion</p> <p>Unit- I</p> <p>Surrender of ego -II.7 ; ,IX.27; VIII. 7; XI.55 ; II.47, Abandoning frivolous debates -VII.21, IV. I I; IX.26, Acquisition of moral qualities -XII. I I; XII.13-19</p>	SM		02	02x15=30

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
GE-2 GE2T:	<p>Sanskrit and other Modern Indian Languages.</p> <p>A.Indo- Aryan Language</p> <p>Unit-I</p> <p>Stages of Indo-Aryan -Old Indo-Aryan, Middle Indo-Aryan Stages of development in the present day.</p>	JM	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02x15=30
	<p>B.Philology</p> <p>Unit-I</p> <p>Phonetics of Sanskrit and other Modern Indian Languages.</p> <p>Unit-II</p> <p>Morphology of Sanskrit and other Modern Indian Languages.</p> <p>Unit-III</p> <p>Syntax of Sanskrit and other Modern Indian Languages.</p>	SM		02	02x15=30
	<p>C.Literature</p> <p>Unit- I</p> <p>Sanskrit as a source of Modern Indian Literature.</p> <p>Unit-II</p>	MD		02	02x15=30

	Vernacular Languages as a source of enrichment of Sanskrit				
--	--	--	--	--	--

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSC-1B DSC1B T : Sanskrit Prose.	A.SukanasopadesaUnit-I Introduction- Author/ Text. Text up to page 116 of Prahlad Kumar upto यथा चेयं चपला दीप्यते समाप्तिपयन्त (up to the end of the text.) Unit- II Society and political thought depicted in Sukanasopadesa logical meaning and application of sayings	JM	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	02	02x15=30
	B.Sivarajavijayam, Nihswasa- I Unit- I Para 1 to 20 Introduction- Author/ Text, Text reading (Grammar, Translation and Explanation), Poetic excellence, plot, Timing of Action. Unit-II From para 21 to the end of the Text Reading (Grammar, Translation and Explanation) , Poetic excellence plot, Timing of Action.	MD		02	02x15=30
	C.Survey of Sanskrit Literature- Prose Unit-I Origin and development of prose and important prose romances - Subandhu, Bana , Dandin, Ambikādatṭa, Vyāsa. Unit-II Panchatantra, Hitopadeśa, Vetālapancavimsatikā, Simhasanadvatimsikā.	SG		02	02x15=30

Course	Course Contents /Syllabus	Allotted Teachers	Credits/Marks	Class allotted per week	Total Class
CC-5	Classical Sanskrit Literature (Drama)	JM	06 (5+1+0)	01	01x15=15

C5T:	<p>A.Svapnavasavadattam- Bhasa Act I & VI</p> <p>Unit: I</p> <p>Svapnavāsavadattam: Act I & VI Story, Meaning/Translation and Explanation.</p> <p>Unit: II</p> <p>Svapnavāsavadattam: Unique features of Bhāsa's style, Characterization, Importance of 1st and 6th Act, Society, Norms of Marriage, Story of 'regains'. भासाहसः</p>		CA-05 + IA-10+ESE-60		
	<p>B.Abhijnanasakuntalam- Kalidasa I & IV</p> <p>Unit: I</p> <p>Abhijñānaśākuntalam : Act I- (a) Introduction, Author, Explanation of terms like nāndī, prastāvanā, sūtradhāra, naṭi, viṣkambhaka, vidūṣaka, kañcukī, (b) Text Reading (Grammar, Translation, Explanation), Poetic excellence, Plot, Timing of Action. Personification of nature, Language of Kālidāsa, dhvani in UpamāKālidāsa, Purpose and design behind Abhijñānaśākuntalam and other problems related to texts, popular saying about Kālidāsa&Śākuntalam .</p> <p>Unit: II</p> <p>Abhijñānaśākuntalam Act IV- Text Reading (Grammar, Translation, Explanation), Poetic excellence, Plot, Timing of Action.</p>	AD		02	02x15=30
	<p>C.Mudraraksasam- Visakhadattam I, II & III</p> <p>Unit: I</p> <p>Mudrārākṣasam: Act I – (a) Introduction, Author, Purpose and design behind Mudrārākṣasa. (b) Text Reading prescribed verses for translation and explanation- 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 14, 16, 18, 19, 21, 22, 24, 26, 27. (Grammar, Translation, Explanation), Poetic excellence, Plot, Timing of Action.</p> <p>Unit: II</p> <p>Mudrārākṣasam: Act II - prescribed verses for translation and explanation- 1, 3, 4, 5, 7, 8, 9, 10, 13, 15, 16, 17, 18, 19, 22, and 23, Text Reading (Grammar, Translation, Explanation), Poetic excellence, Plot, Timing of Action.</p> <p>Unit: III</p> <p>Mudrārākṣasam: Act III - prescribed verses for translation and explanation- 1, 3, 4, 6, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 29, 31 and 33. Text Reading (Grammar, Translation, Explanation), Poetic excellence, Plot, Timing of Action.)</p>	MD		02	02x15=30
	<p>D.Critical Survey of Sanskrit Drama</p>	SM		01	01x15=15

	<p>Unit-I:</p> <p>Sanskrit Drama: Origin and Development, Nature of Nāṭaka,</p> <p>Unit-II:</p> <p>Some important dramatists and dramas: Bhāsa, Kālidāsa, Sūdraka, Viśākhadatta, ŚrīHarṣa, Bhavabhūti, Bhaṭṭanārāyaṇa and their works.</p>				
--	--	--	--	--	--

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-6 C6T :	<p>Poetics and Literature Criticism</p> <p>A.Introduction to Sanskrit Poetics</p> <p>Unit-I</p> <p>Introduction to poetics: Origin and development of Sanskrit poetics, its various names- kriyākālpa, alaṅkāraśāstra, sāhityaśāstra, saundaryaśāstra.</p> <p>Unit- II</p> <p>Definition (lakṣaṇa), objectives (prayojana) and causes (hetu) of poetry. (according to kāvyaprakāśa)</p>	MD	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	01	01x15=15
	<p>B.Forms of Kavya- Literature</p> <p>Unit- I</p> <p>Forms of poetry: dṛśya, śravya, miśra, (campū)</p> <p>Unit- II</p> <p>Mahākāvya, khaṇḍakāvya, gadya-kāvya: kathā, ākhyāyikā (according to Sāhityadarpaṇa)</p>	SG		01	01x15=15
	<p>C.Sabda- sakti (Power of Word) and rasa - sutra</p> <p>Unit-I</p> <p>Power/Function of word and meaning (according to kāvyaprakāśa). abhidhā (expression/ denotative meaning), lakṣaṇā (indication/ indicative meaning) and vyañjanā (suggestion/ suggestive meaning).</p> <p>Unit: II</p> <p>Rasa: rasa-sūtra of Bharata and its prominent expositions: utpattivāda, anumativāda, bhuktivāda and abhivivaktivāda, alaukikatā (transcendental nature) of rasa (as discussed in Kāvyaaprakāśa).</p>	SM		02	02x15=30
	<p>D.Alamkara (figures of speech) and chandas (Meter)</p> <p>Unit- I</p> <p>Figures of speech- anuprāsa, yamaka, śleṣa, upamā, rūpaka,</p>	AD		01	01X15=15

	sandeha, bhrāntimān, apahnuti, utprekṣā, atīśayokti, tulyayogitā, dipaka, drṣṭānta, nidarśanā, vyatireka, samāsokti, svabhāvokti, aprastutapraśamsā, arthāntaranyāsa, kāvyaliṅga, vibhāvanā.				
	Unit- II Metres- anuṣṭup, āryā, indravajrā, upendravajrā, drutavilambita, upajāti, vasantatilakā, mālinī, mandākrāntā, śikhariṇī, śārdūlavikrīḍita, sragdharā.	JM		01	01X15=15

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-7 C7T:	Indian Social Institutions and Polity A.Indian Social Institutions: Nature and Concepts Unit- I Indian Social Institutions: Definition and Scope: Sociological Definition of Social Institutions. Trends of Social Changes, Sources of Indian Social Institutions (Vedic Literature, SūtraLiterature, Purāṇas, Rāmāyana , Mahābhārata ,Dharmaśāstras, Buddhist and Jain Literature, Literary Works, Inscriptions, Memoirs of Foreign Writers) Unit: II Social Institutions and Dharmaśāstra Literature: Dharmaśāstra as a special branch of studies of Social Institutions, sources of Dharma (Manusmṛti, 2, 12; Yājñavalkyasmṛti,1.7). Different kinds of Dharma in the sense of Social Ethics Manusmṛti, 10, 63; Viṣṇupurāṇa 2.16-17); Six kinds of Dharma in the sense of Duties (Mitākṣarāṭīkā on Yājñavalkyasmṛti,1.1). Tenfold Dharma as Ethical Qualities (Manusmṛti,6. 92); Fourteen – Dharmasthānas (Yājñavalkyasmṛti,1.3)	JM	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	01	01X15=15
	B.Structure of Society Unit- I Varna-System and Caste System: Four-fold division of Varna System, (Rgveda, 10.90.12), Mahābhārata, Śāntiparva, 72. 3-8); Division of Varna according to Guna and Karma (Bhagvadgīta , 4.13, 18.41-44). Origin of Caste-System from Inter-caste Marriages (Mahābhārata, Anuśāsanaparva, 48.3-11); Emergence of non-Aryan tribes in Varna-System (Mahābhārata, Śāntiparva, 65.13-22). Social rules for up-gradation and down-gradation of Caste System (Āpastambadharmasūtra, 2.5.11.10-11, Baudhāyanadharmasūtra, 1.8.16.13-14, Manusmṛti, 10, 64,	MD		02	02X15=30

<p>Yājñavalkyasmṛti, 1.96)</p> <p>Unit- II</p> <p>Position of Women in the Society : Brief survey of position of women in different stages of Society. Position of women in Mahābhārata (Anuśāsanaparva, 46.5-11, Sabhāparva, 69.4-13. Praise of women in The Brhatsaṃhitā of Varāhamihira (Strīprasamsā, chapter-74.1-10)</p> <p>Unit- III</p> <p>Social Values of Life: Social Relevance of Indian life style with special reference to Sixteen Saṃskāras. Four aims of life 'PuruṣārthaCatuṣṭaya'- 1. Dharma, 2. Artha, 3. Kāma, 4. Mokṣa. Four Āśramas - 1. Brahmacharya, 2. Gṛhastha, 3. Vānaprastha, 4. Saṃnyāsa.</p> <p>and Value of Life</p>					
<p>C.Indian Polity: Origin and Development</p> <p>Unit- I</p> <p>Initial stage of Indian Polity (from Vedic period to Buddhist period). Election of King by the people: 'Viśas' in Vedic priod (Rgveda,10.173;10.174; Atharvaveda,3.4.2; 6.87.1-2).</p> <p>Parliamentary Institutions: 'Sabhā,'Samiti' and 'Vidatha' in Vedic period (Atharvaveda,7.12.1;12.1.6 ; Rgveda ,10.85.26);</p> <p>King-maker 'Rājakartārah' Council in Atharvaveda (3.5.6-7),Council of 'Ratnis' in śatapathabrāhmaṇa (5.2.5.1);</p> <p>Coronation Ceremony of Samrāt in śatapathabrāhmaṇa (51.1.8-13; 9.4.1.1-5). Republic States in the Buddhist Period (Digghnikāya, Mahāparinibbana Sutta, Aṅguttaranikāya 1.213; 4.252,256)</p> <p>Unit-II</p> <p>Later Stages of Indian Polity (From Kauṭilya to Mahatma Gandhi).</p> <p>Concept of Welfare State in Arthaśāstra of Kauṭilya (Arthaśāstra, 1.13 : 'matsyanyāyābhībhūth' to 'yo' asmāngopāyatīti');</p> <p>Essential Qualities of King (Arthaśāstra, 6.1.16-18: 'sampādayatyasampannaḥ'to 'jayatyevanahīyate');</p> <p>State Politics 'Rajadharma'(Mahābhārata , Śāntiparva,120.1-15; Manusmṛti, 7.1-15; Sukranīti,1.1-15);</p> <p>Constituent Elements of Jain Polity in Nitivākyāmṛta of Somadeva Suri, (Daṇḍanīti- samuddeśa, 9.1.18 and Janapada- samuddeśa, 19.1.10).</p> <p>Relevance of GandhianThought in Modern Period with special reference to 'Satyāgraha' Philosophy ('Satyāgrahagītā' of PanditāKṣamārāva and 'Gandhi Gītā', 5.1-25 of Prof. Indra)</p>	<p>SG</p>			<p>01</p>	<p>01X15=15</p>

	<p>D.Cardinal Theories and Thinkers of Indian Polity</p> <p>Unit- I</p> <p>Cardinal Theories of Indian Polity: 'Saptāṅga' Theory of State: 1.Svāmi, 2. Amātya, 3. Janapada 4. Pura, 5. Kośa, 6. Danda and 7. Mitra (Arthaśāstra, 6.1. Mahābhārata, Śāntiparva, 56.5, Sukranīti, 1.6162).</p> <p>'Maṇḍala' Theory of Inter-State Relations: 1.Ari, 2. Mitra, 3. Ari-mitra, 4.Mitra- mitra, 5.Ari-mitra- mitra;</p> <p>'Śāḍgunya' Policy of War and Peace : 1. Sandhi, 2. Vighraha, 3. Yāna, 4. Āsana, 5. Saṁśraya 6. Dvaidhibhāva.</p> <p>'CaturvidhaUpāya'for Balancing the power of State : 1.Sāma 2.Dāma, 3.Daṇḍa. 4.Bheda;</p> <p>Three Types of State Power 'Śakti': 1.Prabhu- śakti, 2. Mantra- śakti, 3. Utsāha- śakti.</p> <p>Unit: II</p> <p>Important Thinkers on Indian Polity:</p> <p>Manu, Kautilya, Kāmandaka, Śukrācārya, SomadevaSuri, Mahatma Gandhi.</p>	SM		02	02X15=30

Course	Course Contents/Marks	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
SEC-1 SEC1T :	<p>A.Acting and Script Writing</p> <p>Unit-I</p> <p>a. Persons competent for presentation (acting) : kuśala (skilful), vidagdha (learned), pragalbha (bold in speech), jitaśramī (inured to hard-work) .</p> <p>b.Lokadharmī and Nātyadharmī Abhinaya</p> <p>c. Nātya-prayoktā-gana (members of theatrical group) : sūtradhāra (director), nātyakāra (playwrighter), naṭa (actor) kuśilava (musician), bharata, nartaka (dancer), vidūṣaka (jester) etc.</p> <p>Unit- II</p> <p>(i.) Assignment of role:</p> <p>a. General principles of distribution.</p> <p>b. Role of minor characters.</p> <p>c. Role of women characters.</p> <p>d. Special cases of assigning of role.</p> <p>(ii.) Kinds of roles: anurūpa (natural), virūpa (unnatural), rūpānusariṇī (imitative)</p> <p>Unit- III</p> <p>Definition of abhinaya and its types:</p>	AD	<p>CA-05 + IA-05+ESE-40</p> <p>=50</p>	01	01X15=15

<p>a. Aṅgika (gestures): aṅga, upāṅga and pratyāṅga.</p> <p>b. Vācika(oral): svara, sthāna, varṇa, kāku, bhāṣā.</p> <p>C. Sāttvika (representation of the Involuntary gestures).</p> <p>d. Āhārya: pusta, alaṅkāra, aṅgaracanā, sañjiva (dresses and make-up)</p>				
<p>B.Script Writing (Patakathalekhana)</p> <p>Unit-I</p> <p>Types of dramatic production:</p> <p>sukumāra (delicate), āviddha (energetic). Nature of plot (vastu): Adhikārika (principal), Prāsaṅgika (subsidiary), Dṛśya (presentable), Sūchya (restricted scenes).</p> <p>Unit-II</p> <p>Division of Plot:</p> <p>a. Source of plot: Prakhyāta (legendary), Utpādyā (invented), Mīśra (mixed);</p> <p>b. Objectives of plot- Kārya (dharma, artha, kāma);</p> <p>c. Elements of plot- Five kinds of Arthaprakṛtis (caustations), Kāryāvasthā (stages of the action of actor); Sandhis (junctures) and their sub-divisions (segments)</p> <p>d.Five kinds of Arthopakṣepaka (interludes);</p> <p>Unit-III</p> <p>Dialogue writing: kinds of saṁvāda(dialogue)</p> <p>a. Sarvaśrāvya or Prakāśa (aloud)</p> <p>b. Aśrāvya or Svagata (aside)</p> <p>c. Niyataśrāvya :Janāntika (personal address), Apavārita (confidential)</p> <p>d. Ākāśabhāṣita (conversation with imaginary person).</p> <p>Unit- IV</p> <p>a. Duration of play</p> <p>b. Three Unities: Time, Actions and place.</p> <p>c. Starting of a play: Pūrvaraṅga- Raṅgadvāra, Nāndī, Prastāvanā, Prarocanā.</p> <p>d. Analysis of acting, plot and dialogue in the context of Abhijñānaśākuntalam.</p>	JM		01	01X15=15

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
GE-3 GE3T:	<p>Fundamentals of Indian Philosophy</p> <p>A.General Introduction</p> <p>Unit-I</p> <p>Darśana - concept and aims, Classification of Indian Philosophical schools.</p> <p>Unit-II</p> <p>Salient features of Indian Philosophy .</p>	SM	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02X15=30
	<p>B.School of Indian Philosophy</p> <p>Unit-I</p> <p>Darśana - concept and aims, Classification of Indian Philosophical schools.</p> <p>Unit-II</p> <p>Salient features of Indian Philosophy .</p> <ul style="list-style-type: none"> •Cārvāka– General introduction with emphasis on Chanllenge to Veda, Rejection of Transcendental Entities, Ethics (Based on Sarvadarshansamgrah) • Jainism – General introduction with emphasis on Anekāntavāda, Syādvāda, Saptabhaṅginaya, triratna • Buddhism- General Introduction with emphasis on Four Noble Truths <p>Unit: II</p> <p>Orthodox Schools of Philosophy</p> <ul style="list-style-type: none"> •Sāṃkhya– General Introduction with emphasis on prakṛti, gunatraya&puruṣa Entities (Based on Sāṃkhyakārikā) • Yoga - Eight fold path of Yoga (Based on YogasūtraSādhanaṣāda and their on Yogabhāṣya thereon) <p>Unit: III</p> <p>Nyāya–General introduction with emphasis on Vaiśeṣika : Seven Padārthas (Based on Tarkasamgrah)</p> <p>Unit: IV</p> <p>Advaita Vedānta– General introduction with emphasis a Brahman, Māyā, Jīva and Jagat (Based on Vedāntasāra)</p> <p>Unit: V</p> <p>Mīmāṃsā - SvataḥPrāmāṇyavāda</p> <p>Unit: VI</p> <p>Bhakti Schools of Vedānta– General introduction with emphasis on God, Īśvara& nature of bhakti.</p>	JM		02	02X15=30
	C.Problem in Indian Philosophy	MD		02	02X15=30

Unit: I Epistemology: six pramāṇas.				
Unit: II Metaphysics: realism, idealism, Causation - Satkāryavāda. Asatkāryavāda, Parināmavāda, Vivartavāda, svabhāvavāda, consciousness and matter, theories of self.				
Unit: III Ethics: Karma & Punarjanma theory, Liberation				

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSC-1C DSC1C T:	Sanskrit Drama A.Pratimanatakam: Act I & III- Bhāsa Unit-I First Act Introduction, Text Reading (Grammar, Translation, and Explanation), Poetic excellence, Plot. Unit-II Third Act Introduction, Text Reading (Grammar, Translation, and Explanation), Poetic excellence, Plot.	JM	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	01	01X15=15
	B.Abhijñānaśākuntalam - Act IV - Kalidasa Unit-I Fourth Act (a) Introduction, Explanation of terms like Nandi, prastavana, Sutrādhara, nati, viṣkambhaka, vidūṣaka and kancuki. Unit-II (b) Text Reading (Grammar, Translation, Explanation), Poetic excellence, Plot, Timing of Action. Personification of nature. Kavyesunatakamramyam, upama, Language of Kālidāsa, dhvani in Kalidasa, Purpose and design behind Abhijñānaśākuntalam and other problems related to the text.	AD		02	02X15=30
	C.Technical Terms from Sanskrit Dramaturgy Unit-I नाटक, नायक, नायिका, पूर्वसर्ग, नन्दी, सूत्रधार, नेपथ्य, प्रस्तावना, कञ्चुकी एवं विदूषके। Unit-II अङ्क, स्वागत, प्रकाश, अपवारित, जनान्तिक, आकाशभाषित, विष्कम्भक,	SG		02	02X15=30

	प्रवेशक एव भरतवाक्य।				
	D.History of Sanskrit Drama and an Introduction to principle of Sanskrit Dramas Unit-I Origin and Development. Unit-II Some important dramatists and dramas: Bhasa, Kalidasa, Sudraka, Visakhadatta, Harsa, Bhavabhuti, and their works.	JM		01	01X15=15

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
SEC-1 SEC1T:	Computer awareness for Sanskrit A.Basic Computer Awareness Unit-I Design, Architecture: Operating System. Unit-II MS Office Tools (Word, Power points, Excel etc.) Unit- III Using Internet, Web Search (Searching E-text/ e-book for Sanskrit in Roman and Devanagari Scripts), Email etc. B.Typing in Unicode for Preservation and Digitalization of Sanskrit Text Unit-I Character encoding, Unicode, ASCII, UTF-8, UTF-16. Unit-II Typing in Unicode through various Softwares. Unit- III Sanskrit Text Digitalization/ Preservation/ Storage. C.Web Publishing Unit-I Basic HTML, Java Scripts and CSS. Unit-II Basic of Databases.	SM	CA-05 + IA-05+ESE-40 =50	02	02X15=30

Course	Course Contents/Syllabus	Allotted	Credits&Marks	Class allotted	Total Class
--------	--------------------------	----------	---------------	----------------	-------------

		Teachers		per week	
CC-8 CC8T:	<p>Indian Epigraphy, Paleography and Chronology</p> <p>Epigraphy</p> <p>Unit-I</p> <p>Introduction to Epigraphy and Types of Inscriptions .</p> <p>Unit-II</p> <p>Importance of Indian Inscriptions in the reconstruction of Ancient Indian History and Culture.</p> <p>Unit-III</p> <p>History of Epigraphical Studies in India.</p> <p>Unit-IV</p> <p>History of Decipherment of Ancient Indian Scripts (Contribution of Scholars in the field of epigraphy): Fleet, Cunningham, Prinsep, Bühler, Ojha, D.C.Sircar.</p> <p>A.</p>	SM	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02X15=30
	<p>B.Paleography</p> <p>Unit-I</p> <p>Antiquity of the Art of Writing Writing.</p> <p>Unit-II</p> <p>Materials, Inscribers and Library.</p> <p>Unit-III</p> <p>Introduction to Ancient Indian Scripts.</p>	MD		01	01X15=15
	<p>C.Study of selected inscriptions</p> <p>Unit-I</p> <p>Asoka's Giranara Rock Edict-I Asoka's Saranatha Pillar Edict .</p> <p>Unit-II</p> <p>Girnara Institutions of Rudradaman.</p> <p>Unit-III</p> <p>Eran Pillar Inscription of Samudragupta.</p> <p>Mehrauli Iron Pillar Inscription of Candrar.</p> <p>Unit-IV</p> <p>Delhi Topra Edict of Bisaladeva.</p>	AD		01	01X15=15
	<p>D.Chronology Unit-I</p> <p>General Introduction to Ancient</p>	SG		02	02X15=30

	Indian Chronology. Unit-II System of Dating the Inscriptions (Chronograms). Unit-III Main Eras used in Inscriptions - Vikrama Era, Saka Era and Gupta Era				
--	---	--	--	--	--

Course	Course Contents	Allotted Teachers	Credits&Marks	Class allotted per class	Total Class
CC-9 CC9T: Modern Sanskrit Literature	A.Mahakavya and Charitakavya Unit-I SvatantryaSambhavam (Revaprasada Dwivedi) Canto 2, verses 1-45 Bhimayanam (Prabha Shankar Joshi) Canto X. verses 20-29; Canto -XI. Verses 13-20 & 40-46.	SG	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	01	01X15=15
	B.Gadya-kāvya and Rupaka Unit-I Sataparvika (Abhiraja Rajendra Mishra) Unit-II SardulaSakatam (Virendra Kumar Bhattacharya)	AD		02	02X15=30
	C.Gitikavya and Other genres Unit-I Bhatta Mathurna Nath Shastri (Kundaliyan, BacchuLal Avasthi Jnaana (Kaete, KvaYataste), SrinivasaRath (Katama Kavita) etc. Unit-II Hariram Acharya (Sankalpa Gitih) Pushpa Dikshit (BruhikosminYuge ..) Radha Vallabh Tripathi DhivaraGitih (Naukamihasaramsaram...); Unit-III Harshdev Madhava Haiku-Snanagrihe, vedana, mrityuh I, mrtyuh 2; khanih; shatavadhani R. Ganesh (kavi-visadah,	JM		01	01X15=15

	varsavibhutih				
	D.General Survey of Modern Sanskrit Literature	SM		02	02X15=30
	Unit-I Pandita Kshama Rao, P.K. Narayana Pillai, S. B. Varnekar, Parmanand Shastri, Reva Prasad Dwivedi				
	Unit-II Janaki VallabhShastri, Ram Karan Sharma, Jagannath Pathak, S. Sunderrajan, Shankar Dev Avatare				
	Unit-III Haridas Siddhanta Vagish, Mula Shankar M. Yajnika, Mahalinga Shastri, Leela Rao Dayal, Ya ^o tindra Vimal Chowdhury, Virendra Kumar Bhattacharya .				

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-10 CC10T: Sanskrit and World Literature	A.Survey of Sanskrit Literature in the World . Unit-I Vedic cultural elements in ancient Eastern and Western societies. Unit-II Presence of Sanskrit words in the World languages. Unit-III General survey of the Classical Sanskrit Literature in the Eastern and Western literature.	SM	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	01	01X15=15
	B.Upanisad and Gita in World Literature . Unit-I Dara Shikoh's Persian Translation of Upanisads and their Influence on Sufism, Latin translation and its influence on Western thought. Unit-II	SG		01	01X15=15

	Translation of the Gita in European languages and religious-philosophical thought of the west.				
	C.Sanskrit Fables in World Literature. Unit-I Translation of Pancatantra in Eastern and Western Languages. Translation of Vetlapancavimsatika, Simhasanadvatimsika and Sukasaptati in Eastern. Unit-III Languages and Art.	AD		01	01X15=15
	D.Ramayana and Mahabharata in South East Asian Countries. Unit-I Rama Katha in south eastern countries. Unit-II Mahabharata stories as depicted in folk cultures of SE Asia.	MD		02	02X15=30
	E.Kalidasa's Literature in World Literature. Unit-I English and German translation of Kalidasa's writings and their influence on western literature and theatre.				
	F.Sanskrit Studies across the World Unit-I i. Sanskrit Study Centers in Asia. ii. Sanskrit Study Centers in Europe. iii. Sanskrit Study Centers in America	JM		01	01X15=15

--	--	--	--	--	--

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
SEC-2 SEC2T: Sanskrit Meter and Music	A.Brief Introduction to Chhandahsastra. Unit-I Brief Introduction to Chhandahsastra.	SM	CA-05+IA-05+ESE-40=50	01	01X15=15
	B.Classification and Elements of Sanskrit Meter Unit-I Syllabic verse (aksaravrtta), Syllabo-quantitative verse (varnavrtta), Quantitative verse (matravrtta), Syllables: laghu and guru Unit-II Ganga, Feet .				
	C.Analysis of Selected Vedic Meters their musical rendering. Unit-I Definition, Example, Analysis and Lyrical Methods of following Meters:- gayatri, usnika, anustupa, brhati, pamkti, .tristup and jagat. D.Analysis of Selected Classification Meters and their musical rendering. Unit-I Definition, Example, Analysis and Lyrical Methods of following Meters:- bhujangaprayata, sragvini, totaka, harigitika, vidyunmala, anustupa, arya, malini, sikharini, vasantatilaka, mandakranta, sradhara and sardulvikridita.	JM		01	01X15=15

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
GE-4 GE4T: Basic Principles of Indian Medicine System (Ayurveda)	<p>A.Introduction to Indian Medicine System: Ayurveda</p> <p>Unit-I</p> <p>Definition of Ayurveda, Ayuh (Life), Sarira (Body), Health, Aim of Ayurveda, Subject Matter of Ayurveda, Salient Features of Ayurveda, Concept of Health according to Ayurveda, Unique features of .Ayurveda.</p> <p>Unit-II</p> <p>History of Ayurveda, Atharvaveda as an early source for medicinal speculations, Introduction to Major Texts (Susruta Samhita and Caraka Samhita) and Authors (Susruta and Caraka) and AstangaHridayam, AstangaSangraha of Vagbhata.</p> <p>Unit-III</p> <p>Eight Components of .Ayurveda (astanga Ayurveda):-</p> <ol style="list-style-type: none"> 1. Kaycikitsa (General Medicine) 2. Kaumarabhrtya(Pediatrics) 3. SalyaTantra (Surgery) 4. Salakya-Tantra (Ent. and Ophthalmology) 5. Bhuta Vidya (Psychiatry Medicine). 6. Visa Vijnana (Toxicology). 7. Rasayana (Rejuvenates). 8. Vajikarana (Aphrodisiac). <p>B.Basic principles of Ayurveda</p> <p>Unit-I</p> <ol style="list-style-type: none"> 1. The Trigunas: Sattva,Rajas and Tamas. 2. The Pancamahabhutas: Akasa (Space), Vayu (Air), Teja or Agni(Fire), Jala(Water) and Prthvi (Earth). 3. The Tridosas: Vata,Pitta and Kapha. 4. The Saptadhatu: Rasa 	SM	<p>06 (5+1+0)</p> <p>CA-05 + IA- 10+ESE-60 =75</p>	02	02X15=30

	<p>(fluid), Rakta(blood), Mamsa, Meda (fat), Asthi, Majja and Sukra.</p> <p>5. The Trayodosagni: Jatharagni (gastric fire), Saptadhatvagni and Pancabhutagni.</p> <p>6. The Trimalas: Purisa (faeces), Mutra (urine) and Sveda (sweat).</p> <p>Unit-II</p> <p>Ayurvedic understanding of lifestyle and concepts of preventive medicine.</p> <p>Seasonal regimen & social conduct and its effect on health, Concepts of Prakrti, Agni, and Kosta.</p> <p>SvasthaVrtta (Preventive Medicine) Understanding Health and Disease in Ayurveda.</p> <p>UNIT-III</p> <p>Diagnosis of illness: eight ways to diagnose illness, called Nadi (pulse), Mutra (urine), Mala (stool), Jihva (tongue), Sabda (speech), Sparsa (touch), Drk (vision) and Akrti (appearance).</p>				
	<p>C.Dietetics, Nutrition and Treatments in Ayurveda</p> <p>Unit-I</p> <p>Ayurvedic understanding of nutrition and metabolism, Classification of Ahara according to Ayurveda and Viruddhahara (incompatible diet) & role of diet.</p> <p>Unit-II</p> <p>Commonly used substances and their therapeutic properties and Pharmacology : Intro to basic principles of Ayurvedic pharmacology, Art and science of Ayurvedic Pharmacy and Understanding Ayurvedic Herbs and common formulations.</p> <p>Unit-III</p> <p>Pancakarma and Other Ayurvedic Specialty Treatments: Method and classification of treatments in Ayurveda, Pretreatment, Therapeutic vomiting (vamana), Purgation Therapy, Enema (Basti), Nasal Administration -Nasya, Blood Letting (RaktaMoksa),</p>	MD		02	02X15=30

	Introduction and importance of Pancakarma/Detoxification, Science and art of rejuvenation (Rasayana and Vajikarana). Ayurvedic prenatal and postpartum care for healthy mothers and babies, Samskara, care of infants and children.				
	D.Important Medicinal Plants and their Based on Ayurveda Unit-I 19 Medicinal Plants in Susruta Samhita: Tulsi, Haridra, Sarpagandha, Ghrta Kumari, Guggulu, Brahmi, Amala, Aswagandha, Arjun Tree, Turmeric, Ceylon Hydrolea, Neema Plant, Lady Ferns, Blackberries, Pot Marigold, Camomile, Peppermint, Fenugreek and Aloe Vera.	JM		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSC-1D DSC1DT: Sanskrit Grammar	A.Laghusiddhantakaumudi: Samjnaprakarana. Unit-I Samjnaprakarana	SM	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	02	02X15=30
	B.Laghusiddhantakaumudi: Sandhi prakarana. Unit-I Ac sandhi: Yan, guna, dirgha, ayadi, vrddhi and purvarupa. Unit-II Hal sandhi: scutva, stutva, anunasikatva, chhatva and jastva. Unit-III Visarga sandhi: utva, lopa, satva and rutva.	AD		02	02X15=30
	C.Laghusiddhantakaumudi: Vibhaktiprakarana	MD		02	02X15=30

	Unit-I Vibhaktyarthaprakarana.				
--	-----------------------------------	--	--	--	--

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
SEC-2 SEC2T: Basic Elements of Ayurveda	A.Introduction of Ayurveda Unit-I Introduction of Ayurveda, History of Indian Medicine in the pre- caraka period, The two schools of Ayurveda: Dhanvantari and Punarvasu. Unit-II Main Acharya of Ayurveda- Charaka, Susruta, Vagbhatta, Madhava, Samgadharma and Bhavamisra.	JM	CA-05+IA-05+ESE-40=50	01	01X15=15
	B.CarakaSamhita - Sutra sthanam Unit-I Charakasamhita- (sutra-sthanam): Division of Time and condition of nature and body in six seasons. Regimen of Fall Winter (Hemanta), Winter (Sisira) & Spring (Vasanta) Seasons. Regimen of Summer (Grishma), Rainy (Varsa) and Autumn (Sarada) seasons.	MD			
	C.Taittiriyaopanisad Unit-I Taittiriyaopanisad- Bhrguvalli, anuvak 1-3 Unit- II Taittiriyaopanisad-	SG		01	01X15=15

	Bhrguvalli, anuvak 1-3.				
--	-------------------------	--	--	--	--

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC- 11 C11T: Vedic Literature	A.Samhita and Brahmana Unit-I Rgveda- Agni- 1.1, Usas- 3.61, Aksha Sukta 10.34, Hiranyagarbha- 10.121. Unit-II Yajurveda- SivasamkalpaSukta- 34.1-6 Unit-III Atharvaveda- Sammanasyam- 3.30, Bhumi- 12.1-12	SG	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	02	02X15=30
	B.Vedic Grammar Unit-I Declensions (sabdarupa), Subjunctive Mood (let), Gerunds (ktvārthaka, Tumarthaka), Vedic Accent and Padapatha.	SM		02	02X15=30
	C.Mundakopanisad Unit-I Mundakopanisad- 1.1 to 2.1 Unit-II Mundakopanisad- 2.2 to 3.2	MD		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-12 C12T: Sanskrit Grammar	Laghusiddhantakaumudi: Samjnaprakarana Unit-I Samjna Prakarana	AD	06 (5+1+0) CA-05 + IA-10+ESE-60=75	02	02X15=30
	Laghusiddhantakaumudi: Sandhi prakarana Unit-I Ac Sandhi: Yan, guna, dirgha, ayadi, vrddhi and purvarupa. Unit-II Hal Sandhi: Scutva, stutva,	SM		02	02X15=30

	anunasikatva, chhatva and jastva. Unit-III Visarga Sandhi: utva, lopa, Satva and rutva.				
	Laghusiddhantakaumudi: Vibhaktiprakarana Unit-I Vibhaktyartha Prakarana	SM		02	02X15=30
Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSE-1B DSE1BT: Art of Balanced Living	A.Self Presentation Unit-I Method of Self Presentation: Hearing (sravana), Reflection (manana) & Meditation (nididhyasana). Brhadaranyakopanisad- 2.4.5	JM	06 (5+1+0) CA-05 + IA- 10+ESE-60 =75	02	02X15=30
	B.Concentration Unit-I Concept of Yoga: (Yogasūtra, 1.2) Restriction of fluctuations by practice (abhyasa) and passionlessness (vairagya): (Yogasūtra, 1.12-16) Eight aids to Yoga (astangayoga): (Yogasūtra, 2.29, 30, 32, 46, 49, 50; 3.1- 4). Yoga of action (Kriyayoga): (Yogasūtra, 2.1) Four distinct means of mental purity	AD		02	02X15=30
	C.Refinement of Behavior Unit-I Methods of Improving Behavior: jnana- Yoga, dhyana yoga , Karma yoga and bhakti yoga (especially Karma yoga). Karma: A natural impulse, essentials for life journey, co- ordination of the world an ideal duty and a metaphysical dictate (Gita, 3.5, 8, 10- 16, 20 & 21)	MD		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSE-2A DSE2AT: Theatre and Dramaturgy in Sanskrit	A.Theatre: Types and Construction Unit-I Types of theater: vikrsta (oblong),	SG	06 (5+1+0) CA-05 + IA- 10+ESE-60	02	02X15=30

	<p>caturasra (square), tryasra (triangular), jyestha(big), madhyama (medium), avara (small), bhumisodhana (Examining the land) and mapa (measurement of the site), mattavarani (raising of pillars), rangapitha and rangasirsa (stage), darukarma (wood work), nepathyagrha (green house), prekskopavesa (audience hall), Doors for entrance and exit.</p>		=75		
	<p>B.Drama: Vastu (Subject-Matter), Neta (Hero) & Rasa</p> <p>Unit-I</p> <p>Definition of drama and its various names- drsya, rupa, Rupaka, abhinaya; abhinaya and its types: Angika (gestures), Vacika (Oral), Sattvika (representation of the Sattva), Aharya (dresses and make-up).</p> <p>Vastu: (Subject-Matter): adhikarika(principal), prasangika(subsidiary), Five kinds of Arthaprakṛti, karyavastha (stages of the action of actor) and sandhi (segments), Arthopakṣepaka (interludes) Kinds of dialogue:</p> <ol style="list-style-type: none"> 1. Sarvaśrāvya or Prakāśa (aloud) 2. Asravya or Svagata (aside). 3. Niyatasravya: Janāntika (personal address), Apavārita (confidential). 4. Akasabhasita (conversation with imaginary person). <p>Unit-II</p> <p>Neta: Four kinds of heroes, Three kinds of heroines, Sutradhara (stage manager), pariparsvika (assistant of Sutradhara), vidusaka (jester), kancuki (chamberlain), pratinayaka (villain).</p> <p>Unit-III</p>	AD		02	02X15=30

	<p>Rasa: Definition and constitution, ingredients of rasa-nispatti: - bhava (emotions), vibhava (determinant), anubhava (consequent), Sattvikabhava (Involuntary state), sthayibhava (permanent states), vyabhicaribhava (complementary psychological states), svada (pleasure), Four kinds of mental levels: vikasa (cheerfulness), vistara (exaltation), ksobha (agitation), viksepa (perturbation).</p>				
	<p>C.Tradition and History of Indian Theatre</p> <p>Unit-I</p> <p>Origin and Development of stage in different ages: pre historic, Vedic age, epic puranic age, court theater, temple theater, open theater, modern theater: folk theater, commercial theater, national theater and state level theater.</p>	JM		02	02X15=30

Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
<p>DSE-1A</p> <p>DSE-1AT: Philosophy, Religion and Culture in Sanskrit</p>	<p>A.Dharma</p> <p>Unit-I</p> <p>Form of God, Mode of worship, Bhakta as a morally evolved person - Gitā Chapter XII</p> <p>Unit-II</p> <p>Dharma – ten-fold dharma and its versions, definitions of satya, ahimsā, asteya, aparigraha, pañcamahāyajña; theory of three debts.</p> <p>Unit-III</p> <p>Man's initiative and God's design; God's līlā and Kṛpā, Daiva versus puruṣakāra, adṛṣṭa, three types of karma –samchita, kriyamāna and prārabdhā karma.</p>	MD	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02X15=30

	<p>B.Samskara and Puruṣārtha</p> <p>Unit-I</p> <p>Process of acculturation – importance of Saṃskāra.</p> <p>Unit-II</p> <p>Aim of human life - theory of Puruṣārtha.</p>	JM		02	02X15=30
	<p>C.Swadharma</p> <p>Unit-I</p> <p>An 'amoral' person- svadharma and karmayoga, sthitaprajna in the Gita (Chapter II).</p> <p>Unit-II</p> <p>Prakṛti- three gunas and their impact on personality.</p>	SG		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
SEC-3 SEC3T: Basic Elements of Jyotisha	<p>A.Origin, Development and Branches of Jyotis.</p> <p>Unit-I</p> <p>Origin and Development of Jyotisa.</p> <p>Unit-II</p> <p>General introduction to following branches of Astrology :Siddhānta, Samhitā, Horā, Tājika, Praśna, Vāstuśāstra and Muhūrtaśāstra.</p>	SM	CA-05+IA-05+ESE-40=50	01	01X15=15
	<p>B.Jyotischandrika: Sanjna- Prakaranam</p> <p>Unit-I</p> <p>Jyotischandrikā-Sanjna Prakaranam, Verses:1-29)</p> <p>Unit-II</p> <p>Jyotischandrikā-Sanjna Prakaranam, Verses: 30-65)</p>	SG			

	C.Jyotisa Chandrika: Sanjna- Prakarana Unit-I Jyotisachandrikā- Sanjna Prakaranam, Verses: 66 – 90. Unit-II Jyotisachandrikā- Sanjna Prakaranam, Verses: 91-115.	AD		01	01X15=15
Course	Course Contents /Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
GE-1 GE1T: Political Thoughts in Sanskrit	A.Basic Features of Ancient Indian Political Thoughts Unit-I Name, Scope and Sources of Ancient Indian Political Thought: Name of the Science: 'Dandaniti', Dharmaśāstra', 'Nītiśāstra'. Scope of Indian Political Thought: relation with Dharma, Artha and Nīti; Sources of Ancient Indian Political Thought :Vedic Literature, Purana, Rāmāyana, Mahābhārata, Dharmaśāstra, Nītiśāstra Kautilya's Arthaśāstra and Rajaśāsana (Inscriptions).	SM	06 (5+1+0) CA-05 + IA-10+ESE- 60 =75	01	01X15=15
	Unit-II Nature, Types and Theories of the State: Nature of the State in Arthaśāstra (6.1) and Manusmṛti (9.294) with Special reference to Saptāṅga-Theory: Svāmi, Amātya, Janapada, Pura, Kośa, Danda and Mitra. Types of the State: Rājya, Svarājya, Bhojya, Vairājya, Mahārājya, Samarājya (AitreyaBrāhmaṇa, 8.3.13-14; 8.4.15-16).	MD		01	01X15=15
	B.Ancient Indian Political Thoughts: Origin and Development. Unit-I Indian Political Thought from Vedic Period to Buddhist Period: Election of King by the People' Visas 'in Vedic period: (Rgveda,10.173;10.174, Atharvaveda,3.4.2;6.87.1-2), Parliamentary Institutions: 'Sabhā', 'Samiti' and 'Vidatha' in Vedic period (Atharvaveda, 7.12.1;12.1.6 ; Rgveda, 10.85.26), King-maker Council: 'Rajakartarah'and Ratnis' in Vedic period (Atharvaveda, 3.5.6-7 and	AD		01	01X15=15

	Satapathabrahmana, 5.2.5.1); Coronation Ceremony of the King 'Samrāta' (Satapathabrāhmaṇa, 51.1.813; 9.4.1.1-5) Republics in the Buddhist Period (Dīggnikāya, MahāparinibbānaSūta, Anguttaranikāya, 1.213;4.252,256).				
	Unit-II Indian Political Thought from Kautilya to Mahatma Gandhi: Kautilya's concept of Welfare State (Arthaśāstra, 1.13); Essential Qualities of King (Arthaśāstra, 6.1.16-18); Duties of King and State 'Rajadharma' (Mahābhārata, Śāntiparva, 120.1-15; Manusmṛti, 7.1-15; Śukranīti, 1.1-15) Constituent Elements of Jain political thought (Somadeva's Nītivākyāmrta, 9.1.18 and 19.1.10); Relevance of Gandhian political thoughts in modern period (Gandhi Gītā of Prof. Indra, 5.1-25).	SG		01	01X15=15
	C. Cardinal Theories and Ancient Indian Political Thinkers Unit-I Cardinal Theories of Indian Political Science: 'Saptāṅga' Theory of State: Svāmī, Amātya, Janapada, Pura, Kośa, Danda and Mitra (Arthaśāstra 6.1, Mahābhārata-Śāntiparva-56.5, Śukranīti, 1.61-62). 'Mandala' Theory of Inter-State Relations: 'Sadgunya' Policy of War and Peace Diplomacy: Sandhi, Vighraha, Yāna, Asana, Sanśraya and Dvaidhībhaṇa. 'CaturvidhaUpāya' for balancing the power of State: Sāma, Dāma, Danda, Bheda. Three types of State power 'Śakti': Prabhu Śakti, Mantra Śakti, UtsāhaŚakti. Unit-II Prominent Indian Political Thinkers: Manu, Śukrācārya, Kautilya, Kāmandaka, Somadeva Suri and Mahatma Gandhi.	JM		02	02X15=30

Course	Course Contents/Marks	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
--------	-----------------------	-------------------	---------------	-------------------------	-------------

CC-13 C13T: Ontology and Epistemology	<p>A.Essential of Indian Philosophy</p> <p>Unit-I</p> <p>Meaning and purpose of Darsana general Classification of Philosophical schools in Classical Indian Philosophy.</p> <p>Unit-II</p> <p>Realism (yatharthavada or vastuvada) and Idealism (pratyayavada), Monism (ekattvavada), Dualism (dvaitavavada) & Pluralism (bahuttvavada); Dharma (property) Dharma (substratum).</p> <p>Unit-III</p> <p>Causation (karyakaranavada) : naturalism (syabhāvavāda), doctrine of pre existence of effect (Satkāryavāda), doctrine of real transformation (parinamavada), doctrine of illusory transformation (Vivartavāda), doctrine of non preexistence of effect in cause (asatkāryavāda and arambhavada).</p>	JM	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02X15=30
	<p>B.Ontology (Based on Tarkasamgraha)</p> <p>Unit-I</p> <p>Concept of padartha, three dharmas of padarthas, Definition of Dravya.</p> <p>Unit-II</p> <p>Samanya, Visesa, Samavaya, Abhava.</p> <p>Unit-III</p> <p>Definitions of first seven dravyas and their examination; Atma and its qualities, manas.</p> <p>Unit-IV</p> <p>Qualities (other than the qualities of the atman) Five types of karma.</p>	MD		02	02X15=30
	<p>C.Epistemology (Based on Tarkasamgraha)</p> <p>Unit-I</p> <p>Buddhi (jnana) - nature of jnana in Nyaya Vaiśeṣika; smṛiti</p>	MD		02	02X15=30

	<p>anubhava; yathartha and ayathartha.</p> <p>Unit-II</p> <p>Karana and Karana, Definition and Types of prama, karta-Karana-vyapara- phala, model.</p> <p>Unit-III</p> <p>Pratyaksa</p> <p>Unit-IV</p> <p>Anumana including hetvabhāsa.</p> <p>Unit-V</p> <p>Upamana and sabdapramana.</p> <p>Unit-VI</p> <p>Types of ayatharthaanubhava.</p>				
--	---	--	--	--	--

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
CC-14	<p>A.Vibhaktiyartha, Voice and Krt.</p> <p>Unit-I</p> <p>(i) VibhaktiyarthaPrakarāṇa of Laghusiddhāntakaumudī.</p> <p>(ii) Voice (katṛ, karma and bhāva).</p> <p>Unit-II</p> <p>Selections from KṛtPrakarāṇa- from Laghusiddhantakaumudī Major Sūtras for the formation of kṛdanta words (tavyat, tavya, aniyar, yat, nyat, nvul, Tric, Aṇ, kta, katavatu, śātri, śāṇac, tumun, ktvā, lyap, lyuṭ, ghañ, ktin).</p>	SM	<p>06 (5+1+0)</p> <p>CA-05 + IA-10+ESE-60</p> <p>=75</p>	02	02X15=30
	<p>B.Translation and Communication</p> <p>Unit-I</p> <p>(i).Translation from Bengali/English to Sanskrit on the basis of cases, Compounds and kṛt suffixes.</p> <p>(ii). Translation from Sanskrit and Hindi.</p> <p>Unit-II</p> <p>Communicative Sanskrit: Spoken Sanskrit.</p>	SM		02	02X15=30
	C.Essay	AD		02	02X15=30

	<p>Unit-I</p> <p>Essay (traditional subjects) e.g.Veda, Upaniṣad, Sanskrit Language, Samskriti, Rāmāyaṇa, Mahābhārata, Purāṇa, Gītā, principal Sanskrit poets.</p> <p>Unit-II</p> <p>Essay based on issues and topic related to modern subjects like entertainment, sports, national and international affairs and social problems.</p>				
Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSE-3A DSE3AT: Sanskrit Linguistics	<p>भाषाशास्त्र</p> <p>Unit-I</p> <p>भाषा का स्वरूप, परिभाषा, भाषा की विशेषताएँ, भाषा विज्ञान का स्वरूप, भाषाविज्ञान के मुख्य अङ्ग एवं उपादेयता ।</p> <p>Unit-II</p> <p>संस्कृत की दृष्टि से ध्वनिविज्ञान, पदविज्ञान, वाक्यविज्ञान एवं अर्थविज्ञान का सामान्य अवबोध।</p>	AD	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	03	03X15=45
	<p>Unit-III</p> <p>संस्कृत एवं भारोपीय भाषापरिवार।</p> <p>Unit-IV</p> <p>संस्कृत एवं तुलनात्मक भाषाविज्ञान के इतिहास का सामान्य परिचय।</p>	SG		03	03X15=45

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSE-4A DSE4AT: Fundamentals of Ayurveda	<p>A.Introduction of Ayurveda</p> <p>Unit-I</p> <p>Introduction of Āyurveda, History of Indian Medicine in the pre-caraka period, The two schools of Āyurveda: Dhanvantari and Punarvasu.</p> <p>Unit-II</p> <p>Main Ācāryas of Ayurveda–Caraka, Suśruta, Vāgbhatta,</p>	JM	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	02	02X15=30

	Mādhava, Sārṅgadharma and Bhāvamīśra				
	B.CarakaSamhita- Sutra sthanam Unit-I Carakasamhitā- (Sūtra-sthānam): Division of Time and condition of nature and body in six seasons. Regimen of Fall Winter (Hemanta), Winter (Śisīra) & Spring (Vasanta) seasons. Regimen of Summer (Grīṣma), Rainy (Varsā) and Autumn (Śarada) seasons	MD		02	02X15=30
	C.Taittirīyopaniṣad Unit-I Taittirīyopaniṣad —Bhṛguvalli, anuvak 1-3. Unit-II Taittirīyopaniṣad —Bhṛguvalli, anuvak 1-3.	SG		02	02X15=30

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
DSE-1B DSE1B: Literature Criticism	A.Kavya Prakasa: Kavya vaisistya and Kavya Prayojana Unit-I Kāvyaprakāśa: Kāvyavaiśiṣṭya and Kāvyaprayojana.	AD	Credits-06 CA-05 + IA-10+ESE-60 =75	02	02X15=30
	B.Kavya Prakasa: Kavya Karana Unit-I Kāvyaprakāśa: Kāvyakāraṇa.	SM		02	02X15=30
	C.Kavya Prakasa: Kavya Svarupa and Kavyabheda. Unit-I Kāvyaprakāśa: Kāvyasvarūpa and Kāvyabheda.	AD		02	02X15=30

Course	Course Contents/Syllabus	Allotted	Credits&Marks	Class allotted	Total Class
--------	--------------------------	----------	---------------	----------------	-------------

		Teachers		per week	
SEC-4 SEC4T: Indian Theatre	A.Traditional and History of Indian Theatre Unit: I Origin and development of stage in different ages: pre-historic, Vedic age. 05 Credits Unit: II Epic-puranic age, court theatre, temple theatre, open theatre, modern theatre, folk theatre, commercial theatre, national and state level theatre	SG	CA-05+IA-05+ESE-05=50	01	01X15=15
	B.Theatre: Types and Constructions Unit: I Theatre: Types and Constructions				
	C.Acting: Angika, Vacika,Sattvika&Aharya. Unit: I Acting: Āgika, Vācika 06 Credits Unit II Sāttvika and Ahārya	MD		01	01X15=15
	D.Drama: Subject- Plot (Vastu), Hero (Neta) & Sentiment (Rasa) Unit I Vastu (Subject-Matter) 04 Credits Unit II Netā (Hero) 04 Credits Unit II Rasa (Sentiment) 1				

Course	Course Contents/Syllabus	Allotted Teachers	Credits&Marks	Class allotted per week	Total Class
GE-2 GE2T: Sanskrit Meter and Music	A.Brief Introduction to Chhandasastra Unit-I Brief Introduction to Chandaśāstra	AD	06 (5+1+0) CA-05 + IA-10+ESE-60 =75	02	02X15=30
	B.Classification and Elements of Sanskrit Meter Unit-I Syllabic verse (akṣaravṛtta): Syllabo-quantitative verse (varṇavṛtta), Quantitative verse (mātrāvṛtta) Unit-II Syllables: laghu and guru Gaṇa& Feet.				
	C.Analysis of Selected Vedic Meters and their Musical Rendering (गान-पद्धति) Unit-I Definition, Example, Analysis and Lyrical Methods of following Meters: gāyatrī, usnik, anustup, brhati, pamkti, tristup and jagatī.	SG		02	02X15=30

D. Analysis of Selected Classical Meter and their Musical Rendering (गान-पद्धति)	JM		02	02X15=30
Unit-I Definition, Example, Analysis and Lyrical Methods of following Meters: bhujagaprayāta, sragvini, totaka, harigītikā, vidyunmālā, anustup, āryā, mālīnī, śikharinī, vasantatilakā, mandākrāntā, sragdharā and śārdūlvikrīdita.				

THE DEPARTMENT OF POLITICAL SCIENCE
2021-2022

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
SEM-1					
C1T	Understanding Political Theory Unit-I Introducing Political Theory 1. What is Politics: Theorizing the 'Political' 2. Traditions of Political Theory: Liberal, Marxist, Anarchist and Conservative 3. Approaches to Political Theory: Normative, Historical and Empirical 4. Critical and Contemporary Perspectives in Political Theory: Feminist and Postmodern Unit-II Political Theory and Practice The Grammar of Democracy 1. Democracy: The history of an idea 2. Procedural Democracy and its critique 3. Deliberative Democracy 4. Participation and Representation	3 (Jonaki Biswas, Chandan Naru, Snehasis Mondal)	6	L+T 03+02+1=6	6*15=90
C2T	Constitutional Government and Democracy in India Unit- I The Constituent Assembly and the Constitution	2 (Jyoti Mitra, Arpan Roy)	6	4+2=6	6*15=90

	<p>a. Philosophy of the Constitution, the Preamble, and Features of the Constitution</p> <p>b. Fundamental Rights and Directive Principles</p> <p>Unit-II Organs of Government</p> <p>a. The Legislature: Parliament (1.5 weeks or 6 lectures)</p> <p>b. The Executive: President and Prime Minister</p> <p>c. The Judiciary: Supreme Court</p> <p>Unit-III Federalism and Decentralization</p> <p>a. Federalism: Division of Powers, Emergency Provisions, Fifth and Sixth Schedules</p> <p>b. Panchayati Raj and Municipalities</p>				
GE1T	<p>Nationalism in India</p> <p>Unit- I Approaches to the Study of Nationalism in India Nationalist, Imperialist, Marxist, and Subaltern Interpretations</p> <p>Unit-II Reformism and Anti-Reformism in the Nineteenth Century Major Social and Religious Movements in 19th century</p> <p>Unit-III Nationalist Politics and Expansion of its Social Base</p> <p>a. Phases of Nationalist Movement: Liberal Constitutionalists, Swadeshi and the Radicals; Beginning of Constitutionalism in India</p> <p>b. Gandhi and Mass Mobilisation: Non-Cooperation Movement, Civil Disobedience Movement, and Quit India Movement</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90

	<p>c. Socialist Alternatives: Congress Socialists, Communists</p> <p>Unit-IV Social Movements</p> <p>a. The Women's Question: Participation in the National Movement and its Impact</p> <p>b. The Caste Question: Anti-Brahminical Politics</p> <p>c. Peasant, Tribals and Workers Movements</p> <p>Unit-V Partition and Independence</p> <p>a. Communalism in Indian Politics</p> <p>b. The Two-Nation Theory, Negotiations over Partition</p>				
DSC1AT	<p>Introduction to Political Theory</p> <p>Unit-I Course Content:</p> <p>a. What is Politics?</p> <p>b. What is Political Theory and what is its relevance?</p> <p>Unit-II Concepts:</p> <p>Democracy, Liberty, Equality, Justice, Rights, Gender, Citizenship, Civil Society and State</p> <p>Unit-III Debates in Political Theory:</p> <p>a. Is democracy compatible with economic growth?</p> <p>b. On what grounds is censorship justified and what are its limits?</p> <p>c. Does protective discrimination violate principles of fairness?</p> <p>d. Should the State intervene in the institution of the family?</p>	3 (Jonaki Biswas, Chandan Naru, Jyoti Mitra)	6	$2+2+(2+1)=6$	$6*15=90$
SEM-2					

C3T	<p>Political Theory-Concepts and Debates</p> <p>Section A: Core Concepts</p> <p>Unit-I</p> <p>Importance of Freedom</p> <p>a. Negative Freedom: Liberty</p> <p>b. Positive Freedom: Freedom as Emancipation and Development</p> <p><i>Important Issue:</i> Freedom of belief, expression and dissent</p> <p>Unit-II</p> <p>Significance of Equality</p> <p>a. Formal Equality: Equality of opportunity</p> <p>b. Political equality</p> <p>c. Egalitarianism: Background inequalities and differential treatment</p> <p><i>Important Issue:</i> Affirmative action</p> <p>Unit-III</p> <p>Indispensability of Justice</p> <p>a. Procedural Justice</p> <p>b. Distributive Justice</p> <p>c. Global Justice</p> <p><i>Important Issue:</i> Capital punishment</p> <p>Unit-IV</p> <p>The Universality of Rights</p> <p>a. Natural Rights</p> <p>b. Moral and Legal Rights</p> <p>c. Three Generations of Rights</p> <p>d. Rights and Obligations</p> <p><i>Important Issue:</i> Rights of the girl child</p> <p>Section B: Major Debates</p> <p>a. Why should we obey the state? Issues of political obligation and civil disobedience.</p> <p>b. Are human rights universal? Issue of cultural relativism.</p> <p>c. How do we accommodate diversity in plural society? Issues of multiculturalism and toleration.</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90
-----	--	--	---	-------------	---------

C4T	Political Process in India Unit-I Political Parties and the Party System Trends in the Party System; From the Congress System to Multi-Party Coalitions Unit-II Determinants of Voting Behaviour Caste, Class, Gender and Religion Unit-III Regional Aspirations The Politics of Secession and Accommodation Unit-IV Religion and Politics Debates on Secularism; Minority and Majority Communalism Unit-V Caste and Politics Caste in Politics and the Politicization of Caste Unit-VI Affirmative Action Policies Women, Caste and Class Unit-VII The Changing Nature of the Indian State Developmental, Welfare and Coercive Dimensions	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	1+1+2+1+1=6	6*15=90
GE2T	Contemporary Political Economy Unit-I Approaches to Political Economy Classical Liberalism, Marxism, Welfarism, Neo-liberalism and Gandhian approach Unit-II Capitalist Transformation a. European Feudalism and Transition to Capitalism b. Globalization: Transnational Corporations, World Trade Organization, Non-governmental Organizations (their role in development) Unit-III Issues in Development I. Culture: Media and Television	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90

	II. Big Dams and Environmental Concerns III. Military: Global Arms Industry and Arms Trade IV. Knowledge Systems Unit-IV Globalization and Development Dilemmas I. IT revolution and Debates on Sovereignty II. Gender III. Racial and Ethnic Problems IV. Migration				
DSC1BT	Indian Government and Politics Course Content I. Approaches to the Study of Indian Politics and Nature of the State in India: Liberal, Marxist and Gandhian II. Indian Constitution: basic features, debates on Fundamental Rights and Directive Principles III. Institutional Functioning: Prime Minister, Parliament and Judiciary IV. Power Structure in India: Caste, class and patriarchy V. Religion and Politics: debates on secularism and communalism VI. Parties and Party systems in India VII. Social Movements : Workers, Peasants, Environmental and Women's Movement VIII. Strategies of Development in India since Independence: Planned Economy and Neo-liberalism	3 (Jonaki Biswas, Jyoti Mitra, Snehasis Mondal)	6	2+2+2=6	6*15=90
SEM-3					
C5T	Introduction to Comparative Government and Politics Unit-I Understanding Comparative Politics a. Nature and scope b. Going beyond Eurocentrism Unit-II Historical context of modern government a. Capitalism: meaning and development:	2 (Arpan Roy, Jonaki Biswas)	6	3+3=6	6*15=90

	<p>globalization</p> <p>b. Socialism: meaning, growth and development</p> <p>c. Colonialism and decolonization: meaning, context, forms of colonialism; anti-colonialism struggles and process of decolonization</p> <p>Unit-III</p> <p>Themes for comparative analysis</p> <p>A comparative study of constitutional developments and political economy in the following countries: Britain, Brazil, Nigeria and China.</p>				
C6T	<p>Perspectives on Public Administration</p> <p>Unit-I</p> <p>Public administration as a discipline</p> <ul style="list-style-type: none"> □ Meaning, Dimensions and Significance of the Discipline □ Public and Private Administration □ Evolution of Public Administration <p>Unit-II</p> <p>Theoretical perspectives : Classical theories</p> <ul style="list-style-type: none"> □ Scientific management (F.W.Taylor) □ Administrative Management (Gullick, Urwick and Fayol) □ Idealtype bureaucracy (Max Weber) <p>Neo-classical theories</p> <ul style="list-style-type: none"> □ Human relations theory (Elton Mayo) □ Rational decisionmaking (Herbert Simon) <p>Contemporary theories</p> <ul style="list-style-type: none"> □ Ecological approach (Fred Riggs) □ Innovation and Entrepreneurship (Peter Drucker) <p>Unit-III</p> <p>Public policy</p> <ul style="list-style-type: none"> □ Concept, relevance and approaches □ Formulation, implementation and evaluation <p>Unit-IV</p> <p>Major approaches in public administration</p> <ul style="list-style-type: none"> □ New Public Administration □ New Public Management □ New Public Service Approach 	2 (Jyoti Mitra, Snehasis Mondal)	6	4+2=6	6*15=90

	<input type="checkbox"/> Good Governance <input type="checkbox"/> Feminist Perspectives				
C7T	Perspectives on International Relations and World History Unit-I Studying International Relations i. How do you understand International Relations: Levels of Analysis ii. History and IR: Emergence of the International State System iii. Pre-Westphalia and Westphalia iv. Post-Westphalia Unit-II Theoretical Perspectives i Classical Realism & Neo-Realism ii. Liberalism & Neoliberalism iii. Marxist Approaches iv. Feminist Perspectives v. Eurocentricism and Perspectives from the Global South Unit-III An Overview of Twentieth Century IR History i. World War I: Causes and Consequences ii. Significance of the Bolshevik Revolution iii. Rise of Fascism / Nazism iv. World War II: Causes and Consequences v. Cold War: Different Phases vi. Emergence of the Third World vii. Collapse of the USSR and the End of the Cold War viii. Post Cold War Developments and Emergence of Other Power Centers of Power	5 (Chandan Naru, Jyoti Mitra, Arpan Roy, Jonaki Biswas, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90
SEC1T	Public Opinion and Survey Research Unit-I Introduction to the course Definition and characteristics of public opinion, conceptions and characteristics, debates about its role in a democratic political system, uses for opinion poll	2 (Chandan Naru, Jyoti Mitra)	2	1+1=2	2*15=30

	<p>Unit-II Measuring Public Opinion with Surveys: Representation and sampling a. What is sampling? Why do we need to sample? Sample design. b. Sampling error and non-response c. Types of sampling: Non random sampling (quota, purposive and snowball sampling); random sampling: simple and stratified</p> <p>Unit-III Survey Research a. Interviewing: Interview techniques pitfalls, different types of and forms of interview b. Questionnaire: Question wording; fairness and clarity.</p> <p>Unit-IV Quantitative Data Analysis a. Introduction to quantitative data analysis a. Basic concepts: correlational research, causation and prediction, descriptive and inferential Statistics</p> <p>Unit-V Interpreting polls Prediction in polling research: possibilities and pitfalls Politics of interpreting polling</p>				
GE3T	<p>Gandhi and the Contemporary World Unit-I Gandhi on Modern Civilization and Ethics of Development a. Conception of Modern Civilisation and Alternative Modernity b. Critique of Development: Narmada Bachao Andolan</p> <p>Unit-II Gandhian Thought: Theory and Action a. Theory of Satyagraha b. Satyagraha in Action i. Peasant Satyagraha: Kheda and the Idea of Trusteeship</p>	4 (Jonaki Biswas, Jyoti Mitra, Snehasis Mondal, Chandan Naru)	6	2+2+1+1=6	6*15=90

	ii. Temple Entry and Critique of Caste iii. Social Harmony: 1947 and Communal Unity Unit-III Gandhi's Legacy a) Tolerance: Anti - Racism Movements (Anti - Apartheid and Martin Luther King) b) The Pacifist Movement c) Women's Movements d) <i>Gandhigiri</i> : Perceptions in Popular Culture IV. Gandhi and the Idea of Political a) Swaraj b) Swadeshi				
DSC1CT	Comparative Government and Politics Course Content: 1. The nature, scope and methods of comparative political analysis 2. Comparing Regimes: Authoritarian and Democratic 3. Classifications of political systems: a) Parliamentary and Presidential: UK and USA b) Federal and Unitary: Canada and China 4. Electoral Systems: First past the post, proportional representation, mixed systems 5. Party Systems: one-party, two-party and multi-party systems 6. Contemporary debates on the nature of state: From state centric security to human centric security and the changing nature of nation-state in the context of globalization.	2 (Chandan Naru, Arpan Roy)	6	3+3=6	6*15=90
SEC1T	Legislative Support Course Content: 1. Powers and functions of people's representatives at different tiers of governance Members of Parliament, State Legislative Assemblies, functionaries of rural and urban local self government from Zila Parishads/Municipal Corporation to Panchayat/Ward. 2. Supporting the legislative process: How a Bill	2 (Jyoti Mitra, Snehasis Mondal)	2	1+1=2	2*15=30

	<p>becomes a Law, Role of the Standing Committee in reviewing a Bill, Legislative Consultations, amendments to a Bill, the framing of Rules and Regulations.</p> <p>3. Supporting the legislative committees Types of committees, Role of committees in reviewing government finances, policy, programmes, and legislation.</p> <p>4. Reading the budget document: Overview of Budget Process, Role of Parliament in reviewing the Union Budget, Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries.</p> <p>5. Support in media monitoring and communication: Types of media and their significance for legislators. Basics of communication in print and electronic media.</p>				
--	--	--	--	--	--

SEM-4

C8T	<p>Political Processes and Institutions in Comparative Perspective</p> <p>Unit-I Approaches to Studying Comparative Politics a. Political Culture b. New Institutionalism</p> <p>Unit-II Electoral System Definition and procedures: Types of election system (First Past the Post, Proportional Representation, Mixed Representation)</p> <p>Unit-III Party System Historical contexts of emergence of the party system and types of parties</p> <p>Unit-IV Nation-state What is nation-state? Historical evolution in Western Europe and postcolonial contexts 'Nation' and 'State': debates</p> <p>Unit-V</p>	3 (Arpan Roy, Jonaki Biswas, Snehasis Mondal)	6	2+2+2=6	6*15=90
------------	--	---	---	---------	---------

	Democratization Process of democratization in postcolonial, post-authoritarian and post-communist countries Unit-VI Federalism Historical context Federation and Confederation: debates around territorial division of power.				
C9T	Public Policy and Administration in India Unit-I Public Policy a. Definition, characteristics and models b. Public Policy Process in India Unit-II Decentralization a. Meaning, significance and approaches and types b. Local Self Governance: Rural and Urban Unit-III Budget a. Concept and Significance of Budget b. Budget Cycle in India c. Various Approaches and Types Of Budgeting Unit-IV Citizen and Administration Interface a. Public Service Delivery b. Redressal of Public Grievances: RTI, Lokpal, Citizens' Charter and E-Governance Unit-V Social Welfare Administration a. Concept and Approaches of Social Welfare b. Social Welfare Policies: □ Education: Right To Education, □ Health: National Health Mission, □ Food: Right To Food Security □ Employment: MNREGA	2 (Jyoti Mitra, Snehasis Mondal)	6	4+2=6	6*15=90
C10T	Global Politics Unit-I Globalization: Conceptions and Perspectives a. Understanding Globalization and its Alternative	3 (Chandan Naru, Jonaki Biswas, Jyoti	6	2+2+2=6	6*15=90

	<p>Perspectives</p> <p>b. Political: Debates on Sovereignty and Territoriality</p> <p>c. Global Economy: Its Significance and Anchors of Global Political Economy: IMF,</p> <p>d. World Bank, WTO, TNCs</p> <p>e. Cultural and Technological Dimension</p> <p>f. Global Resistances (Global Social Movements and NGOs)</p> <p>Unit-II</p> <p>Contemporary Global Issues</p> <p>a. Ecological Issues: Historical Overview of International Environmental Agreements, Climate Change, Global Commons Debate</p> <p>b. Proliferation of Nuclear Weapons</p> <p>c. International Terrorism: Non-State Actors and State Terrorism; Post 9/11 developments</p> <p>d. Migration</p> <p>e. Human Security</p> <p>Unit-III</p> <p>Global Shifts: Power and Governance</p>	Mitra)			
GE4T	<p>United Nations and Global Conflicts</p> <p>Unit-I</p> <p>The United Nations</p> <p>(a) An Historical Overview of the United Nations</p> <p>(b) Principles and Objectives</p> <p>(c) Structures and Functions: General Assembly; Security Council, and Economic and Social Council; the International Court of Justice and the specialised agencies (International Labour Organisation [ILO], United Nations Educational, Scientific and Cultural Organisation [UNESCO], World Health Organisation [WHO], and UN programmes and funds: United Nations Children's Fund [UNICEF], United Nations Development Programme [UNDP], United Nations Environment Programme [UNEP], United Nations High Commissioner for Refugees [UNHCR])</p> <p>(d) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to</p>	4 (Chandan Naru, Jyoti Mitra, Snehasis Mondal, Arpan Roy)	6	2+2+1+1=6	6*15=90

	<p>Protect (e) Millennium Development Goals</p> <p>Unit-II Major Global Conflicts since the Second World War (a) Korean War (b) Vietnam War (c) Afghanistan Wars (d) Balkans: Serbia and Bosnia</p> <p>Unit-III Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms</p>				
DSC1DT	<p>Introduction to International Relations</p> <p>Course Content:</p> <p>Unit-I Approaches to International Relations a) Classical Realism (Hans Morgenthau) and Neo-Realism (Kenneth Waltz) b) Neo-Liberalism: Complex Interdependence (Robert O. Keohane and Joseph Nye) c) Structural Approaches: World Systems Approach (Immanuel Wallerstein) and Dependency School (Andre Gunder Frank) d) Feminist Perspective (J. Ann Tickner)</p> <p>Unit-II Cold War & Post-Cold War Era a) Second World War & Origins of Cold War b) Phases of Cold War: i. First Cold War ii. Rise and Fall of Detente iii. Second Cold War iv. End of Cold War and Collapse of the Soviet Union (c) Post Cold- War Era and Emerging Centres of Power (European Union, China, Russia and Japan)</p> <p>Unit-III India's Foreign Policy</p>	2 (Chandan Naru, Arpan Roy)	6	3+3=6	6*15=90

	a) Basic Determinants (Historical, Geo-Political Economic, Domestic and Strategic) b) India's Policy of Non-alignment c) India: An Emerging Power				
SEC2T	Public Opinion and Survey Research Course Content: Unit-I Introduction to the course Definition and characteristics of public opinion, conceptions and characteristics, debates about its role in a democratic political system, uses for opinion poll. Unit-II Measuring Public Opinion with Surveys: Representation and sampling a. What is sampling? Why do we need to sample? Sample design. b. Sampling error and non-response c. Types of sampling: Non random sampling (quota, purposive and snowball Sampling); random sampling: simple and stratified Unit-III Survey Research a. Interviewing: Interview techniques pitfalls, different types of and forms of Interview b. Questionnaire: Question wording; fairness and clarity. Unit-IV Quantitative Data Analysis a. Introduction to quantitative data analysis b. Basic concepts: co relational research, causation and prediction, descriptive and Inferential Statistics Unit-V Interpreting polls Prediction in polling research: possibilities and pitfalls Politics of interpreting polling	4 (Arpan Roy, Jyoti Mitra, Chandan Naru, Snehasis Mondal)	2	1+1=2	6*15=90

SEM-5

C11T	<p>Classical Political Philosophy</p> <p>Unit-I Text and Interpretation</p> <p>Unit-II Antiquity Plato Philosophy and Politics, Theory of Forms, Justice, Philosopher King/Queen, Communism Presentation theme: Critique of Democracy; Women and Guardianship, Censorship</p> <p>Aristotle Forms, Virtue, Citizenship, Justice, State and Household Presentation themes: Classification of governments; man as zoon politikon</p> <p>Unit-III Interlude: Machiavelli Virtu, Religion, Republicanism Presentation themes: morality and statecraft; vice and virtue</p> <p>Unit-IV Possessive Individualism Hobbes Human nature, State of Nature, Social Contract, State Presentation themes: State of nature; social contract; Leviathan; atomistic individuals.</p> <p>Locke Laws of Nature, Natural Rights, Property, Presentation themes: Natural rights; right to dissent; justification of property</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90
C12T	<p>Indian Political Thought-I</p> <p>I. Traditions of Pre-colonial Indian Political Thought a. Brahmanic and Shramanic b. Islamic and Syncretic.</p> <p>II. Ved Vyasa (Shantiparva): Rajadharma</p> <p>III. Manu: Social Laws</p> <p>IV. Kautilya: Theory of State</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	1+1+2+1+1=6	6*15=90

	<p>V. Aggannasutta (Digha Nikaya): Theory of kingship</p> <p>VI. Barani: Ideal Polity</p> <p>VII. Abul Fazal: Monarchy</p> <p>VIII. Kabir: Syncretism</p>				
DSE1T	<p>Development Process and Social Movements in Contemporary India</p> <p>I. Development Process since Independence</p> <p>a. State and planning</p> <p>b. Liberalization and reforms</p> <p>II. Industrial Development Strategy and its Impact on the Social Structure</p> <p>a. Mixed economy, privatization, the impact on organized and unorganized labour</p> <p>b. Emergence of the new middle class</p> <p>III. Agrarian Development Strategy and its Impact on the Social Structure</p> <p>a. Land Reforms, Green Revolution</p> <p>b. Agrarian crisis since the 1990s and its impact on farmers</p> <p>IV. Social Movements</p> <p>a. Tribal, Peasant, Dalit and Women's movements</p> <p>b. Maoist challenge</p> <p>c. Civil rights movements</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90
DSE2T	<p>United Nations and Global Conflicts</p> <p>.Unit-I</p> <p>The United Nations</p> <p>(a) An Historical Overview of the United Nations</p> <p>(b) Principles and Objectives</p> <p>(c) Structures and Functions: General Assembly; Security Council, and Economic and Social Council; the International Court of Justice and the specialised agencies (International Labour Organisation [ILO], United Nations Educational, Scientific and Cultural Organisation [UNESCO], World Health Organisation [WHO], and UN programmes and funds: United Nations Children's Fund [UNICEF], United Nations Development Programme [UNDP], United Nations Environment Programme [UNEP], United Nations High</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	1+2+1+1+1=6	6*15=90

	<p>Commissioner for Refugees [UNHCR])</p> <p>(d) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect</p> <p>(e) Millennium Development Goals</p> <p>Unit-II</p> <p>Major Global Conflicts since the Second World War</p> <p>(a) Korean War</p> <p>(b) Vietnam War</p> <p>(c) Afghanistan Wars</p> <p>(d) Balkans: Serbia and Bosnia</p> <p>Unit-III</p> <p>Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms</p>				
GE1T	<p>Nationalism in India</p> <p>Unit- I</p> <p>Approaches to the Study of Nationalism in India</p> <p>Nationalist, Imperialist, Marxist, and Subaltern Interpretations</p> <p>Unit-II</p> <p>Reformism and Anti-Reformism in the Nineteenth Century</p> <p>Major Social and Religious Movements in 19th century</p> <p>Unit-III</p> <p>Nationalist Politics and Expansion of its Social Base</p> <p>a. Phases of Nationalist Movement: Liberal Constitutionalists, Swadeshi and the Radicals; Beginning of Constitutionalism in India</p> <p>b. Gandhi and Mass Mobilisation: Non-Cooperation Movement, Civil Disobedience Movement, and Quit India Movement</p> <p>c. Socialist Alternatives: Congress Socialists, Communists</p> <p>Unit-IV</p> <p>Social Movements</p> <p>a. The Women's Question: Participation in the</p>	<p>3 (Chandan Naru, Jonaki Biswas, Snehasis Mondal, Arpan Roy)</p>	6	2+2+2=6	6*15=90

	National Movement and its Impact b. The Caste Question: Anti-Brahminical Politics c. Peasant, Tribals and Workers Movements Unit-V Partition and Independence a. Communalism in Indian Politics b. The Two-Nation Theory, Negotiations over Partition				
DSE1AT	Themes in Comparative Political Theory Course Content: 1. Distinctive features of Indian and Western political thought 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 e. Marx and Bakunin on State 3. Indian Thought: Thinkers and Themes a. Kautilya on State b. Tilak and Gandhi on Swaraj c. Ambedkar and Lohia on Social Justice d. Nehru and Jayaprakash Narayan on Democracy e. Pandita Ramabai on Patriarchy	2 (Jonaki Biswas, Chandan Naru)	6	3+3=6	6*15=90

SEC3T	<p>Democratic Awareness with Legal Literacy</p> <p>Course Content:</p> <p>Unit I</p> <ul style="list-style-type: none"> □ Outline of the Legal system in India □ System of courts/tribunals and their jurisdiction in India - criminal and civil courts, □ writ jurisdiction, specialized courts such as juvenile courts, Mahila courts and tribunals. □ Role of the police and executive in criminal law administration. □ Alternate dispute mechanisms such as lok adalats, non - formal mechanisms. <p>Unit II</p> <ul style="list-style-type: none"> □ Brief understanding of the laws applicable in India □ Constitution- fundamental rights, fundamental duties, other constitutional rights and their manner of enforcement, with emphasis on public interest litigation and the expansion of certain rights under Article 21 of the Constitution. □ Laws relating to criminal jurisdiction- provision relating to filing an FIR, arrest, bail search and seizure and some understanding of the questions of evidence and procedure in Cr. P.C. and related laws, important offences under the Indian Penal Code, offences against women, juvenile justice, prevention of atrocities on Scheduled Castes and Scheduled Tribes. □ Concepts like Burden of Proof, Presumption of Innocence, Principles of Natural Justice, Fair comment under Contempt laws. □ Personal laws in India : Pluralism and Democracy □ Laws relating to contract, property and tenancy laws. □ Laws relating to dowry, sexual harassment and violence against women □ Laws relating to consumer rights □ Laws relating to cyber crimes □ Antiterrorist laws: implications for security 	2 (Jyoti Mitra, Snehasis Mondal)	2	1+1=2	2*15=30
-------	---	----------------------------------	---	-------	---------

	<p>and human rights</p> <p>Practical application: Visit to either a (i) court or (ii) a legal aid centre set up by the Legal Services Authority or an NGO or (iii) a Lok Adalat, and to interview a litigant or person being counseled. Preparation of a case history.</p> <p>Unit III Access to courts and enforcement of rights □ Critical Understanding of the Functioning of the Legal System □ Legal Services Authorities Act and right to legal aid, ADR systems</p> <p>Practical application: What to do if you are arrested; if you are a consumer with a grievance; if you are a Victim of sexual harassment; domestic violence, child abuse, caste, ethnic and Religious discrimination; filing a public interest litigation. How can you challenge Administrative orders that violate rights, judicial and administrative remedies Using a hypothetical case of (for example) child abuse or sexual harassment or any other violation of a right, preparation of an FIR or writing a complaint addressed to the appropriate authority.</p>				
SEM-6					
C13T	<p>Modern Political Philosophy</p> <p>Unit-I Modernity and its discourses This section will introduce students to the idea of modernity and the discourses around modernity. Two essential readings have been prescribed.</p> <p>Unit-II</p>	<p>5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis</p>	6	2+1+1+1+1=6	6*15=90

	<p>Romantics</p> <p>a) Jean Jacques Rousseau Presentation themes: General Will; local or direct democracy; self-government; origin of inequality.</p> <p>b) Mary Wollstonecraft Presentation themes: Women and paternalism; critique of Rousseau's idea of education; legal rights</p> <p>Unit-III</p> <p>Liberal socialist</p> <p>John Stuart Mill Presentation themes: Liberty, suffrage and subjection of women, right of minorities; utility principle.</p> <p>Unit-IV</p> <p>Radicals</p> <p>a) Karl Marx Presentation themes: Alienation; difference with other kinds of materialism; class struggle</p> <p>b) Alexandra Kollontai Presentation themes: Winged and wingless Eros; proletarian woman; socialization of housework; disagreement with Lenin</p>	Mondal)			
C14T	<p>Indian Political Thought-II</p> <p>I. Introduction to Modern Indian Political Thought</p> <p>II. Rammohan Roy: Rights</p> <p>III. Pandita Ramabai: Gender</p> <p>IV. Vivekananda: Ideal Society</p> <p>V. Gandhi: Swaraj</p> <p>VI. Ambedkar: Social Justice</p> <p>VII. Tagore: Critique of Nationalism</p> <p>VIII. Iqbal: Community</p> <p>IX. Savarkar: Hindutva</p> <p>X. Nehru: Secularism</p> <p>XI. Lohia: Socialism</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90
DSE3T	<p>Women, Power and Politics</p> <p>Unit-I</p> <p>Groundings</p> <p>1. Patriarchy</p> <p>a. Sex-Gender Debates</p>	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy,	6	1+1+2+1+1=6	6*15=90

	b. Public and Private c. Power 2. Feminism 3. Family, Community, State a. Family b. Community c. State Unit-II Movements and Issues 1. History of the Women's Movement in India 2. Violence against women 3. Work and Labour a. Visible and Invisible work b. Reproductive and care work	Snehasis Mondal)			
DSE4T	Human Rights in a Comparative Perspective Unit-I Human Rights: Theory and Institutionalization a. Understanding Human Rights: Three Generations of Rights b. Institutionalization: Universal Declaration of Human Rights c. Rights in National Constitutions: South Africa and India Unit-II Issues a. Torture: USA and India b. Surveillance and Censorship: China and India c. Terrorism and Insecurity of Minorities: USA and India Unit-III Structural Violence a. Caste and Race: South Africa and India b. Gender and Violence: India and Pakistan c. Adivasis/Aboriginals and the Land Question: Australia and India.	5 (Chandan Naru, Jonaki Biswas, Jyoti Mitra, Arpan Roy, Snehasis Mondal)	6	2+1+1+1+1=6	6*15=90
GE2T	United Nations and Global Conflicts Unit-I The United Nations	4 (Jyoti Mitra, Chandan	6	2+1+1+1=6	6*15=15

	<p>(a) An Historical Overview of the United Nations (b) Principles and Objectives (c) Structures and Functions: General Assembly; Security Council, and Economic and Social Council; the International Court of Justice and the specialised agencies (International Labour Organisation [ILO], United Nations Educational, Scientific and Cultural Organisation [UNESCO], World Health Organisation [WHO], and UN programmes and funds: United Nations Children's Fund [UNICEF], United Nations Development Programme [UNDP], United Nations Environment Programme [UNEP], United Nations High Commissioner for Refugees [UNHCR]) (d) Peace Keeping, Peace Making and Enforcement, Peace Building and Responsibility to Protect (e) Millennium Development Goals</p> <p>Unit-II Major Global Conflicts since the Second World War (a) Korean War (b) Vietnam War (c) Afghanistan Wars (d) Balkans: Serbia and Bosnia</p> <p>Unit-III Assessment of the United Nations as an International Organisation: Imperatives of Reforms and the Process of Reforms</p>	<p>Naru, Arpan Roy, Snehasis Mondal)</p>			
--	--	---	--	--	--

DSE1BT	Administration and Public Policy: Concepts and Theories Course Content: <ol style="list-style-type: none"> 1. Public administration as a discipline: Meaning, scope and significance of the subject, public and private administration, brief evolution and major approaches, and comparative approaches to public administration. 2. Administrative theories: the classical theory, scientific management, the human - relation theory, and rational decision-making. 3. Understanding public policy: concept and theories, relevance of policy making in public administration and process of policy formulation and implementation and evaluation. 4. From Development Administration to New Public Management. Elements and politics of development administration, the New Public Management paradigm – a critical perspective in the post globalized era. 	2 (Jyoti Mitra, Snehasis Mondal)	6	4+2=6	6*15=90
SEC4T	Conflict and Peace Building Course Content: Unit I Concepts <ol style="list-style-type: none"> a. Understanding Conflict b. Conflict Management, Conflict Resolution and Conflict Transformation c. Peace Building Unit II Dimensions of Conflict <ol style="list-style-type: none"> a. Ideology b. Economic/Resource Sharing Conflicts c. Socio- Cultural Conflicts (Ethnic, Religious, Gender- based) Unit III Sites of Conflict <ol style="list-style-type: none"> a. Local b. Sub-National 	3 (Chandan Naru, Arpan Roy, Jonaki Biswas)	2	1+1=2	2*15=30

	c. International Unit IV Conflict Responses: Skills and Techniques a. Negotiations: Trust Building b. Mediation: Skill Building; Active Listening c. Track I, Track II & Multi Track Diplomacy d. Gandhian Methods.				
--	---	--	--	--	--

PHILOSOPHY (HONOURS)
2021-2022

Course	Course Contents / Syllabus	Allotted Teachers	Credits & Marks	Class allotted	Total Class
CC -1 C1T: Indian Philosophy-I	a. Introduction: Division of Indian Philosophical School: Āstika and Nāstika, b. Cārvāka school: Epistemology, Metaphysics and Ethics c. Jaina philosophy: Concept of <i>Dravya, Sat, Guṇa, Paryāya, Anekāntavāda, Syādvāda</i> and <i>Saptabhanginyāya</i> d. Buddhism: Four Noble Truth, Theory of Dependent Origination (<i>Pratītyasamutpādvāda</i>) Definition of Reality(<i>arthakriyākāritva</i>), Doctrine of Momentariness	A.R.Khatua	06 (5+1+0) CA-15 + ESE-60 =75	03	03x15 = 45
	e. Nyāya Philosophy: <i>Pramā</i> and <i>Pramāṇa</i> ; <i>Pratyakṣa</i> (definition), <i>Sannikarṣa</i> , Classification of <i>Pratyakṣa</i> , <i>Nirvikalpaka</i> , <i>Savikalpaka</i> , <i>Laukika</i> , <i>Alaukika</i> f. Anumiti, anumāna (definition), <i>vyāpti</i> , <i>parāmarśa</i> , Classification of <i>anumāna</i> (<i>purvavat</i> , <i>śeṣavat</i> , <i>sāmānyatodṛṣṭa</i> and <i>kevalānvayī</i> , <i>anvayavyātirekī</i> , <i>Svārthānumāna</i> and <i>Parārthānumāna</i>), <i>Upamāna</i> (definition) and <i>Śabda</i> (definition) g. Vaiśeṣika Philosophy: seven <i>padārtha</i> , <i>dravya</i> , <i>guṇa</i> , <i>karma</i> , <i>sāmānya</i> , <i>viśeṣa</i> , <i>samavāya</i> and <i>abhāva</i> h. Different types of causes: <i>samavāyi</i> , <i>asamavāyi</i> , and	S. Chandra		03	03x15 = 45
CC-2 C2T: History of Western Philosophy-I	a. Pre-Socratic philosophy, A brief outline b. Plato: Theory of Knowledge, Theory of Forms c. Aristotle: Critique of Plato's theory of Forms , Doctrine of Four Causes, Form and Matter d. St. Thomas Aquinas: Faith and Reason, Essence and Existence	S. Jana	06 (5+1+0) CA-15 + ESE-60 =75	03	03x15 = 45
	e. Descartes : Cartesian method of doubt, Cogito ergo sum, criterion of truth, Types of Ideas, Proofs for Existence of God, Mind-body Dualism, Proofs for Existence of External World	R. Das Sasmal		03	03x15 = 45

	<p>f. Spinoza: Doctrine of Substance, Attributes and Modes, Existence of God, Pantheism, Three orders of knowing.</p> <p>g. Leibniz: Monads, Truths of reason, Truth of Facts, Innate ideas, Some Metaphysical Principles, Laws of identity of indiscernible, Law of sufficient reason, Law of continuity, Doctrine of Pre-established Harmony.</p>				
<p>GE-1</p> <p>GE1T:</p> <p>Ethics:</p> <p>Indian and Western</p>	<p>A. Four <i>Puruṣārthas</i> and their interrelation, <i>Niṣkāma</i> and <i>Sakāma</i> karmas, Cārvāka Ethics</p>	<p>06 (5+1+0) CA-15 + ESE-60 =75</p>	S. Chandra	02	02x15 =30
	<p>B. Buddhist Ethics: The Four Noble Truths and the Eight Fold Path</p>		A.R.Khatua	01	01x15 =15
	<p>C. Moral and Non-moral Actions, Object of Moral judgement</p> <p>E. Theories of Punishment</p>		R. Das Sasmal	01	01x15 =15
	<p>D. Teleological Ethics: Utilitarianism (Bentham and Mill) ; Deontological Ethics, Kant's Moral Theory.</p>		S. Jana	02	02x15 =30

<p>CC-1</p> <p>DSC-1A</p> <p>Indian Philosophy</p>	<p>1. Introduction</p> <p>(a) General Feature of Indian Philosophy</p> <p>2.Cārvāka:</p> <p>(a) <i>Pratyakṣa</i> as the only source of knowledge.</p>	<p>06 (5+1+0) CA-15 + ESE-60 =75</p>	A. R. Khatua	01	01x15 5=15
	<p>3.Jainism:</p> <p>(a) <i>Anekāntavāda</i> (b) <i>Syādvāda</i> and <i>Nayavāda</i></p>		S. Chandra	01	01x15 5=15
	<p>4. Buddhism:</p> <p>(a) Four Noble Truths (b) <i>Pratītyasamutpādvāda</i></p>		A. R. Khatua	01	01x15 5=15
	<p>5. Nyāya-Vaiśeṣika :</p> <p>(a) <i>Pramāṇa</i>; <i>Pratyakṣa</i> (perception), <i>anumāna</i> (inference), <i>Upamāna</i> (comparison) and <i>Śabda</i> (testimony) (b) <i>Saptanadārtha</i> (Seven categories)</p>		S. Chandra	01	01x15 5=15
	<p>6. Sāṃkhya:</p> <p>(a) <i>Satkāryavāda</i> (Theory of Causation)</p> <p>(b) <i>Parināmavāda</i> (Theory of Evolution)</p>		R. Das Sasmal	01	01x15 5=15
	<p>7. Yoga:</p>				

	8. Mimāṃsā: (a) <i>Arthāpatti</i> (b) <i>Anupalabdhi</i> 9. Vedānta:		S. Jana	01	01x15=15
CC -3 C3T: Outlines of Indian Philosophy-II	a. Sāṃkhya: Satkāryavāda, Nature of Prakṛti, its constituents and proofs for its existence. Nature of Puruṣa and proofs for its existence, Plurality of Puruṣas, theory of evolution.	06 (5+1+0) CA-15 + ESE-60	R. Das Sasmal	02	2x15=30
	b) Yoga—Citta, Cittavṛtti, Cittaabhūmi. Eight fold path of Yoga, God.		S. Chandra	01	1x15=15
	c) Mīmāṃsā (Prābhakara and Bhāṭṭa) :Anvitābhīdhānvāda and avihitānvayavāda, Arthāpatti and Anupalabdhi as sources of knowledge.		A. R. Khatua	01	1x15=15
	d) Advaita Vedānta—Sankara’s view of Brahman, Saguṇa and Nirguṇa Brahman, Three grades of Sattā: prātibhāsika, vyavahārika and pāramārthika, Jīva, Jagat and Māyā.		S. Jana	01	1x15=15
	e) Viśiṣṭādvaita—Rāmānuja’s view of Brahman, Jīva, Jagat. Refutation of the doctrine of Māyā		S. Chandra	01	1x15=15
CC-4 C4T: History of Western Philosophy-II	a) Locke : Refutation of innate ideas, the origin and formation of ideas, simple and complex ideas, substance, modes and relations, nature of knowledge and its degrees, limits of knowledge, primary and secondary qualities, representative realism.	06	R. Das Sasmal	02	2x15=30
	b) Berkeley: Refutation of abstract ideas. Criticism of Locke’s distinction between primary and secondary qualities, Immaterialism, esse-est-percipi, role of God.		S. Chandra	01	1x15=15
	c) Hume: Impression and ideas, association of ideas, distinction between judgements concerning relations of ideas and judgements concerning matters of fact, theory of causality, theory of self and personal identity, scepticism.		S. Jana	01	1x15=15

	d) Kant : Conception of critical Philosophy, distinction between a priori and a posteriori judgements, distinction between analytic and synthetic judgements. Synthetic a priori judgements, General problem of the Critique, Copernican Revolution in Philosophy, Transcendental Aesthetic : Space & time— Metaphysical & Transcendental expositions of the ideas of space & time.		A. R. Khatua	02	2x15 =30
--	---	--	--------------	----	-------------

GE-2 GE2T: Philosophy of Mind	a) Sensation: What is sensation? Attributes of sensation.	06 (5+1+0)	S. Jana	02	02x 15 =30
	b) Perception: What is perception? Relation between sensation and perception, Gestalt theory of perception, illusion and hallucination.	CA-15 + ESE-60 =75			
	c) Consciousness: Conscious, Subconscious, Unconscious, Evidence for the existence of the Unconscious, Freud's theory of dream.		R. Das Sasmal	01	01x 15 =15
	d) Memory: Factors of memory, Laws of association, Forgetfulness. Learning: The trial and Error theory, Pavlov's Conditioned Response theory, Gestalt theory.		A. R. Khatua	02	02x 15 =30
	e) Intelligence: Measurement of Intelligence, I.Q., Test of Intelligence, Binnet-Simon test.		S. Chandra	01	01x 15 =15

Core-4 DSC-1B Western Philosophy	1. Metaphysics: Nature of Metaphysics, Elimination of Metaphysics	06 (5+1+0)	R. Das Sasmal	01	01x15 =15
	2. Realism: Naïve Realism, Scientific Realism, Representative Realism	CA-15 + ESE-60 =75			
	3. Idealism: Subjective Idealism, Objective Idealism		A. R. Khatua	02	02x15 =30
	4. Critical Theory of Kant				
	5. Theories of Causation: Regularity Theory and Entailment Theory		S. Chandra	02	02x15 =30
	6. Substance: Views of Descartes, Spinoza, Locke and Berkeley				
	7. Relation between Mind and Body: Interactionism and Parallelism		S. Jana	01	01x15 =15
	8. Theories of Evolution: Mechanistic and Emergent				

Core-5 C5T: Philosophy of Mind	a) Psychology: Definition, Nature and Scope b) Methods of Psychology: Introspection, Extrospection, Experimental Methods — variables —dependent & independent, controls in experiment, limitations of experimental method.	06 60+15 =75	A.R.Khatua	01	01x15 =15
	c) Sensation and Perception: Nature of sensation, nature of perception, relation between sensation and perception, Gestalt theory of perception. Illusion and Hallucination. d) Learning: Theories of Learning—Trial and error theory, Thorndike's laws of learning, Gestalt Theory, Pavlov's theory of conditioned response, B.F. Skinner's theory of Operant Conditioning(reinforcement, extinction, punishment).		R. Sasmal	02	02x15 =30
	e) Philosophical Theories of Mind: Interactionism, Double aspect theory, Philosophical Behaviourism, Materialism mind-brain identity theory, The Person theory (Strawson).		S. Chandra	02	02x15 =30
	f) Consciousness: Levels of mind—Conscious, Sub-conscious, Unconscious, proofs for the existence of Unconscious, Freud's theory of Dream. g) Personality: Types, Factors and Traits of Personality.		S. Jana	01	01x15 =15
Core-6 C6T: Social and Political Philosophy	a) Nature and Scope of i) Social Philosophy ii) Political Philosophy iii) Relation between social and Political Philosophy. b) Primary concepts: Society, community, association, institution, family: nature, different forms of family, role of family in the society.	06 60+15 =75	R. Sasmal	01	01x15 =15
	c) Social Class and Caste: Principles of class and caste, Marxist conception of class, Varṇaśrama dharma. d) Theories regarding the relation between individual and society: I. Individualistic theory II. Organic theory III. Idealistic theory		S. Chandra	02	02x15 =30
	e) Secularism —its nature, Secularism in India. f) Social Change: Nature, Relation to Social progress, Marx-Engles on social change, Gandhi		A.R.K	02	02x15 =30

	on social change.				
	g) Political Ideals: Nature of Democracy and its different forms, direct and indirect democracy, liberal democracy, democracy as a political ideal, Socialism: Utopian and Scientific, Anarchism.		S. Jana	01	01x15 =15

Core-7 CC-7: Philosophy of Religion	a) Nature and scope of Philosophy of Religion. Doctrine of karma and rebirth, doctrine of liberation, (Hindu, Bauddha and Jaina views).	06	S. Jana	01	01x15 =15
	b) The Philosophical teachings of the Holy Quran: God the ultimate Reality, His attributes, His relation to the world and man.	60+15 =75			
	c) Some basic tenets of Christianity: The doctrine of Trinity, The theory of Redemption. d) Religious Pluralism, Inter-religious dialogue and Possibility of Universal Religion.		S.Chandra	02	02x15 =30
	e) Arguments for the existence of God: Cosmological, Teleological and Ontological arguments, Nyāya arguments. f) Grounds for Disbelief in God: Sociological theory (Durkheim), Freudian theory, Cārvāka, Bauddha and Jaina views.		R. Das Sasmal	02	02x15 =30
	g) The Peculiarity of Religious Language: The doctrine of analogy, Religious statements as Symbolic, Religious language as Non-Cognitive (Randal's view), the language game theory (D.Z. Phillip).		A. R. Khatua	01	01x15 =15
SEC-1: Philosophy of Human Rights	a) Definition and Nature of Human Rights. b) The Idea of Human Rights: Its Origins and Historical Developments during Ancient period, Modern period and Contemporary period.	02 40+10 =50	S. Jana	01	01x15 =15
	c) The Idea of Natural Law and Natural Rights: Thomas Hobbes and John Locke. d) The Natural Rights Tradition: Some Reactions from Jeremy Bentham, Edmund Burke and Thomas Paine.				
	e) Natural Right, Fundamental Right and Human Right. f) Preamble, Fundamental Rights and Duties (Indian Constitution).		R. Das Sasmal	01	01x15 =15

	g) Contemporary Perspectives: Joel Feinberg—Basic Rights		S. Chandra	01	01x15 =15
--	--	--	-------------------	-----------	------------------

Core-7 (DSC-1C) Logic	1. Basic Concept of Logic: (a) Nature and Scope of Logic, (b) Sentence, Proposition and Statement, (c) Inference and Argument	6 15+ 60	S. Jana	01	01x15 =15
	2. Types of Argument and Inference: (a) Deductive Argument and Inductive Argument, (b) Immediate inference and Mediate inference, (c) Categorical Syllogism, (d) Truth Functional Argument and Quantificational Argument		S. Chandra	01	01x15 =15
	3. Opposition of Propositions: Rules and Fallacies		A. R. Khatua	02	02x15 =30
	4. Immediate Inference: Rules and Fallacies				
	5. Categorical Syllogisms: Rules and Fallacies, Venn diagram.				
	6. Truth functional Argument: Rules and Fallacies.		R. Das Sasmal	02	02x15 =30
	7. Inductive Argument: Rules and Fallacies				
	8. Analogical Reasoning				
	9. Science and Hypothesis				
SEC-1T Ethics in Practice	1. Morality and Ethics 2. Motive and Intention 3. Moral action and Moral Judgment 4. Normative Theories: (a) Ethical Egoism & Utilitarianism, (b) Kant's Moral Theory.	2 10+40 =50	R. Das Sasmal	01	01x15 =15
	5. puruṣārtha (Buddha and āstika views) 6. Vedic Concepts of ṛta, yajña, ṛṇa, vidhi and niṣedha 7. Concept of ahimsā in Yoga 8. Concept of niṣkāmakarma preached in Śrīmadbhagavadgītā		S. Jana	01	01x15 =15
	9. Concept of pañcaśīla in Buddhism 10. Jaina Concepts of pañcamahāvratā, triratna, anuvratā and mahāvratā		A.R.Khatua	01	01x15 =15

	11. Awareness, Views and Praxis on Basic Moral Concerns of Environment: (a) Environmental awareness and Buddhism (b) Rabindranath Tagore's Environmental Praxis (c) Land Ethics (d) Shallow and Deep Ecology		S. Chandra	01	01x15 =15
GE 3T: Theory of Inference in Nyāya	a. Definition & classification of <i>Anumiti</i> .	06	S. Chandra	03	03x15=45
	b. Importance of <i>Pañcabayabinyāya</i> .	Marks 60+15=75	A. R. Khatua	03	03x15=45
Core-8 T Western Logic-I	a) Logic and Arguments, Deductive and Inductive Arguments, Argument forms and arguments, statement forms and statement, Truth and Validity. Categorical propositions and classes: quality, quantity and distribution of terms, Translating categorical propositions into standard form. b) Immediate inferences: Conversion, Obversion and Contraposition, Traditional square of opposition and Immediate Inferences based there on; Existential Import, symbolism and Diagrams for	S. Jana	6 15+ 60= 75	01	01x15 =15
	c) Categorical Syllogism: Standard Form categorical Syllogism; The Formal nature of Syllogistic Argument, Rules and Fallacies, General Rules; To test Syllogistic Arguments for validity (by applying general rules for syllogism); To solve problems and prove theorems concerning syllogism. d) Boolean Interpretation of categorical propositions; Review of the Traditional Laws of Logic concerning immediate inference and syllogism; Venn Diagram Technique for Testing	A. R. Khatua		02	02x15 =30
	e) Induction: Argument by Analogy, Appraising Analogical Arguments, Refutation by Logical Analogy f) Causal Connections: Cause and Effect, the meaning of "Cause"; Induction by Simple Enumeration; Mill's Method of Experimental Inquiry; Mill's Method of Agreement, Method of Difference, Joint Method of Agreement and Difference, Method of Residues,	S. Chandra		02	02x15 =30

	<p>g) Science and Hypothesis: Explanations; Scientific and Unscientific, Evaluating Scientific Explanations; The pattern of Scientific Investigation; Crucial Experiments and Ad Hoc Hypotheses.</p> <p>h) Probability: Alternative Conception of Probability; The Probability Calculus; Joint Occurrences; Alternative</p>	R. Das Sasmal		01	01x15 =15
Core-9 T Western Logic-II	<p>a) Symbolic Logic: The value of special symbols; Truth-Functions; Symbols for Negation, Conjunction, Disjunction, Conditional Statements and Material Implication; Material Equivalence and Logical Equivalence; Dagger and stroke functions; inter-definability of truth functors.</p> <p>b) Tautologous, Contradictory and</p>	R. Das Sasmal	6 15+ 60= 75	02	02x15 =30
	<p>c) Testing Argument Form and Argument for validity by i. The Method of Truth-table.</p> <p>ii. The Method of Resolution (Fellswoop & Full Sweep)[dot notation excluded]</p> <p>d) Determining the logical character of</p>	S. Jana		01	01x15 =15
	<p>e) The Method of Deduction: Formal Proof of Validity: Difference between Implicational Rules and the Rules of Replacement; Construction of Formal Proof of Validity by using nineteen rules; Proof of invalidity by assignment of truth-values.</p> <p>f) Quantification Theory: Need for Quantification Theory, Singular</p>	A. R. Khatua		02	02x15 =30
	<p>g) Quantification Rules and Proving Validity; Proving Invalidity for arguments involving quantifiers.</p>	S. Chandra		01	01x15 =15

Core-10 T Epistemology and Metaphysics (Western)	a) Concepts, Truth. b) Sources of Knowledge. c) Some Principal uses of the verb “To know”, Conditions of Propositional Knowledge, Strong	S. Chandra	6 15+ 60= 75	03	03x15=45
	d)Analytic truth and logical possibility. e) The apriori.	S. Chandra			
	g) Cause and Causal Principles	A. R. Khatua		03	03x15=45
	i) Phenomenalism	A. R. Khatua			
SEC-2T: Value Education	a) Meaning, Characteristics, significance and objectives of Value education	A. R. Khatua	2 10+ 40= 50	01	01x15 =15
	b) Values in different contexts: Individual, Social, Cultural, Moral and Global and	S. Chandra		01	01x15 =15
	c) Meaning and Characteristics of Peace education	A. R. Khatua		02	02x15 =30
	d) Aims and Objectives of Peace Education				
	e) Types of peace education	S. Chandra		02	02x15 =30
	f) Peace and Value education in Global Perspective				

GE - 4T: Termination of Life & Ethics	a. Euthanasia.	R. Das Sasmal & A. R. Khatua	6 15+ 60= 75		03	03x15=45
	b. Abortion.	S. Chandra & S. Jana			03	03x15=45
Core-10 (DSC-1D) Contemporary Indian	Philosophical Thoughts of Rabindranath Tagore, Swami Vivekananda, Sri Aurobindo, S. Radhakrishnan, Md. Iqbal and Mahatma Gandhi 1. Rabindranath Tagore (a)Nature of man : The Finite Aspect of Man, the Infinite Aspect of Man ,the Finite-Infinite		A. R. Khatua	6 15+ 60= 75	01	01x15 =15

Philosophy	2. Swami Vivekananda (a) Practical Vedānta, (b) Universal Religion, (c) Yoga.	A. R. Khatua		01	01x15 =15
	3. Sri Aurobindo (a) Nature of Reality, (b) Human Evolution– its different stages, (c) Integral Yoga	R. Das Sasmal		01	01x15 =15
	4. S. Radhakrishnan a) Nature of Man, (b) Nature of Religious Experience, (c) Nature of Intuitive	S. Chandra		01	01x15 =15
	5. Md. Iqbal (a) Nature of the Self, (b) Nature of the World, (c) Nature of God	S. Chandra		01	01x15 =15
	6. Mahatma Gandhi (a) God and Truth, (b) Ahimsa, (c)	S. Jana		01	01x15 =15
SEC-2: Philosophical Analysis	1. Meaning: (a) Word -meaning and Sentence-meaning, (b) Testability and Meaning	S. Chandra	2 10+ 40= 50	01	01x15 =15
	2. Definition				
	3. Concept and Truth	A. R. Khatua		12	01x15 =15
	4. Knowledge: Nature and Source of Knowledge	R. Das Sasmal		01	01x15 =15
	5. Determinism and Freedom	S. Jana		01	01x15 =15

C11T: Nayaya Logic and Epistemology	a) Definition of buddhi or jñāna (cognition), its two kinds; Definition of smṛti; Two kinds of smṛti (memory); Definition of anubhava, its division into veridical (yathārtha) and non-veridical (ayathārtha); Three kinds of nonveridical anubhava; Definitions	S. Chandra	Credits= 6 CA:15+ ESE: 60= 75	Lecture:05& Tutorial:01 03	03x15=45
	b) Four-fold division of pramā and pramāṇa. Definition of “Kāraṇa” (special causal condition) and “kāraṇa” (general causal condition). The concept of anyathāsiddhi (irrelevance) and its varieties. The definition of kārya (effect). Kinds of cause: samavāyi, a-samavāyi and nimitta kāraṇa (definitions and analysis).	A.R. Khatua			

	c) Definition of pratyakṣa and its two-fold division : nirvikalpaka and savikalpaka jñāna. Evidence for the	R. Sasmal		03	03x15=45
	d) Sannikarsa and its six varieties. Problem of transmission of sound; the claim of “anupalabdhi” as a distinctive pramāṇa examined.	S.Jana			
CC-12: Ethics (Indian)	a) Introduction: Concerns and Presuppositions, Concept of Sthitaprañña, Karmayoga: (Gīta) Puruṣārthas and their inter-relations	S. Chandra	Credits= 6 CA:15+ ESE: 60= 75	02	02x15 =30
	b) Meaning of Dharma, Concept of ṛṇa and ṛta. Classification of Dharma: sādharmaṇadharmā and Asadharana Dharma. Varnasrama Dharma				
	c) Vidhi and Niṣedha	A. R. Khatua			
	d) Buddhist Ethics: Pancaśīla, Brahmavihārabhāvanā (Bauddha).				
	e) Jaina Ethics: anubrata, mahābrata, Ahimsā	R. Das Sasmal			
	f) Mimāṃsa Ethics: nitya naimittika karma and kāmya karma, the imperative in kāmya karmas and in kāmya karmas involving hiṃsā.	S. Jana		01	01x15 =15

DSE-1T: Philosophy of Language (Indian)	a) Definition and classification of pada	S. Chandra	Credits =6 CA:15+ ESE: 60=	02	02x15 =30
	b) Introduction of concepts of āsatti, yogyatā, tātparya, ākāṃṣā	A. R. Khatua			
	c) Different types of lakṣaṇā				
	d) śābdabodha	R. Das Sasmal			
	e) anvitābhīdhānvāda and abhihitānvayavāda.	S. Jana			

DSE2T: Philosophy of Language (Western)	a) Syntax, Semantics, Pragmatics. b) Word-meaning, Definitions.	S. Chandra	Credits =6 CA:15+ ESE: 60=	02	02x15 =30
	c) Vagueness.	A. R. Khatua		02	02x15 =30
	d) Sentence-meaning	R. Das Sasmal		01	01x15 =15
	e) Testability and Meaning.	S. Jana		01	01x15 =15

Course	Course Contents / Syllabus	Allotted Teachers	Credit s & Marks	Class allotted per week	Total no of class
DSE1A: Philosophy of Religion	1. Nature and Scope of Philosophy of Religion: (a) Religion, Dharma, Dhamma, (b) Philosophy of Religion, Comparative Religion and Theology 2. Origin and Development of Religion	S. Chandra	Credit s=6 CA:15 + ESE: 60= 75	02	02x15 =30
	3. Fundamental Features of Major Religions: Hinduism, Christianity, Islam, Buddhism: Basic Tenets, Prophets (if any), Incarnation, Bondage and Liberation	A. R. Khatua		02	02x15 =30
	4. Arguments for the Existence of God (Indian and Western): Sāṃkhya-Yoga Arguments, Nyāya Arguments, Cosmological Arguments, Teleological Arguments, Ontological Arguments				
	5. Arguments against the Existence of God: Sociological Arguments, Freudian Arguments, Buddhist Arguments	R. Das Sasmal		01	01x15 =15
	6. Religious Pluralism & Mysticism				
	7. Monotheism, Polytheism, Henotheism 8. Immanence and Transcendence of God	S. Jana		01	01x15 =15

GE1:) Western Philosophy [Interdisciplina	1. Metaphysics: Nature of Metaphysics, Elimination of Metaphysics	S. Chan dra	Credits=6 CA:15+ ESE: 60=	02	02x15 =30
	2. Realism: Naïve Realism, Scientific Realism, Representative Realism		75		
	3. Idealism: Subjective Idealism, Objective Idealism 4. Critical Theory of Kant	A. R. Khatu a		02	02x15 =30

ry for other department]	5. Theories of Causation: Regularity Theory and Entailment Theory	R. Das Sasma I		01	01x15 =15
	6. Substance: Views of Descartes, Spinoza, Locke and Berkeley				
	7. Relation between Mind and Body: Interactionism and Parallelism	S. Jana		01	01x15 =15
	8. Theories of Evolution: Mechanistic and Emergent				
SEC-3: Value Education	A. Meaning, Characteristics, significance and objectives of Value education	S. Chandra	Credits =2 CA:10+ ESE: 40= 50	01	02x15 =30
	B. Values in different contexts: Individual, Social, Cultural, Moral and Global and Spiritual.				
	C. Meaning and Characteristics of Peace education	A. R. Khatua		01	02x15 =30
	D. Aims and Objectives of Peace Education				
	E. Types of peace education	R. Das Sasmal		01	01x15 =15
	F. Peace and Value education in Global Perspective	S.		01	01x15 =15
C-13T: Nyāya Logic and Epistemology-II	a) Definition of anumāna, anumiti and parāmarśa. Analysis of pakṣatā. Definition of vyāpti, Vyāptigraha. b) Definition of pakṣadharmatā—svārthānumiti and parārthānumiti; Analysis of pañcāvayavī Nyāya. Necessity of parāmarśa. Three kinds of linga or hetu: kevalānvayī, kevalavyātirekī and anvayavyātirekī. Definition of pakṣa, Sapakṣa and vipakṣa with illustrations. Marks of sadhetu. c) Hetvābhāsa—two types of definition. Five kinds of hetvābhāsa: (1) “Savyābhicāra” and its three kinds—defined and illustrated; (2) “Viruddha” defined and illustrated; (3) “Satpratipakṣa” defined and illustrated; (4) Three kinds of “Asiddha” enumerated; (a) āśrayāsiddha (b) svarūpāsiddha and (c) vyāpyatvāsiddha. Vyāpyatvāsiddha defined as “sopādhika hetu”. Upādhi and its four kinds (definition and illustration); (5) “Bādhita” (definition	S. Chandra	Credits =6 CA:15+ ESE: 60= 75	Lecture:05 & Tutorial:01 03	03x15= 45

	<p>d) “Upamāna pramāṇa”: Definition and analysis. “Śabda pramāṇa” : Definition and analysis. “Śakti” (the direct signifying power), the padapadārtha-sambandha considered as Īśvara-saṁketa, Controversy between the Mīmāṃsakas and the Naiyāyikas regarding the nature of Śakti as universal or particular.</p> <p>e) “Śaktigraha” (ascertainment of the meaning-relation), lakṣaṇa, varieties of lakṣaṇa, Analysis of “Gaunī-vṛtti” (the secondary signifying power of a term), “Vyāñjanāvṛtti” (the suggestive power of a term) analysed as a kind of śakti or lakṣaṇā.</p> <p>f) The definition of lakṣaṇā, The concept of “yoga-rūḍhi”. The conditions of “śābdabodha”, ākāṅkṣā, yogyatā and sannidhi. Two kinds of statements</p>	A. R. Khatua		03	03x15=45
	g) “Arthāpatti” as a distinctive pramāṇa: Controversy between the Mīmāṃsakas and the Naiyāyikas.	R. Sasmal		01	01x15=15
	h) The theory of prāmāṇya: the issue between svataḥ-prāmāṇyavāda and parataḥprāmāṇyavāda regarding	S.Jana		01	01x15=15

CC-14: Ethics (Western)	a) Nature and Scope of Ethics, Classification of Ethics: a: Prescriptive, b: Meta Ethics, c: Applied Ethics. b) Moral and Non-moral actions, Object of Moral Judgement - Motive and Intention	S. Chandra	Credits=6 CA:15+ ESE: 60= 75	02	02x15=30
	c) Moral Theories: Plato and Aristotle	A. R. Khatua		02	02x15=30
	d) Standards of Morality: Hedonism - Ethical, Psychological. Utilitarianism: Act utilitarianism, Ruleutilitarianism. Deontological Theories: Act - Deontological Theories, Rule-Deontological Theories - Kant's Theory				
	e) Theories of Punishment	R. Das Sasmal		01	01x15=15
	f) Environmental Ethics: Its nature, Concepts of Anthropocentrism and Non anthropocentrism, value beyond sentient beings, reverence for life.	S. Jana		01	01x15=15
DSE-3T: Śrimadbhaga -badgīta (3 rd & 14 th Chapters)	a) a) Karmayoga (Third Chapter) Śloka: 1-21	S. Chandra	Credits=6 CA:15+ ESE: 60=	02	02x15=30
	a) Karmayoga (Third Chapter) Śloka: 22-43	A. R. Khatua		02	02x15=30

	b) Guṇatrayabibhāga (Fourteenth Chapter): Śloka: 1-15	R. Das Sasmal		01	01x15 =15
	b) Guṇatrayabibhāga (Fourteenth Chapter) Śloka: 16-27	S. Jana		01	01x15 =15
DSE-4T: Indian Contemporary Philosophy	a) God and Truth. b) Nature of Man	S. Chandra	Credits= 6 CA:15+	02	02x15 =30
M.K.Gandhi	c) Non-Violence d) Satyāgraha.	A. R. Khatua		02	02x15 =30
	e) Swaraj	R. Das Sasmal		01	01x15 =15
	f) Theory of Trusteeship	S. Jana		01	01x15 =15
DSE-1BT /2BT: Tarkasaṁgraha with Dīpikā	a) Maṅgalācaraṇam - anubandhacatuṣṭaya, alocanā- paddhati b) Saptapadārtha : Lakṣaṇa and Vibhāga	S. Chandra	Credits= 6 CA:15+ ESE: 60= 75	02	02x15 =30
Topic:	c) Dravya : Lakṣaṇa and Vibhāga d) Guṇa : Lakṣaṇa and Vibhāga	A. R. Khatua		02	02x15 =30
Saptapadārtha	f) Sāmānya: Lakṣaṇa and Vibhāga g) Viśeṣa: Lakṣaṇa and Vibhāga h) Samavāya: Lakṣaṇa and Vibhāga i) Abhāva: Lakṣaṇa and Vibhāga	R. Das Sasmal		01	01x15 =15
		S. Jana		01	01x15 =15
GE-2T Philosophy of Mind	(a) Sensation: What is sensation? Attributes of sensation.	S. Chandra	Credits= 6 CA:15+	02	02x15 =30
	(b) Perception: What is perception? Relation between sensation and perception, Gestalt theory of perception, illusion and hallucination. (c) Consciousness: Conscious, Subconscious, Unconscious, Evidence for the existence of	A. R. Khatua		02	02x15 =30
	(d) Memory: Factors of memory, Laws of association, Forgetfulness. Learning: The trial and Error theory, Pavlov's Conditioned Response theory, Gestalt theory.	R. Das Sasmal		01	01x15 =15
	(e) Intelligence: Measurement of Intelligence, I.Q., Test of Intelligence, Binnet-Simon test.	S. Jana		01	01x15 =15

SEC-4 Logical Reasoning and Application	A. The main objective of logical reasoning. B. Definitions: Pakṣa, sādhyā, hetu, sapakṣa and Vipakṣa C. Construction of kevalānvayī,	S. Chandra	Credits=2 CA:10+ ESE: 40= 50	01	01x15 =15
	D. Hetvābhāsa and its different kinds, detection of hetvābhāsa. E. Reasoning in practice: (i). Fallacy of relevance, Fallacies of ambiguity, Fallacies of weak induction, Avoiding fallacies (ii) Logical applications of the concept of pakṣatā (iii) Functional applications of ordinary operative relations between sense-organs and	A. R. Khatua		01	01x15 =15
	F. Inductive reasoning in Law (i) The method of Inquiry in Law (ii) Causation in Legal reasoning (iii) Analogical Reasoning in legal argument (iv) Probability in legal argument	R. Das Sasmal		01	01x15 =15
	G. Deductive Reasoning in Law (i) Determining the correct rule of Law (ii) Identifying, formulating, and applying rules of law. (iii) The law of libel (iv) Logic is right reasoning	S. Jana		01	01x15 =15

Dept. of Education (General)

2021-2022

	Semester-I				
DSC1AT: Principles of Education	Course Contents:	Teacher	No. of Lecture per week	Total No. of Lecture	Credit
	Unit -I: <ul style="list-style-type: none"> ➤ Education: Meaning, Nature and Scope. ➤ Functions of Education ➤ Factors of Education. ➤ Aims of Education: Individualistic and Socialistic. Unit -III: <ul style="list-style-type: none"> ➤ Child Centric Education: Meaning and Characteristics. ➤ Aims of modern child centric education. ➤ Child Centricism in Education: its significance. ➤ Play and play-way in education: Kindergarten, Montessori, Basic education and Project method. 	KK	3	3X15=45	06
	Unit -II: <ul style="list-style-type: none"> ➤ Meaning of Curriculum. ➤ Types of curriculum. ➤ Principles of curriculum construction. ➤ Co – curricular activities. UNIT -IV: <ul style="list-style-type: none"> ➤ Freedom and Discipline: Concepts. ➤ Needs of discipline. ➤ Concept of Free discipline. ➤ Concept of Self-discipline. ➤ Application of Discipline in Educational Institution. 	PCR	3	3X15=45	
GE1T: Educational Psychology	Course Contents:	Teacher	No. of Lecture	Total No. of Lecture	Credit
	Unit -I: <ul style="list-style-type: none"> ➤ Educational Psychology: Meaning, Nature and Scope 	KK	3	3X15=45	06

	<ul style="list-style-type: none"> ➤ Relation between Education and Psychology. ➤ Methods of Educational Psychology. <p>Unit –III:</p> <ul style="list-style-type: none"> ➤ Personality: Concept and definition. ➤ Development of Personality. ➤ Types and Traits Approaches to Personality. ➤ Individual Differences: Concepts and Types. ➤ Causes of Individual Differences. <p>Unit –V:</p> <ul style="list-style-type: none"> ➤ Learning: Meaning & Nature. ➤ Factors associated with learning. ➤ Theories of Learning: Trial & Error, Classical conditioning and Gestalt theory of learning. ➤ Learning relation to; Attention, Interest, Maturation and Motivation. 				
	<p>Unit –II:</p> <ul style="list-style-type: none"> ➤ Growth and Development: Meaning and Concepts. ➤ Stages of Development of a Child: Infancy, Childhood and Adolescence. ➤ Aspects of Child Development : Physical, Intellectual, Emotional, Social <p>Unit –IV:</p> <ul style="list-style-type: none"> ➤ Intelligence: Concept and Definition. ➤ Theories of intelligence: Two-factor, Group-factors and Structure of Intellect. ➤ Intelligence Test: Verbal, Non-verbal test and their uses. 	PCR	3	3X15=45	

	Semester-II	Teacher	No. of Lecture per week	Total no of lecture	Credit
DSC2AT: Educational Psychology	Unit –I: <ul style="list-style-type: none"> ➤ Educational Psychology: Meaning, Nature and Scope ➤ Relation between Education and Psychology. ➤ Methods of Educational Psychology. Unit –III: <ul style="list-style-type: none"> ➤ Personality: Concept and definition. ➤ Development of Personality. ➤ Types and Traits Approaches to Personality. ➤ Individual Differences: Concepts and Types. ➤ Causes of Individual Differences. Unit –V: <ul style="list-style-type: none"> ➤ Learning: Meaning & Nature. ➤ Factors associated with learning. ➤ Theories of Learning: Trial & Error, Classical conditioning and Gestalt theory of learning. ➤ Learning relation to; Attention, Interest, Maturation and Motivation 	KK	3	3X15=45	06
	Unit –II: <ul style="list-style-type: none"> ➤ Growth and Development: Meaning and Concepts. ➤ Stages of Development of a Child: Infancy, Childhood and Adolescence. ➤ Aspects of Child Development : Physical, Intellectual, Emotional, Social Unit –IV: <ul style="list-style-type: none"> ➤ Intelligence: Concept and Definition. ➤ Theories of intelligence: Two-factor, Group-factors and Structure of Intellect. Intelligence Test: Verbal, Non-verbal test and their uses. 	PCR	3	3X15=45	

	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
GE2T : Psychology of Mental Health and Hygiene	Unit –I: <ul style="list-style-type: none"> ➤ Mental Hygiene: Meaning and Concept. ➤ Mental Health: Meaning and Concept. ➤ Characteristics of Mental Health. ➤ Education and Mental Health & Hygiene. Unit –III: <ul style="list-style-type: none"> ➤ Maladjustment: Meaning and Definition. ➤ Causes of Maladjustment. ➤ Different forms of Maladjustment. ➤ Role of Family and School in remedial measures. 	KK	4	4X15=60	06
	Unit –II: <ul style="list-style-type: none"> ➤ Adjustment: Concepts, Need, and Areas of Adjustment. ➤ Mechanism of Adjustment. ➤ Role of Family and School in effective Adjustment. 	PCR	2	2X15=30	
	<u>Semester-III</u>				
	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
DSC3AT: Educational Sociology	Unit –I: <ul style="list-style-type: none"> ➤ Education Sociology: Meaning, Nature and Scope. ➤ Relation between Sociology and Education. ➤ Education-as a social sub-system. Unit –III: <ul style="list-style-type: none"> ➤ Socialization: Meaning, process and factors of socialization. ➤ Social Control: Meaning and types of Social control, Agencies of Social Control. 	KK	3	3X15=45	06

	Unit -II: <ul style="list-style-type: none"> ➤ Social Change: Concept and nature. ➤ Factors and problems of social change in India. ➤ Social stratification: Meaning and Types. Unit -IV: <ul style="list-style-type: none"> ➤ Social Agencies of Education and their educative role: ➤ Family. ➤ School. ➤ State. ➤ Mass media. 	PCR	3	3X15=45	
	Course Contents:	Teacher	No. of Lecture per week	Total No. of Lecture	Credit
SEC1T: Measurement and Evaluation in Education	Unit -I: <ul style="list-style-type: none"> ➤ Concept of Measurement and Evaluation. ➤ Difference between Measurement and Evaluation. ➤ Needs of Evaluation in Education. Unit -IV: <ul style="list-style-type: none"> ➤ Tabulation of Educational Data. ➤ Measurement of Central Tendency: Mean, Median, Mode (Computation and their uses). ➤ Measures of Dispersion: Range; Quartile Deviation; Standard Deviation. (Computation and their uses) Unit -V: <ul style="list-style-type: none"> ➤ Concept of Correlation. ➤ Rank Difference method and Product moment method for Computation of correlation, Co-efficient. ➤ Interpretation of results. 	KK	01	1X15=15	02
	Unit -II: <ul style="list-style-type: none"> ➤ Different tools and techniques of Evaluation. ➤ Teacher Made test and Standardized test. 	PCR	01	1X15=15	

	<ul style="list-style-type: none"> ➤ Achievement tests and Psychological tests ➤ Cumulative Record Card. Unit -III: <ul style="list-style-type: none"> ➤ Reliability: Meaning and Method of Determining Reliability by Tests- Retest Method. ➤ Validity: Meaning and Method of Determining Content Validity. 				
	Course Contents:	Teacher	No. of Lecture per week	Total No. of Lecture	Credit
GE3T: Education of Children with Special Needs	Unit -I: Education of Children with: Visual Impairment: identification, intervention, education and prevention. Hearing Impairment: identification, intervention, education and prevention. Unit -III: Education of Children with: Physically Handicraft: identification, intervention, education and prevention.	KK	4	4X15=60	6
	Unit -II: Education of Children with: Speech and Language Disorders: identification, intervention, education and prevention. Unit -IV: Education of Children with: Learning Disabilities: identification, intervention, education and prevention.	PCR	2	2X15=30	
	<u>Semester-IV</u>				
	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
DSC4AT: History of Education in	Unit -I: <ul style="list-style-type: none"> ➤ Missionary educational activities in India: Characteristics 	KK	3	3X15=45	06

India	<p>and significance.</p> <ul style="list-style-type: none"> ➤ Serampore Mission: Contributions of the Trio to Education. ➤ Charter Act of 1813. ➤ Macaulay's Minute. ➤ Adam's Report and its recommendations. ➤ Woods Despatch (1854). <p>Unit -IV:</p> <ul style="list-style-type: none"> ➤ Radhakrishnan Commission- 1948, with special reference to rural university. ➤ Mudaliar Commission (1952-53): Reports and Recommendations. ➤ Kothari Commission (1964-66): Reports and Recommendations. ➤ National Education Policy 1986 and Revised Educational Policy of 1992. 				
	<p>Unit -II:</p> <ul style="list-style-type: none"> ➤ Indian Education commission -1882. ➤ Indian University Commission (1902). ➤ National Education Movement. <p>Unit -III:</p> <ul style="list-style-type: none"> ➤ Sadler Commission -1917 ➤ Hartog Committee Report. ➤ Wardha Scheme. ➤ The Sargent Plan (1944). 	PCR	3	3X15=45	
	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
SEC2T : Educational Guidance and Counseling	<p>Unit -I:</p> <ul style="list-style-type: none"> ➤ Educational Guidance: Meaning, Definition, Scope. ➤ Needs and Importance of Guidance. ➤ Essentials of good Guidance program. <p>Unit -III:</p> <ul style="list-style-type: none"> ➤ Counseling: meaning, nature, scope. ➤ Types of counseling. ➤ Tools and techniques of Counseling. 	KK	2	2X15=30	02

	Unit -II: <ul style="list-style-type: none"> ➤ Different forms of Guidance. ➤ Educational and Vocational Guidance. ➤ Organization of Guidance service at different levels of education. ➤ Tools and techniques of Guidance. Unit -IV: <ul style="list-style-type: none"> ➤ Difference between Guidance and Counseling. ➤ Counseling process-relationships & its characteristics. ➤ Role of parent, teacher & counselor in guidance program. 	PCR	1	1X15=15	
	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
GE4T: Value Based Education	Unit -I: Value – An Introduction <ol style="list-style-type: none"> 1. Meaning and Importance of value 2. Classification of value-Indian and western Unit-III: Values -- Traditional and Contemporary <ol style="list-style-type: none"> 1. Traditional values- Pu;r;ushartha, Satyam shivam sundaram, ahimsha prem and karma, tyaga and lokasangraha 2. Contemporary values- democracy, socialism, secularism, freedom discipline, responsibility, human rights. 	PCR	3	3X15=45	06
	Unit-II: Sources of Value <ol style="list-style-type: none"> 1. Religion, 2. Philosophy, and 3. Literature Unit -IV: Value Erosion and Inculcation <ol style="list-style-type: none"> 1. Value crises in social life, economic life, and political life 2. Value inculcation- need and importance, 3. Approaches to value education- direct and indirect method, curricular and co-curricular and extra curricular 	KK	3	3X15=45	

	<u>Semester-V</u>				
	Course Contents:	Teacher	No. of Lecture		Credit
DSE1AT: Great Educators	Unit -I: <ul style="list-style-type: none"> ➤ Swami Vivekananda (1863-1902). ➤ Sri Aurobindo (1872-1950). Unit -III: <ul style="list-style-type: none"> ➤ Jean Jacques Rousseau (1712-1778). ➤ F.W. August Froebel (1782-1852). 	KK	3	3X15=45	06
	Unit -II: <ul style="list-style-type: none"> ➤ Rabindranath Tagore (1861-1941). ➤ Mahatma Gandhi (1869-1948). Unit -IV: <ul style="list-style-type: none"> ➤ John Dewey (1859-1952). ➤ Madam Maria Montessori (1870-1952). 	PCR	3	3X15=45	
SEC-3T : Yoga Education	Unit -I: <ul style="list-style-type: none"> ➤ Basis of Yoga Meaning and Concept. ➤ Patanjala Yogasutra. ➤ Hathayoga Pradipika. Unit -III: <ul style="list-style-type: none"> ➤ Theories of Yoga Practices. ➤ Asana. ➤ Pranayama. ➤ Kriyas. ➤ Dhyana. 	KK	2	2X15=30	02
	Unit -II: <ul style="list-style-type: none"> ➤ Concept of Yoga. ➤ Streams of Yoga. ➤ Raja Yoga: Eight Fold Path. ➤ Anand Mimamsa. Unit -IV:	PCR	1	1X15=45	

	<ul style="list-style-type: none"> ➤ Practical Eight Step Method: Single Group and Double Group Practice. ➤ Asana. Pranayama. Relaxation Techniques 				
	Course Contents:	Teacher	No. of Lecture		Credit
GE1T : Mental Health and Hygiene	Unit –I: <ul style="list-style-type: none"> ➤ Mental Hygiene: Meaning and Concept. ➤ Mental Health: Meaning and Concept. ➤ Characteristics of Mental Health. ➤ Education and Mental Health & Hygiene. Unit –III: <ul style="list-style-type: none"> ➤ Maladjustment: Meaning and Definition. ➤ Causes of Maladjustment. ➤ Different forms of Maladjustment. ➤ Role of Family and School in remedial measures. 	KK	4	4X15=60	06
	Unit –II: <ul style="list-style-type: none"> ➤ Adjustment: Concepts, Need, and Areas of Adjustment. ➤ Mechanism of Adjustment. ➤ Role of Family and School in effective Adjustment. 	PCR	2	2X15=30	
	<u>Semester-VI</u>				
	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
DSE-1BT: Guidance and Counseling	Unit - I: Guidance <ol style="list-style-type: none"> 1. Concept, Nature, Principles, and types— educational, vocational and personal. Individual and Group Guidance. 2. Role of parents, teachers, and counselor in guidance. Unit- II: Counseling <ol style="list-style-type: none"> 1. Concept, Nature, Principles, Types — Directive, Non-directive and Eclectic; 	KK	3	3X15=45	06

	Individual and Group Counseling, 2. Counseling process, Characteristics of good counseling 3. Differences between guidance, counseling and psychotherapy				
	Unit-III: Techniques of Collecting Information for Guidance and Counseling 1. Intelligence test, Aptitude test, Interest test, and Personality Test & Interview, CRC, ARC and Case Study Unit-IV: Adjustment 1. Concept and Definition of Adjustment, Characteristics of good adjustment, common adjustment problems in Childhood and adolescence, Adjustment Mechanism.	PCR	3	3X15=45	
	Course Contents:	Teacher	No. of lecture per week	Total no of lecture	Credit
SEC-4T : Education of Children with Special Needs	Unit –I: ➤ Education of Children with: 1. Visual Impairment: identification, intervention, education and prevention. 2. Hearing Impairment: identification, intervention, education and prevention. Unit –III: Education of Children with: Physically Handicraft: identification, intervention, education and prevention.	KK	2	2X15=30	02
	Unit –II: Education of Children with: Speech and Language Disorders: identification, intervention, education and prevention. Unit –IV: Education of Children with: Learning Disabilities: identification, intervention, education and prevention.	PCR	1	1X15=15	

	Course Contents:	Teacher	No. of Lecture per week	Total no of lecture	Credit
GE-2T: Environmental Education	Unit-I: Environmental Education <ol style="list-style-type: none"> 1. Environmental Education: Concept, Characteristics, Components and Scope 2. Historical Background of Environmental Education Unit-IV- Approaches and Methods of Environmental Education <p>Approaches to Environmental Education: Interdisciplinary and Multidisciplinary Methods: Discussion, Seminar, And Workshop, Problem solving and Field survey.</p>	PCR	3	3X15=45	06
	Unit-II: Education of Environmental Concepts <ol style="list-style-type: none"> 1. Concept of Environment and Ecosystem 2. Disasters: Natural and Man Made Unit III: Environmental Education and Social Issues <ol style="list-style-type: none"> 1. Education for Sustainable development: From Unsustainable to Sustainable development. 2. Education of Urban Environment: Problems related to energy and water 	KK	3	3X15=45	

Physical Education (General)
2021-2022
Semester-I (CBCS)

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1AT (CC-1):	Foundation and History of Physical Education Unit- I: Introduction 1.1. Meaning, definition and scope of Physical Education. 1.2. Aims and objectives of Physical Education. 1.3. Misconception and modern concept of Physical Education. 1.4. Needs and importance of Physical Education in modern society.	A.SI	4	3	3×15 = 45
	Unit- II: Biological and Sociological Foundations of Physical Education 2.1 Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development. 2.2 Age- Chronological age, anatomical age, physiological age and mental age. 2.3 Sociological Foundation-Meaning and definition of Sociology, Society, Socialization in Physical Education and Sports, Sports Ethics. 2.4 Role of games and sports in National and International integration.	B.Garai		3	3×15 = 45
	Unit- III: History of Physical Education 3.1. Historical development of Physical Education and Sports in India- Pre- Independence period and Post-Independence period. 3.2. Olympic Movement- Ancient Olympic Games and Modern Olympic Games. 3.3. Brief historical background of Asian Games and Commonwealth Games. 3.4. National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award, Dhyanchand Award.	J.K.Jana		3	3×15 = 45
	Unit- IV: Yoga Education 4.1. Meaning and definition of the term Yoga, types, aims, objectives and importance of Yoga. 4.2. History of Yoga. 4.3. Astanga Yoga 4.4. Hatha Yoga	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1AP:	Field Practical 1. Marching- fall in attention, Stand at ease, stand easy, Eyes right, Eyes front, Right Turn, Left Turn, About Turn, Mark Time Mark, Forward Mark	B.Garai &	2	4	4×15 = 60
	2. Learn and demonstrate the technique of Suryanamaskar.	A.SI,		4	4×15 = 60
	3. Development of physical fitness through Callisthenics and Aerobic activities.	J.K.Jana		4	4×15 = 60

Semester-II (CBCS)

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1BT (CC-1):	Management of Physical Education and Sports Unit- I: Introduction 1.1. Concept and definition of Sports Management. 1.2. Purpose of Sports Management, Importance of Sports Management, 1.3. Principles of Sports Management. 1.4. Sports Manager and his duties.	A.SI	4	3	3×15 = 45
	Unit- II: Tournaments 2.1. Tournaments: Meaning and definition, and types of tournaments (Knock-out, League, Combination, Challenge). 2.2. Procedure of drawing fixture. 2.3. Method of organizing Annual Athletic Meet and Play Day. 2.4. Method of organizing of Intramural and Extramural competition.	B.Garai		3	3×15 = 45
	Unit- III: Facilities and Equipments 3.1. Method of calculation of Standard Athletic Track marking. 3.2. Care and maintenance of play ground and gymnasium. 3.3. Importance, care and maintenance of sports equipment. 3.4. Time Table: Meaning, importance and factors affecting school Physical Education Time Table.	J.K.Jana		3	3×15 = 45
	Unit- IV: Leadership 4.1. Meaning and definition of leadership. 4.2. Qualities of good leader in Physical Education. 4.3. Types of Leadership. 4.4. Principles of leadership activities.	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1BP:	Practical 1. Lay out knowledge and Officiating ability of Track and field events	J.K.Jana	2	4	4×15 = 60
	2. Lay out knowledge and Officiating ability of Games: Football, Kabaddi, Kho- Kho, Volleyball, Hand Ball, Net Ball, Throw Ball, Badminton and Table Tennis.	B.Garai		4	4×15 = 60
	3. Gymnastic and Yoga Scoring	A.SI		4	4×15 = 60

Semester-III (CBCS) DSC1

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1CT (CC-1):	Anatomy, Physiology and Exercise Physiology Unit- I: Introduction 1.1. Meaning and definition of Human Anatomy, Physiology and Exercise Physiology. 1.2. Importance of Human Anatomy, Physiology and Exercise Physiology in Physical Education. 1.3. Cell- Structure and function. 1.4. Tissue- Types and functions.	A.SI	4	2	2×15 = 30
	Unit- II: Musculo-skeletal System 2.1. Skeletal System- Structure of Skeletal System. Classification and locations of bones and joints. Anatomical differences between male and female. 2.2. Muscular System- Type, location, function and structure of muscle. 2.3. Types of muscular contraction. 2.4. Effect of exercise and training on muscular system.	B.Garai		3	3×15 = 45
	Unit- III: Circulatory System 3.1. Blood- Composition and function. 3.2. Heart- Structure and functions. Mechanism of blood circulation through heart. 3.3. Blood Pressure, Athletic Heart and Bradycardia. 3.4. Effect of exercise and training on circulatory system.	J.K.Jana		2	2×15 = 30
	Unit- IV: Respiratory System 4.1. Structure and function of Respiratory organs. 4.2. Mechanism of Respiration. 4.3. Vital Capacity, O ₂ Debt and Second Wind. 4.4. Effect of exercise and training on respiratory system.	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1CP:	Field Practical 1. Assessment of BMI, and WHR. 2. Measurement of Blood Pressure, Vital Capacity, Respiratory rate, Heart Rate, Limb length, PEI, and Pick flow Rate.	A.SI, B.Garai & J.K.Jana	2	6	6×15 = 90

Semester-III (CBCS) SEC-1

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
SEC- 1	Indian Games and Racket Sports A. KABADDI a. Fundamental skills 1. Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line. 2. Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques. 3. Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defence. 4. Game practice with application of Rules and Regulations. b. Rules and their interpretations, and duties of the officials.	A.SI	2	2	2×15 = 30
	B. KHO-KHO a. Fundamental skills 1. Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul. 2. Skills in running: Chain Play, Ring play and Chain & Ring mixed play. 3. Game practice with application of Rules and Regulations. b. Rules and their interpretations and duties of the officials.	B.Garai		3	3×15 = 45
	C. BADMINTON a. Fundamental skills 1. Basic Knowledge: Various parts of the Racket and Grip. 2. Service: Short service, Long service, Long-high service. 3. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash. 4. Game practice with application of Rules and Regulations. b. Rules and their interpretations and duties of the officials.	J.K.Jana		2	2×15 = 30
	D. TABLE TENNIS a. Fundamental skills 1. Basic Knowledge: Various parts of the Racket and Grip (Shake Hand & Pen Hold Grip). 2. Stance: Alternate & Parallel. 3. Push and Service: Backhand & Forehand. 4. Chop: Backhand & Forehand. 5. Receive: Push and Chop with both Backhand & Forehand. 6. Game practice with application of Rules and Regulations. B. Rules and their interpretations and duties of the officials.	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Semester-IV (CBCS)

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1D T (CC-1):	Health Education, Physical Fitness and Wellness Unit- I: Introduction 1.1. Concept, definition and dimension of Health. 1.2. Definition, aims, objectives and principles of Health Education. 1.3. Activities of Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO) and United Nations International Children's Emergency Fund (UNICEF) 1.4. School Health Program- Health Service, Health Instruction, Health Supervision, Health appraisal and Health Record, Personal hygiene.	A.SI	4	3	3×15 = 45
	Unit- II: Health Problems in India- Prevention and Control 2.1. Communicable Diseases- Malaria, Dengue and Chicken Pox and Diarrhea. 2.2. Non-Communicable Diseases- Obesity, Diabetes and Asthma. 2.3. Nutrition- Nutritional requirements for daily living. Preparation and Principles of Balance Diet. Health disorders due to deficiencies of Protein, Vitamins and Minerals. 2.4. Postural deformities- Causes and corrective exercises of Kyphosis, Lordosis, Scoliosis, Knock Knee, Flat Foot and Bow Legs.	B.Garai		3	3×15 = 45
	Unit- III: Physical Fitness and Wellness 3.1. Physical Fitness- Meaning, definition and importance of Physical Fitness. 3.2. Components of Physical Fitness- Health and performance related Physical Fitness. 3.3. Concept of Wellness. Relationship between physical activities and wellness. 3.4. Ageing- Physical activities and its importance.	J.K.Jana		3	3×15 = 45
	Unit- IV: Health and First-aid Management 4.1. First aid- Meaning, definition, importance and golden rules of First-aid. 4.2. Concept of sports injuries- Sprain, Strain, Fracture, Dislocation and Wound. 4.3. Management of sports injuries through the application of Hydro-therapy and Thermo- therapy. 4.4. Physiotherapy: Basic concept, types & principles. Management of sports injuries through the application of exercise and massage therapy.	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC1DP :	Field Practical 1. First aid - Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica. 2. Practical Knowledge of Hydro-therapy, Thermo-therapy and Cryo-therapy.	A.SI, B.Garai & J.K.Jana	2	6	6×15 = 90

Semester-IV (CBCS) SEC- 2

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
SEC- 2	<p>Ball Games:</p> <p>a. Fundamental Skills</p> <ol style="list-style-type: none"> 1. Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick. 2. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot. 3. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot. 4. Heading: In standing, running and jumping condition. 5. Throw-in: Standing throw-in and Running throw-in. 6. Feinting: With the lower limb and upper part of the body. 7. Tackling: Simple Tackling, Slide Tackling. 8. Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting. 9. Game practice with application of Rules and Regulations. <p>b. Rules and their interpretation and duties of officials.</p>	A.SI	2	2	2×15 = 30
	<p>B. BASKETBALL</p> <p>a. Fundamental Skills</p> <ol style="list-style-type: none"> 1. Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass. 2. Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running. 3. Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble. 4. Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw. 5. Rebounding: Defensive rebound and Offensive rebound. 6. Individual Defence: Guarding the player with the ball and without the ball, Pivoting. 7. Game practice with application of Rules and Regulations. <p>b. Rules and their interpretation and duties of officials.</p>	B.Garai		3	3×15 = 45
	<p>C. VOLLEYBALL</p> <p>a. Fundamental skills</p> <ol style="list-style-type: none"> 1. Service: Under arm service, Side arm service, Tennis service, Floating service. 2. Pass: Under arm pass, Over head pass. 3. Spiking and Blocking. 4. Game practice with application of Rules and Regulations. <p>b. Rules and their interpretation and duties of officials.</p>	J.K.Jana		2	2×15 = 30

Semester-V (CBCS)

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSE1T	Tests, Measurements and Evaluation in Physical Education Credits Unit- I: Introduction 1.1. Concept of test, measurement & evaluation. 1.2. Criteria of good test. 1.3. Principles of evaluation. 1.4. Importance of Test, Measurement and Evaluation in Physical Education and Sports.	A.SI	4	3	3×15 = 45
	Unit- II: Measurements of Body Compositions and Somatotype Assessment 2.1. Body Mass Index (BMI) - Concept and method of measurement. 2.2. Body Fat - Concept and method of measurement. 2.3. Lean Body Mass (LBM) - Concept and method of measurement. 2.4. Somatotype- Concept and method of measurement.	B.Garai		3	3×15 = 45
	Unit- III: Fitness Test 3.1. Kraus-Weber Muscular Strength Test 3.2. AAHPER Youth Fitness Test 3.3. Queens College Step Test 3.4. Harvard Step Test	J.K.Jana		3	3×15 = 45
	Unit- IV: Sports Skill Test 4.1. Lockhart and McPherson Badminton Skill Test 4.2. Johnson Basketball Test Battery 4.3. McDonald Soccer Test 4.4. Brady Volleyball Test	A.SI, B.Garai & J.K.Jana		3	3×15 = 45
Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSE1P:	Field Practical 1. Assessment of somatotype and Body fat percentage (%) 2. Assessment of AAHPER Youth Fitness Test and Harvard Step Test.	A.SI, B.Garai & J.K.Jana	2	6	6×15 = 90

Semester-V (CBCS) SEC- 3

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
SEC- 3	GYMNASTICS 1. Compulsory 1.1. Forward Roll 1.2. T-Balance 1.3. Forward Roll with Split leg 1.4. Backward Roll 1.5. Cart-Wheel [Note: Perform the above Gymnastic skills continuously in the same sequence] 2. Optional 2.1. Dive and Forward Roll 2.2. Hand Spring 2.3. Head Spring 2.4. Neck Spring 2.5. Hand Stand and Forward Roll 2.6. Summersault	A.SI	2	2	2×15 = 30
	3. YOGA 3.1. Asanas 3.1.1 Ardhachandrasana 3.1.2. Brikshasana 3.1.3. Padahasthasana 3.2. Sitting Position 3.2.1 Ardhakurmasana 3.2.2. Paschimottanasana 3.2.3. Gomukhasana 3.3. Supine Position 3.3.1. Setubandhasana 3.3.2. Halasana 3.3.3. Matsyasana 3.4 Prone Position 3.4.1. Bhujangasana 3.4.2. Salvasana 3.4.3. Dhanurasana 3.5 Inverted Position 3.5.1 Sarbangasana 3.5.2 Shirsasana 3.5.3 Bhagrasana [Note: One Asana is compulsory from each position]	B.Garai		3	3×15 = 45
	1. Pranayama 4.1 Kapalbhati 4.2 Bhramri 4.3 Anulam Vilom.	J.K.Jana		2	2×15 = 30

Semester-V (CBCS) GE-1

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
GE-1	Foundation and History of Physical Education Unit- I: Introduction 1.1. Meaning, definition and scope of Physical Education. 1.2. Aim and objectives of Physical Education. 1.3. Misconception and Modern concept of Physical Education. 1.4. Need and Importance of Physical Education in modern society.	A.SI	4	3	3×15 = 45
	Unit- II: Biological and Sociological Foundations of Physical Education 2.1. Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development. 2.2. Age- Chronological age, anatomical age, physiological age and mental age. 2.3. Sociological Foundation- Meaning and definition of Sociology, Society, Socialization in Physical Education and Sports, Sports Ethic. 2.4. Role of games and sports in National and International integration.	B.Garai		3	3×15 = 45
	Unit- III: History of Physical Education 3.1. Historical development of Physical Education and Sports in India- Pre-Independence period and Post-Independence period. 3.2. Olympic Movement- Ancient Olympic Games and Modern Olympic Games. 3.3. Brief historical background of Asian Games and Commonwealth Games. 3.4. National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award, Dhyanchand Award.	J.K.Jana		3	3×15 = 45
	Unit- IV: Yoga Education 4.1. Meaning and definition of the term Yoga, types, aim, objectives and important of Yoga. 4.2. History of Yoga. 4.3. Astanga Yoga 4.4. Hatha Yoga	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
GE-1P:	Field Practical 1. Marching- fall in attention, Stand at ease, stand easy, Eyes right, Eyes front, Right Turn, Left Turn, About Turn, Mark Time Mark, Forward Mark	B.Garai &	2	4	4×15 = 60
	2. Learn and demonstrate the technique of Suryanamaskar.	A.SI,		4	4×15 = 60
	3. Development of physical fitness through Callisthenics and Aerobic activities.	J.K.Jana		4	4×15 = 60

Semester-VI (CBCS)

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSE2T	Sports Training Unit- I: Introduction 1.1. Meaning and definition of Sports Training. 1.2. Aim and characteristics of Sports Training. 1.3. Principles of Sports Training. 1.4. Importance of Sports Training.	A.SI	4	3	3×15 = 45
	Unit- II: Principle of Training and Conditioning 2.1. Warming up and cooling down- Meaning, types and methods. 2.2. Conditioning - Concept of Conditioning and its principles. 2.3. Training Methods- Circuit Training, Interval Training, Weight Training. 2.4. Periodisation- Meaning, types, aim and contents of different periods.	B.Garai		2	2×15 = 30
	Unit- III: Training Load and Adaptation 3.1. Training Load - Meaning, definition, types and factors of training load. 3.2. Components of training load. 3.3. Over Load - Meaning, causes, symptoms and tackling of over load. 3.4. Adaptation - Meaning and conditions of adaptation.	J.K.Jana		3	3×15 = 45
	Unit- IV: Training Techniques 4.1. Strength - Means, types and methods of strength development. 4.2. Speed - Means, types and methods of speed development. 4.3. Endurance - Means, types and methods of endurance development. 4.4. Flexibility - Means, types and methods of flexibility development.	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSE2P:	Field Practical 1. Practical Experience of Weight Training and Circuit Training. 2. Measurement of Speed, Strength (Grip/Leg), Explosive Strength (Leg) and Flexibility.	A.SI, B.Garai & J.K.Jana	2	6	6×15 = 90

Semester-VI (CBCS) SEC- 4

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
SEC- 4	Track and Field 1. Track Events 1.1. Starting Techniques: Standing start and Crouch start (its variations) use of Block. 1.2. Acceleration with proper running techniques. 1.3. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug. 1.4. Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing.	A.SI	2	2	2×15 = 30
	2. Field events 2.1. Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing. 2.2. High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing. 2.3. Shot put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique). 2.4. Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle). 2.5. Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride).	B.Garai		3	3×15 = 45

Semester-VI (CBCS) GE- 2

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
GE-2	Anatomy, Physiology and Exercise Physiology Unit- I: Introduction 1.1. Meaning and definition of Human Anatomy, Physiology and Exercise Physiology. 1.2. Importance of Human Anatomy, Physiology and Exercise Physiology in Physical Education. 1.3. Cell- Structure and function. 1.4. Tissue- Types and functions.	A.SI	4	2	2×15 = 30
	Unit- II: Musculo-skeletal System 2.1. Skeletal System- Structure of Skeletal System. Classification and locations of bones and joints. Anatomical differences between male and female. 2.2. Muscular System- Type, location, function and structure of muscle. 2.3. Types of muscular contraction. 2.4. Effect of exercise and training on muscular system.	B.Garai		3	3×15 = 45
	Unit- III: Circulatory System 3.1. Blood- Composition and function. 3.2. Heart- Structure and functions. Mechanism of blood circulation through heart. 3.3. Blood Pressure, Athletic Heart and Bradycardia. 3.4. Effect of exercise and training on circulatory system.	J.K.Jana		2	2×15 = 30
	Unit- IV: Respiratory System 4.1. Structure and function of Respiratory organs. 4.2. Mechanism of Respiration. 4.3. Vital Capacity, O ₂ Debt and Second Wind. 4.4. Effect of exercise and training on respiratory system.	A.SI, B.Garai & J.K.Jana		3	3×15 = 45

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
GE-2P:	Field Practical 1. Assessment of BMI, and WHR. 2. Measurement of Blood Pressure, Vital Capacity, Respiratory rate, Heart Rate, Limb length, PEI, and Pick flow Rate.	A.SI, B.Garai & J.K.Jana	2	6	6×15 = 90

DEPARTMENT OF PHYSICAL EDUCATION CURRICULUM OF B.P.Ed 2021-2022					
PAPER	Course contents / Syllabus	Allotted Teachers	Credits & Marks	Class Allotted per weeks	Total Class
SEM I	Theoretical Course				
CC 101	History, Principle and Foundation of Physical Education& Olympic Movement	ANA, AM, AK	04	06	15X6=90
CC 102	Anatomy and Physiology	MS,BD	4	04	15X4=60
CC 103	Health Education and Environmental Studies	SD,MS1, AB	4	04	15X4=60
EC-101	Physical Literacy through Movement Education	DR,MS1	4	04	15X4=60
SEM I	Practical Course				
PC 101	Track and Field:All Running Events, Relay Race	AK	4	04	15X4=60
PC 102	Gymnastics Mass Demonstration Activities:Any Five Dumbbells/ Wands/ Hoop/ Umbrella/ Malkhamb/ Lazium/ Calisthenics/ Apparatus Drills	ANA,MS 1	4	08	15X8=120
PC 103	March Past Ball Games: Handball Indigenous Sports:Kabaddi and Kho-kho	AK,SD	4	10	15X10=150
PC 104	Yoga, Weight training, Aerobics, Bratochari	BD,AM,S DAK,	4	12	12X15=180
SEM II	Theoretical Course				
CC 201	Yoga Education and Inclusive Education	ANA,BD	4	06	15X6=90
CC 202	Educational Technology and Methods of Teaching in Physical Education	AM,MB	4	06	15X6=90
CC 203	Organization, Administration and Management in Physical Education & Sports	AK,SK	4	05	15X5=75
EC-202	Sports Nutrition and Weight Management	SD,MS1	4	05	15X5=75
SEM II	Practical Course				

PC 201	Track and Field: 100 (All Jumping events)	ANA	4	04	15X4=60
PC 202	Swimming Team Games: Volleyball, & Softball	BD,SD,A M,ANA		10	15X10=150
PC 203	Team Games: Hockey and Cricket	MS,AK,B D,AM,SK	4	20	15X20=300
TP 201	Class room teaching Outdoor teaching	SD,BD	4	04	15X4=60
SEM III	Theoretical Course				
CC 301	Sports Training	AM,MB	4	05	15X5=75
CC 302	Computer Applications in Physical Education and Sports Science	MS,SK	4	04	15X4=60
CC-303	Sports Psychology and Sociology in Physical Education and Sports	BSP,SD, MS1	4	04	15X4=60
EC-302	Curriculum Design and Gender Education	DR, BD, SD	4	04	15X4=60
SEM III	Practical Course				
PC 301	Throwing Events: Shot Put, Discus	ANA	4	04	15X4=60
PC 302	Combative Sports: Karate/ Judo/Boxing/ Taekwondo/ Wrestling/Lathi Adventure activity/Outdoor activity: Camping/Trekking/Hiking/Rock-climbing /Artificial Climbing etc Lab-based Practical on Physical and Physiological/Psychological/Biomechanical measures	SK,AB	4	04	15X4=60
PC 303	Ball Games: Football, Netball, Throw ball	MS,AK, SD	4	06	15X6=90
TP301	Teaching Lessons: Atleast Coaching lessons in school. Total 02 Coaching lessons, Teaching Practice: On Yoga/Weight Training or Aerobics	BD,MS1, MB	4	10	15X10=150
SEM IV	Theoretical Course				
CC 401	Measurement and Evaluation in Physical Education	MS,AK	4	06	15X6=90
CC 402	Kinesiology and Biomechanics	BSP, BD,	4	06	15X6=90

		SD			
CC-403	Research and Statistics in Physical Education	SD,MB	4	05	15X5=75
EC 402	Sports Management	SK,AM	4	04	15X4=60
SEM IV	Practical Course				
PC 401	Measurement of AAHPER Youth Fitness Measurement of Motor Fitness Test	BSP,DR, MS1	4	06	15X6=90
PC 402	Layout and Officiating ability	AK,MS1	4	04	15X4=60
TP 401	Teaching lessons at School	ANA,AM, MS, BD, MS1,BSP,	4	8	15X8=120
TP-402	External Coaching lessons at school	SK,BSP, MB	4	06	15X6=90

CURRICULUM OF M.P.Ed 2021-2022					
PAPER	Course contents / Syllabus	Allotted Teachers	Credits & Marks	Class Allotted per weeks	Total Class
SEM I	Theoretical Course				
MPCC 101	Research Process in Physical Education & Sports Sciences	SK,BSP	3	06	15X6=90
MPCC 102	Physiology of Exercise	DR,MS, BD	3	06	15X6=90
MPCC 103	Yogic Sciences	ANA,BD	3	06	15X6=90
MPEC101	Tests, Measurement and Evaluation in Physical Education	MS,MB	3	06	15X6=90
SEM I	Practical Course				
MPPC 101	Track and Field: Running Events	AM	3	04	15X4=60
MPPC 102	Sports Major: Swimming And Gymnastics	BSP,DR, SD	3	06	15X6=90
MPPC 103	Karate / Self Defense and Adventure Sports	SK,AB	3	06	15X6=90
MPPC 104	Class Room Teaching Lessons	MB,MS1, MS,AM, BSP,AN A,BD,SD	3	10	15X10= 150
SEM II	Theoretical Course				
MPCC 201	Applied Statistics in Physical Education & Sports	DR	3	04	15X4=60
MPCC 202	Sports Biomechanics & Kinesiology	BSP,AN A	3	06	15X6=90
MPCC 203	Athletic Care and Rehabilitation	SD,BD	3	06	15X6=90
MPEC 202	Sports Management	SK,AM	3	04	15X4=60

SEM II	Practical Course				
MPPC 201	Track & Field: Shot put Discus and Javelin Throws, High, Long and Triple Jump	AM	3	06	15X6=90
MPPC 202	Sports Major: : Basketball and Cricket	SK,MS1	3	08	15X8= 120
MPPC 203	Yoga: Asanas, Pranayam and Kriyas	ANA	3	04	15X4=60
MPPC 204	Teaching Lessons: Sports Major – 4 lessons Track & Field- 4 lessons	MS,SD	3	04	15X4=60
SEM III	Theoretical Course				
MPCC 301	Scientific Principles of Sports Training	AM,MB	3	06	15X6=90
MPCC 302	Sports Medicine	DR,BD	3	05	15X5=75
MPCC 303	Health Education and Sports Nutrition	DR,MS1	3	05	15X5=75
MPEC 301	Physical Fitness and Wellness	SK,BSP	3	04	15X4=60
SEM III	Practical Course				
MPPC 301	Sports Major: Football and One Racket Sports	MS,SK	3	04	15X4=60
MPPC 302	Sports Major: : Volleyball and Handball	BD,MB	3	06	15X6=90
MPPC 303	Officiating of Track & Fields and Sports	AK,MB	3	06	15X6=90
MPPC 301	Internship on a Team Game*/ Project Work on Practical Activities*	MB	3	04	15X4=60
SEM IV	Theoretical Course				
MPCC 401	Information & Communication Technology (ICT) in Physical Education And Sports	DR,MS1	3	06	15X6=90
MPCC 402	Psychology and Sociology Of Sports	BSP,MB	3	05	15X5=75
MPCC-403	Dissertation	DR,MS, MB	3	04	15X4=60
MPEC 401	Value and Environmental Education	ANA, MS	3	06	15X6=90
SEM IV	Practical Course				
MPPC 401	Hammer or Pole Vault or Combined Events Triathlon, Pentathlon, Heptathlon and Decathlon	AK	3	04	15X4=60
MPPC 402	Sports Specialization: Among Track & Field, Yc and Sports Major	AM, ANA,SK, BSP,MS, MS1,MB, BD,AK,D R	3	12	15X12=180
MPPC 401	Coaching Lessons on Sports Specialization	AM,MS, A MB,	3	08	15X8=120
MPPC-404	Lab Practical: A) Physiology of Exercise B) Kinesiology and Sports Biomechanics C) Sports Psychology D) Measurement & Evaluation in Physical Education E) Sports Management	SK,MS, ANA, BSP, DR	3	10	15X10=150

B.Voc Tourism & Hotel Management 2021-202

Course	Course Contents / Syllabus	Allotted Teachers	Credits & Marks	Class allotted per week	Total Class
1st Year					
Semester 1: A. Tourism	<ul style="list-style-type: none"> • Understanding some basic concepts of Tourism & Hospitality Industry: Introduction to Tourism Industry, Meaning & Definition, Features, Characteristics / Elements, Approaches, Benefits, Functions, Forms & Types, Concept of Tourist, Prerequisites for a Tourist, Introduction to Hospitality Industry, Forms & Types, Aspects, Relation with Tourism, Types of Accommodation, Hospitality Industry in India. • History of Travel - International: A brief history of Travel, Travel-Down the ages, Why do people travel? • History of Travel in India: Early times, Persian - Macedonian Times, The Mauryan Empire, The Muslim Empire, The Mughal Empire, The English Raj, Post Independence. • Role of Tourism: Introduction, Concept of Recreation & Leisure, Differences, Role of Tourism Department, Pilgrimage, Tourism Activities. • Tourism Infrastructure: Introduction, Components of Tourism Infrastructure, Food Service Innovations, Climate, Portable water, Flora & Fauna, Scenery. 	Pinki Kumari		2	2x15 =30

Semester 1: B. Housekeeping	<ul style="list-style-type: none"> • Types of hotel: what is Hotel, Hotel categories, key terms. • Hotel Chain Associations: introduction, History of Chain operations, Key terms. • Organization of Hotel: introduction, large Hotel organization structure, Small Hotel organization structure, Accommodations Division, Staff Departments, Key terms. • Types of Rooms: Introduction, Significance of Rooms, Types of Rooms. • Layout of the Housekeeping Department: introduction, Housekeeping Design Factors, Layout and Housekeeping Facilities, Key Terms. • Organization of housekeeping Department: Introduction, Responsibilities of Housekeeping. • Competencies of Housekeeping Professional: Introduction, Competencies. 	Prabhat Sharma		3	3x15 =45
Semester 1: C. Front Office	<ul style="list-style-type: none"> • Front Office Introduction: What is Front Office Department? Front Office Operations, Guest Cycle in Hotel. • Front Office - Terminology • Front Office – Structure: Physical Setup of Front Office, Operational Structure of Front Office 	Pinki Kumari		2	2x15 =30

Semester 1: D. English Communication	<ul style="list-style-type: none"> • English Grammar: Parts of Speech (Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection), Sentence, Articles, Tenses (Present Tense, Past Tense, Future Tense), Number, Active or Passive Voice, Direct & Indirect Speech. • Spoken English: Reading Newspaper, Vocabularies, Dialogues, and Salutation Words. <p style="text-align: center;">Conversation: Role Plays, Self Introduction, Speech and Conversation with the class Teacher.</p>	Pinki Kumari		2	2x15 =30
Semester 1: E. Food & Beverage Production	<ul style="list-style-type: none"> • Introduction Of cookery: Introduction, Types Of Kitchen, Receiving area, food Stores, Commissary Kitchen, main Kitchen, Scope of Becoming a Chef, Attitude and Behavior in the kitchen, Personal Hygiene and food safety, Uniform and protective clothing, Kitchen Towel/ duster shoes, Identification of Knives and how to sharpen them, Safety procedures in handling, Equipment: Ergonomics, Burns and Scalds, Origin of modern Cookery, Temperature. • Organization of Structure and of Kitchen: Duties and Responsibility various Chef, Layout of Kitchen Department, General Kitchen Layout, Commissary, kitchen. 	Prabhat Sharma		3	3x15 =45
Semester 1: F. Food & Beverage Service	<ul style="list-style-type: none"> • Origins of the food Service Industry: Introduction, Restaurant, Fast Food Restaurants, Institutional Catering. • Food and Service facilities: Classification Of Food and 	Prabhat Sharma		3	3x15 =45

	<p>Beverage Facilities, Commercial, Institutional.</p> <ul style="list-style-type: none"> • Organization and Responsibilities Of F&B Operations: Mission and Goals, Structure Of the Organization, Corporate Structures, Job Descriptions, Responsibilities of Food and Beverage Operations, Influences on Food and Beverage Operations. • Associate Department of Hotel Food Service: Departments Of Hotel. • The New Food Service Professional: Introduction, Competencies of New Front-Line Food Backline Specialists Staff, Competencies Of New Corporate Management. • Understanding Guest Service: Introduction, Different between product and services, Providing a Good Guest Experience, Understanding Needs and Wants of Customers, Why do People Dine Out?, How do People Choose Restaurant ? • Competencies Of a Food Service Professional: Introduction, Grooming And Hygiene, Basic Etiquettes, Hygiene and Sanitation, Teamwork, Attitude, Discipline, Courtesy. 				
On Job Practical Training & Report	<ul style="list-style-type: none"> • One month 				
Semester 2: A. Tourism	<ul style="list-style-type: none"> • History of Hotels & Motels: Inns of early times, Hotels in modern times, History of Hotels in America, History of Motels and its features, Advent of Hotel Chains. • Origin of the Food Service 	Pinki Kumari		2	2x15 =30

	<p>Industry: Origins of Restaurants, Fast food Restaurants, Institutional Catering, Airline Catering, Ship Catering, Theme Parks & Resorts, Railway Catering.</p> <ul style="list-style-type: none"> • History of the Travel Agency and Tour Operations: Introduction, Cox and Kings, Thomas Cook, Other Notable Landmarks. • History of Air Travel: Introduction, Growth of the Air Travel, Airline Hotels. • Understanding Guest Service: Introduction, Difference between Services and Physical products, Service, Understanding customer's needs and wants, Customer Relationship Management (CRM) 				
Semester 2: B. Housekeeping	<ul style="list-style-type: none"> • The Executive Housekeeper: Introduction, Duties of an Executive Housekeeper, Planning Of Housekeeping Budget, Directing Responsibilities, Controlling Responsibilities, Organizing Responsibilities, staffing Responsibilities. • The Floor Pantry: Introduction, Furniture and Fixtures, Floor Layout and Basic Principles of the Floor Pantry, Requisitioning Procedures, kept in a Floor Linen Room. • Preparing a Room Report Introduction, The Room Report, Occupancy Codes, Immediate Reportable Matters. • Other Floor Procedures: Introduction, Periodic Duties of a Floor Supervisor, Inventory Of Guest Supplies, Spring Cleaning Procedure, Guest Room Inspection, handling Arrival Of VIP Guests, Closing Down The 	Prabhat Sharma		3	3x15 =45

	Shift.				
Semester 2: C. Front Office	<ul style="list-style-type: none"> • Front Office – Ranks & Responsibilities: Reservation Manager, Reception Manager, Guest Service Manager, Night Audit Manager, Communication Manager, Front Office - Staff Qualities and Competencies. • Front Office – Reservation: Types of Hotel Reservation Systems, the role of Internet in reservations, Sources of Reservations, Managing Reservations. <p style="text-align: center;">Front Office – Guest Registration: Pre-registration Procedure, verifying Guest's Identity, Registration Card Typical Format, Creating Registration Record, Establishing Payment Method, Assigning an Accommodation, Issuing Room Keys or Access Code, Handling Special Requests</p>	Pinki Kumari		2	2x15 =30
Semester 2: D. English Communication	<ul style="list-style-type: none"> • English Communication: Meaning and Definition, Importance, Need, Types, Barriers to Communication, Communication - Art or Science? • Group Discussion: Meaning, Importance / Purpose, Process of Group Discussion, Characteristics of a successful Group Discussion, Group Discussion Preparation, Group Discussion Tips and Skills. <p style="text-align: center;">Audio Video Presentation: Meaning, Tips on how to make an Audio Visual Presentation, Structuring the material and content, Audio - Visual Aids, Seminar Paper Presentation and Discussion.</p>	Pinki Kumari		2	2x15 =30

<p>Semester 2: E. Food & Beverage Production</p>	<ul style="list-style-type: none"> • Organizational Structure and Layout of Kitchen: Butchery, Grade Manager, Bakery and Confectionery, Western Banquet Kitchen, Slow Kitchen. • Basic Menu Planning: Introduction, Menu, Function of the Menu, Types of Menu, Menu used as Control Tools, Menu of Engineering Grid, Menu Balancing, Selecting Dishes and Courses, Wine and Food Pairing. • Aims and Objective Of Cooking Food: Why do we need to cook food, Various Texture and Consistencies, Controlling the Change in Texture and Techniques used in Pre-Preparation, Commodities used for cooking, Flour, Raising Agents, Fats and Oils, Vegetable Oil, Milk and Dairy Product, Sweeteners, Souring Agents Used in cooking, Cooking, Thickening Agents Used in cooking, Tenderizing Agents Used in Indian cooking, Flavouring And Aromatic Agents Used in Indian Cooking, Spicing Agents Used in Indian Cooking. 	<p>Prabhat Sharma</p>		<p>3</p>	<p>3x15 =45</p>
<p>Semester 2: F. Food & Beverage Service</p>	<ul style="list-style-type: none"> • Basics of Management: Introduction, what is management, Principles of management: Functions of management. • Role of Menu: Introduction, A Classical Menu, Modern Menu, Role of The menu Towards the Establishment & Guests • Types of menu: Classification Of Menu. • Menu Planning: Introduction, Catering Policy, Principal Contributors to Menu Planning, Pre- Menu Activity, Complete Knowledge of the Cuisine, Food trials, The Menu, Control Cycle, 	<p>Prabhat Sharma</p>		<p>3</p>	<p>3x15 =45</p>

	Wine Lists, Designing the Menu Cover, Evaluating the Menu, Conclusion.				
On Job Practical Training	<ul style="list-style-type: none">• One month				
2nd Year					
Semester 3: A. Tourism	<ul style="list-style-type: none">• Types of Lodgings: Introduction, Types of Hotels, Other Lodgings• Types of Food Service Facilities: Introduction, Commercial Food Facilities, Hotel Restaurants, Independent Restaurants, Institutional Food Facilities.• Hotel Organization: Introduction, Large Independent Hotel Structure, Revenue Divisions / Departments, Accommodations, Front Office, Uniformed Services, Housekeeping, Laundry, Engineering, Health Club and Recreation, Food & Beverage, Room Service, Bars, Banquets, Kitchens, Kitchen Stewarding, Non Revenue Departments, Finance & Accounts, Human Resources, Sales & Marketing, Minor Revenue Departments, Small Hotel structure.• Tour Operators and Travel Agents: Introduction, Meaning & Definition, Operations, Functions, Types, Role of a travel agent, Travel Agency Revenue, Tour Operators, Travel Agency & the Distribution Chain, Functions, Influence of E-Trade. <p>Future Tourism Trends: Introduction, Neo Tourism, New Initiatives in Tourism.</p>	Pinki Kumari		2	2x15 =30

Semester 3: B. Housekeeping	<ul style="list-style-type: none"> • Layout of a guest room: Introduction, types of guest room, features in a typical room, guest amenities. • The Maid's cart: Introduction, Design of a Maid's cart. • Cleaning a room: Introduction, procedure for checking a room, making the bed • Housekeeping control desk: Role of the control desk, co-ordination with the Engineering Department, Types of Registers and files Maintained, Lost and Found, Co-Ordination with the front office, Housekeeping Supply Store, Housekeeping Furniture store, Store Requisition. 	Prabhat Sharma		3	3x15 =45
Semester 3: C. Front Office	<ul style="list-style-type: none"> • Front Office – Accounting: What is Front Office Accounting? Types of Accounts, Folios and Types, Postings and Types, Vouchers and Types, Ledger and Types, Account Settlements. • Front Office Communication: Importance of Front Office Communication, Switchboard Operators, Do's and Don'ts of Hotel Communication, Essential Attributes of Front Office Staff. • Front Office – SOPs: SOP for Handling Guest Luggage, SOP for Handling Reservation Request, SOP for Guest Check-in, SOP for Handling Wake up Calls. 	Pinki Kumari		2	2x15 =30
Semester 3: D. English Communication	<ul style="list-style-type: none"> • English Writings: Essay Writing, Report Writing, Letter Writing (Personal & Formal), CV, Surveys, Questionnaire, E-mails, Job Application, Resignation, Notices, Circulars, Memorandum, Precise, Meetings (Agenda, Minutes). • Telephone Etiquettes: Telephone 	Pinki Kumari		2	2x15 =30

	<p>Etiquettes Tips, How to answer a phone call? How to improve Telephone Etiquettes? Telephone Etiquettes to improve communication, Importance of Telephone Etiquettes.</p> <ul style="list-style-type: none"> • Personal Interview: Grooming, Tips on how to crack an Interview, Dos & Don'ts in an Interview, How to prepare for the Personal Interview. 				
Semester 3: E. Food & Beverage Production	<ul style="list-style-type: none"> • Use of Vegetables and Fruit in Cookery: Introduction, Vegetables, Pigment and Heat on Vegetables, Carbohydrate, Vegetables Fibers, Mineral, Vitamin, Pigment, and Flavour Components, Proteins, Controlling the Changes in texture, Controlling Changes in Flavour, Controlling the Colour of the Vegetables, Controlling Nutrient loss, Cuts of vegetables, Fruit, classification of a fruit, On basis of Texture and flavour, On Basis of Appearance and Flesh Content. 	Prabhat Sharma		3	3x15 =45
Semester 3: F. Food & Beverage Service	<ul style="list-style-type: none"> • Restaurant Service Equipment: Introduction, Linen, Furniture, Chinaware, Glassware, Flatware (Cutlery or Silverware), Hollowware, Types of Cutlery, Service Trolleys. • Types of Service: Introduction, English Service, French Service, American Service, Silver Service, Russian Service, Cafeteria Service, Snack Bar Service, Grill Room Service, Gueridon Service, Buffet Service, Breakfast Service. • Room Service: Introduction, types of Room Service, Room Service organization, Room Service Equipment and Layout, Room Service Workflow, Room Service Menu, Marketing and 	Prabhat Sharma		3	3x15 =45

	<p>Communication, Room Service Strategies.</p> <ul style="list-style-type: none"> • The Restaurant Service chain: The Service Chain, Payment. 				
Semester 4: Internship & Report	4 months				
Semester 5: A. Tourism	<ul style="list-style-type: none"> • Future Trends in Hospitality: Transformation of Hospitality Industry, Markets of the future, Properties of the future, Large complexes, Resort Properties, Boutique Hotels, Reservations of the Future, Check-ins of the Future, Hotel Rooms of the Future, Surge of Hotel Technology, Innovations of the Future, Hotels & Resorts by 2055, Future Dining Trends, Globalization, Professionalism, Technology, Specialization, Hygiene, Sanitation and Safety. • Future Travel Trends: Introduction, Space Travel, Sea Travel, Air Travel. • The future Guest: Introduction, Profile of Gen - Y • Customer Service: Introduction, Definition, Importance, Types of Customers, Service Behavior, Customer Need, Customer Expectations, Creating excellent Service Mindsets, Influencing customer expectations, Recovering from a bad experience, Providing unbelievable service, Customer Service and the Organization, Customer Service Before, During and After a Sale, Customer Service & Technology, Operational CRM, Collaborative CRM, Analytical CRM. • Tourism Marketing: Introduction, Meaning & Definition, Role of 	Pinki Kumari		2	2x15 =30

	Tourism Organizations in Tourism Marketing, Tourism Motivation, Tourism Market Segment, Tourism Market Mix and Strategies, Public relation in the field of Tourism.				
Semester 5: B. Housekeeping	<ul style="list-style-type: none"> • Housekeeping equipment: equipment selection, storage of equipments, types of cleaning equipments. • Cleaning methods: cleaning agents, common cleaning agents, selection of cleaning agents—general principles. Pest control, types of pesticides, pest control equipment, pest control programme. Control of odours, concept of foul odour, classification of odours, principles of odour elimination, common types of odours in hotels and modern methods to eliminate them, some general principles. Organisation of laundry department, organization structure with job descriptions, job descriptions. Laundry process flow, guest laundry procedure, house linen and uniform, Stain removal, equipment used in spotting, classification of stains, how to identify stains, stain removal agents 	Prabhat Sharma		3	3x15 =45
Semester 5: C. Front Office	<ul style="list-style-type: none"> • Front Office – SOPs: SOP for Guest Check-Out, SOP for processing Cancellation Requests, SOP for controlling Guest Room Keys, SOP for turning away Reservation Request. • Front Office – Night Audit: What is Night Audit?, The Need For Night Audit, Responsibilities of a Night 	Pinki Kumari		2	2x15 =30

	<p>Auditor, Types of Night Audit Reports, Balancing Night Reports.</p> <ul style="list-style-type: none"> • Front Office – Information System: What is a Property Management System? Why is PMS required? Types of PMS, Common Software Options in a PMS, Concerns in Selection of Appropriate PMS 				
Semester 5: D. English Communication	<ul style="list-style-type: none"> • PowerPoint Presentation • Speeches • Public Speaking 	Pinki Kumari		2	2x15 =30
Semester 5: E. Food & Beverage Production	Soups and salads, soups, classification of soups, international soups, making of a good soup, modern trends of presenting soups, salads, types of salads, various types of lettuce used in salads, oil based dressing, emerging trends in salad making, salient features of preparing good salads.	Prabhat Sharma		3	3x15 =45
Semester 5: F. Food & Beverage Service	Kitchen organization, kitchen stewarding, Methods of cooking, the role of heat/media. Stocks, categories of stocks, stocks and sauces. Sauces, thickening agents, basic sauces, preparation of basic sauces, Soups and garnishes, thin soups, thick soups, regional soups of note, soup garnishes, service of soups, Nutrition, six basic nutrients, application to food plans, Marketing of food and beverage, marketing, environment, marketing research, marketing plans, marketing mix, food promotions, internally control, promotions, promotions with other travel partner, full destination promotions, tips on planning a promotion, In-house selling, components of in-house selling.	Prabhat Sharma		3	3x15 =45
Semester 6: On the Job Training	4 months				

Dept of Nutrition (UG) B.VOC IN FOOD PROCESSING

(2021-2022)

UG	Course Code	Course Name	Total Allotted Marks	Total credit	Allotted Teacher Name	Allotted Topic /Unit	Weekly Class Hour	Total Class Hours
SEM 1	BVFPS101 T&P	BASIC PRINCIPLES OF FOOD PROCESSING & PRESERVATION	100(30T+30P+40 internal +attendance)	3	SM	all	4	
	BVFPS102 T&P	CEREAL AND PULSE PROCESSING TECHNOLOGY	100(30T+30P+40 internal +attendance)	3	SS	all	4	
	BVFPS103 T&P	LIQUID MILK PROCESSING TECHNOLOGY	100(30T+30P+40 internal +attendance)	5	AG	all	5	
	BVFPS104 T&P	FOOD ADDITIVES AND INGREDIENTS	100(30T+30P+40 internal +attendance)	3	MR	all	4	
	BVFPS105 T&P	FOOD CHEMISTRY	100(30T+30P+40 internal +attendance)	4	AM+KCG	Unit1,3 +unit2. 4,5	2+2	
SEM 2	BVFPS201 T&P	DAIRY PRODUCTS PROCESSING TECHNOLOGY	100(30T+30P+40 internal +attendance)	5	AG	all	5	
	BVFPS202 T&P	PRINCIPLES OF FOOD ENGINEERING	100(30T+30P+40 internal +attendance)	4	SS+SM	(1,2,3+ 4,5,6)	2+2	
	BVFPS203 T&P	FOOD MICROBIOLOGY AND SAFETY	100(30T+30P+40 internal +attendance)	4	MR+AM	(1,2+3, 4)	2+2	
	BVFPS204 T&P	INTRODUCTION TO COMPUTER APPLICATION AND STATISTICS	100(30T+30P+40 internal +attendance)	3	KCG	all	3	

	BVFPS205 T&P	EDUCATIONAL EXCURSION	100	2	SM			
SEM 3	BVFPS301 T&P	SANITATION AND HYGIENE	100(60T+40 internal +attendance)	2	MR	all	3	
	BVFPS302 T&P	MEAT, POULTRY & FISH PROCESSING TECHNOLOGY	100(30T+30P+4 0 internal +attendance)	4	SS	all	4	
	BVFPS303 T&P	FRUITS AND VEGETABLE PROCESSING TECHNOLOGY	100(30T+30P+4 0 internal +attendance)	4	KCG	all	4	
	BVFPS304 T&P	FATS AND OILS PROCESSING TECHNOLOGY	100(30T+30P+4 0 internal +attendance)	4	SM	all	4	
	BVFPS305 T&P	INSTRUMENTATIO N AND PROCESS CONTROL IN FOOD INDUSTRY	100(30T+30P+4 0 internal +attendance)	4	AM	all	4	
SEM 4	BVFPS401 T	FOOD LAWS, STANDARD & REGULATIONS	100(60T+40 internal +attendance)	4	MR	all	4	
	BVFPS402 T&P	BAKERY, CONFECTIONERY AND SUGAR PROCESSING TECHNOLOGY	100(30T+30P+4 0 internal +attendance)	5	SM+KC G	(Unit- 1,2,3,4, 5+6,7,8 ,9)	3+2	
	BVFPS403 T&P	FOOD BEVERAGE TECHNOLOGY	100(30T+30P+4 0 internal +attendance)	3	SS	all	4	
	BVFPS404 T&P	FOOD PLANT UTILITIES & SERVICES	100(30T+30P+4 0 internal +attendance)	4	AM	all	4	
	BVFPS405 P	EDUCATIONAL EXCURSION	100	2	SM			
SEM 5	BVFPS501 T&P	ENTREPRENEURSH IP DEVELOPMENT AND	100(30T+30P+4 0 internal +attendance)	4	MR	all	4	

		MANAGEMENT						
	BVFPS502 T&P	DOCUMENTATION IN FOOD PROCESSING	100(30T+30P+4 0 internal +attendance)	2	KCG	all	3	
	BVFPS503 T&P	FOOD INDUSTRY WASTE AND BYPRODUCT MANAGEMENT	100(30T+30P+4 0 internal +attendance)	4	AM+SM	(unit- 1,2+3,4 ,5)	2+2	
	BVFPS504 T	INDUSTRIAL SAFETY AND HAZARDS	100(60T+40 internal +attendance)	3	SS	all	3	
	BVFPS505 P	IN-PLANT TRAINING IN PRODUCT PLANT	100	5	SM			
SEM 6	BVFPS601 T	FOOD BUSINESS MANAGEMENT	100(60T+40 internal +attendance)	3	MR+KC G	Unit- 3,4+1,2 ,3)	2+2	
	BVFPS602 T&P	FOOD PLANT LAYOUT & DESIGN	100(30T+30P+4 0 internal +attendance)	4	SM	all	4	
	BVFPS603 T&P	FOOD PACKAGING TECHNOLOGY	100(30T+30P+4 0 internal +attendance)	4	SS+AM	Unit- (1,2,3+ 3,4)	2+2	
	BVFPS604 P	PROJECT	100	5	AG+AM		1	
	BVFPS605 P	SEMINAR	100	1	SS		1	
	BVFPS606 P	COMPREHENSIVE VIVA-VOCE	100	1				

Dept-Nutrition (M.Voc in Food Technology, Nutrition and Management)
2021-2022

Se m	Course	Course Conte nt & Syllab us	Details Syllabus	Allotted Teacher	Credi t Mark s	Class Allot ted per Wee k	Total Class
SE M1	FTNM 11T&P	Funda mental s of food technol ogy –I	<p>THEORY</p> <p>Unit-1</p> <p>Basic principles of food processing & preservation: Food spoilage: microbial, physical, chemical & miscellaneous. Thermal processing methods and preservation: heat resistance of microorganisms, thermal death curve. Blanching, pasteurization, sterilization, Canning of foods, heat penetration. Moisture removal: Evaporation, drying, dehydration and concentration, Principle, Methods, equipment and effect on quality: Drying curve, drying methods and type of dryers; physical and chemical changes in food during drying. Need and principle of concentration, methods of concentration, changes in food quality by concentration Preservation by salt and sugar: Pickling, fermentation, intermediate moisture foods</p> <p>Unit-2</p> <p>Principles of food engineering: Sterilizers and accessories used in canning industries; Seaming machine. Construction of cold storage; Different types of freezers including plate contact freezer, air blast freezer, cryogenic freezing and refrigerated vans. Various types of driers– Tray drier, roller drier, spray drier, fluidized bed drier, freeze drier and solar drier.</p> <p>Unit-3</p> <p>Food additives and ingredients: Food additives, Preservatives, antioxidants, colours and flavours (synthetic and natural), emulsifiers, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents, Spices- pepper, cinnamon, turmeric, fennel, chilli, cardmom (small and big), cumin, mint, ginger cloves and fenugreek. Condiments- definition. Spice oleoresins, spice essential oils, encapsulated spices (Brief) Food flavours, Flavour enhancers, their properties and toxicity, analysis of flavours, extraction techniques of flavours, Proteins, starches and lipids as functional ingredient</p> <p>Unit – 4</p> <p>Cereal and pulse processing technology: Rice: paddy processing and rice milling, quality characteristics influencing final milled products. Parboiling: rice bran stabilization and its methods; Aging of rice; Enrichment – need, methods; processed foods from wheat: break system, purification system and reduction system; extraction rate and its effect on flour composition; Quality characteristics of flour and their suitability for baking. Corn: corn milling – dry and wet milling, starch and gluten separation, milling fractions and modified starches.</p>	Sucheta Sahoo	5(3+2)	5	15*5 =75

			<p>Barley: malting and milling; Sorghum: milling, malting, pearling and industrial utilization; Millets: importance of millet, composition, processing of millets for food uses, major and minor millets; Classification and types of legumes, anti-nutritional compounds in legumes; methods of removal of anti-nutritional compounds, milling of legumes: home scale, cottage scale and modern milling methods, milling quality, efficiency and factors affecting milling; problems in dhal milling industry, Soaking and germination of pulses, Cooking quality of legumes – factors affecting cooking quality, Byproduct of pulses and their value addition.</p> <p>Unit - 5</p> <p>Milk and milk product technology: Clean milk production, annual milk production, production growth rate and per capita availability, Anand pattern, NDDB, operation flood, contribution of Kurien. Processing of market milk, UHT milk, flavoured milk, dahi, yoghurt, cream, butter, butter oil and ghee, ice cream, condensed and dried milk, malted milk powder, infant milk food, cheese (Cheddar, Swiss, mozzarella, cottage, processed cheese, cheese spread) khoa, gulabjamun, channa, rasogolla, paneer, dairy by-products, CIP.</p> <p>Unit-6</p> <p>Meat, poultry & fish processing technology: Structure of meat, muscle protein, composition of meat, Rigor mortis, post mortem changes in meat, meat slaughtering process, meat products, meat preservation, meat plant sanitization & waste disposal, meat byproducts. Processing of poultry meat, classification & composition of poultry meat, egg Processing & egg products, fish processing & fish product.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Preservation of food by high concentration of sugar i.e. jam. 2. Preservation of food by addition of chemicals i.e. tomato ketchup. 3. Preservation of food by using acidulants i.e. pickling by acid, vinegar or acetic acid 4. Calculation of freezing time for some typical foods 5. Determination of moisture in whole and ground spices. 6. Determination of total ash in spices. 7. Adulteration tests for different spices 8. Determination of starch content of cereal 9. Study on gelatinization of starch 10. Determination of amylase content of rice 11. Analysis of milk testing –MBRT, Platform tests, Detection of Fat, SNF, adulterants in milk 12. Physico-chemical and microbiological quality of different types of meat. 13. Estimation of nitrites/nitrates in processed meat products. 				
	FTNM 12	Funda mental s of Food Techn ology	<p>Unit-1</p> <p>Bakery, confectionery and sugar processing technology: Roles & pfa specification of raw materials used in bakery industry, processing of bread, biscuit, cake, pastry, cookie, crackers, pizza, pie, rusk. cane sugar processing, beet sugar, liquid sweetener, reaction of sugar, confectionary ingredients, sugar boiled confectionary, chocolate</p>	Sruti Mandal	5(3+2)	5	15*5 =75

		<p>-II</p> <p>confectionary, Indian confectionary, bakery plant layout & maintenance & hygiene, bakery equipment.</p> <p>Unit-2</p> <p>Food beverage technology: Roles of ingredients used in beverage industry, synthetic and natural beverages, dry mix beverages, sports drinks, dairy based beverages, fruit juice beverages & processing, carbonated beverages & processing, packaged drinking water processing, types of tea & tea processing, coffee processing, cocoa processing & cocoa beverages, alcoholic beverages-wine, beer, distilled spirit.</p> <p>Unit-3</p> <p>Food plant utilities and services: Introduction to food plant utilities; industrial water; steam boiler; air moving and vacuum equipment; electrical equipment; waste treatment; plant size and capacity.</p> <p>Unit -4</p> <p>Instrumentation and process control: Introduction to instrumentation and process control; hydrostatic balance measurement, temperature measurement and control, pressure measuring transducers and control, viscosity and flow rate measuring transducers, chromatographic measurement; spectrophotometric analysis.</p> <p>Unit – 5</p> <p>Documentation in food processing: Documentation and inspection of raw material in food industry. Methods of documentation for raw material to finished product. Labeling of finished products in packaging materials. Calibration and validation of different instruments, glass wares and machines and equipment Introduction and implementation of ERP, application of ERP in food industry. Statistical analysis in food industry</p> <p>Unit-6</p> <p>Industrial safety and hazards: Origin of process hazards, Laws Codes, Standards, Health hazards of industrial substances. Toxicology: Toxic materials, properties, effect of dose and exposure time, relationship. Threshold value, material safety data sheets, industrial hygiene evaluation. Fire & explosion: Fire and explosion hazards, causes and preventive methods. Flammability characteristics. Other Energy Hazards: Electrical hazards, noise hazard, radiation hazard etc.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Quality assessment: Flour (Maltose Number, Water Absorption, Sedimentation value, Alcohol Acidity), yeast, water, leavening agents. 2. Dough characteristics - determination of gluten. 3. Determination of reducing and non-reducing sugars in sugar product. 4. Chemical and microbiological analysis of raw water quality 5. Preparation fruit juice, dairy based beverages, alcoholic beverages 6. Study of various transducers for measuring temperature, pressure, specific gravity, viscosity and flow rate. 				
--	--	--	--	--	--	--

	FTNM 13	Advances in Food Bio-Chemistry and Nutrition	<p>THEORY</p> <p>Unit 1</p> <p>Physical and chemical properties of water: structure and chemical properties, hydrogen bonding, effect of hydrogen bonding on the properties of water, solute effects on water, state of water in foods, kinetic principles; water activity: principles, measurement, control, effects, related concepts; acid-base chemistry of foods and common additives</p> <p>Unit 2</p> <p>Proteins: physical properties of proteins in relation to protein structure, analytical methods; basic properties: hydration, ionization, colloidal behaviour; functional properties-denaturation, hydrolysis, changes in proteins during processing; effects of food processing: changes occurring in chemical, functional & nutritional properties of proteins; nitrite function, chemistry and nitrosamine formation. Protein as nutrient, protein quality, role in human body. Protein metabolism.</p> <p>Enzymes - criteria for purity of enzyme, Specificity, mechanism of enzyme action, factors influencing enzymatic activity, controlling enzyme action, enzymes added to food during processing, Browning reaction- Enzymatic and non enzymatic browning, advantages and disadvantages, factors affecting their reaction and control.</p> <p>Unit 3</p> <p>Lipids: Content and role in foods, analytical methods, processing of fats and oils, degradation reactions</p> <p>Physical and chemical properties - hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, Reichert-Meissl number, Polenske value, smoke point. Lipids of biological importance like cholesterol and phospholipids, fat metabolism.</p> <p>Unit 4</p> <p>Carbohydrates: simple sugars, sugar derivatives and oligosaccharides, basic chemistry, conformation, anomeric forms, equilibrium, reactivity, sweetness; sugar derivatives: sugar alcohols, glycosides, etc.; browning and related reactions; case studies – acrylamide and furan formation in foods; polysaccharides: basic structures and properties, starches, celluloses, gums, modification techniques; dietary fiber: components, properties, analysis. Nutritional importance. Metabolic processes like glycolysis, pentose phosphate pathway, TCA cycle. Oxidative phosphorylation</p> <p>Unit 5</p> <p>Vitamins: structure and properties of vitamins, distribution and morphology of vitamins in foods, changes of vitamins in food processing and storage, Regulation and control of vitamins in foods, relationship of vitamins and food quality. Deficiency of vitamins and metabolic disorders.</p>	Monalisa Roy	3(2+1)	5	15*5 =75

			<p>Unit 6</p> <p>Minerals: structure and properties of minerals, distribution and morphology of minerals in foods and processed goods, changes of minerals in food processing and storage, regulation and control of minerals in foods, relationship of minerals and food quality</p> <p>Unit 7</p> <p>Role of protein, carbohydrate and lipid in nutrition, water, minerals and vitamins in nutrition: Functions, food sources, storage in body, deficiency, bioavailability etc.</p> <p>Unit 8</p> <p>Effect of cooking and heat processing on nutritive value of food. Processed supplementary foods. Use of food in body: digestion, absorption transportation and utilization. Nutrition and its relation to obesity. Energy calculations from foods and formulation of balanced diet.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1 Estimation of moisture content in food sample 2 Estimation of reducing sugars 3 Estimation of crude fibre content 4 Estimation of protein by Kjeldahl's method 5 Estimation of total ash, water soluble and acid soluble ash 6 Extraction of fat by Gravimetric Method (Mojonnier Method) 7 Estimation of free fatty acids 8 Estimation of peroxide value 9 Estimation of iodine value 10 Estimation of saponification value 11 Refractive index of fats and oils 12 Specific gravity of fats and oils 13 Water activity 14 Calculation of normal diet 15 Calculation of liquid diet 16 Calculation of high and low calorie diet 				
	FTNM 14	Advances in Food Microbiology and Food Biotechnology	<p>THEORY</p> <p>Unit 1</p> <p>History, scope and importance of food microbiology</p> <p>Unit 2</p> <p>Microorganisms and food: Their primary sources of microorganisms in foods: Airborne bacteria and fungi, Microorganisms found in soil, Microorganisms in water, Normal flora of skin, nose, throat, GI tract</p> <p>Unit 3</p> <p>Factors affecting the survival and growth of microorganisms in food: Intrinsic factors for growth, Moisture, pH & acidity, Nutrient content, Biological structure, Redox Potential, Naturally occurring and added antimicrobials, Competitive micro flora, Extrinsic factors for growth, Types of packaging/atmospheres, Effect of time/temperature conditions on microbial growth, Storage/holding conditions,</p>	Sruti Mandal	4(2+2)	6	15*6 =90

			<p>Processing steps</p> <p>Unit 4</p> <p>Microbiological examination-Methods of Isolation and detection of microorganisms or their products in food. -</p> <p>Conventional methods - Rapid methods (Newer techniques) – Immunological methods: Fluorescent, antibody, Radio immunoassay, ELISA etc. – Chemical methods PCR (Polymers chain reactions), RT PCR, Microchip based techniques</p> <p>Unit 5</p> <p>Microflora of Fresh Food:Meat, Poultry, Eggs, Fruits and vegetable, Shellfish and Fish, Milk, Microbial Spoilage of Food, Fresh Foods, Fresh Milk, Canned Foods</p> <p>Unit 6</p> <p>Food Preservation and application to different types of foods: Physical methods –, Drying, freeze-drying cold storage, heat treatments(pasteurization, UHT), TDT, TDP, D-value, Z-value, F-value, 12-D concept Irradiation (UV, microwave, ionization), high pressure processing, Aseptic packaging, modified atmosphere, Chemical preservatives and Natural antimicrobial compounds. Biologically based preservation systems</p> <p>Unit 7</p> <p>Food borne infections and diseases: Significance to public health food hazards and risk factors, Bacterial, and viral food-borne disorders, Food-borne important animal parasites, Mycotoxins. - Bacillus, Campylobacter, Brucella, Staphylococcus, Clostridium, E.coli, Aeromonas, Vibrio cholerae, Listeria, Mycobacterium, Salmonella, Shigella</p> <p>Unit 8</p> <p>Cheese fermentation technology, Traditional fermented food products- pickle, sauerkrauts, kishk, raabadi, temph, meso, idli, sausages, mistidahi etc. prebiotics with probiotics, water activity, intermediate moisture food. Factors affecting microbiological quality of food, food preservation by heating cooling and drying, microbiological food safety in food industry, Use of DVS culture for preparation of fermented milk product, importance of UHT milk</p> <p>A. Advances in Food Biotechnology</p> <p>Unit 1: Advances in preservation of food by various biotechnological process.</p> <p>Unit 2: technology on fermented food for fruits, vegetables, cereals, legumes, milk, meat, fish etc. Role of LAB on preservation of food items.</p> <p>Unit 3: Extraction and clarification of fruit vegetable juice by enzymes.</p> <p>Unit 4: Fermentative production of enzymes like amylase, protease, pectinase, glucose isomerase, glucose oxidase, cellulase, xylanase, lipases etc.</p> <p>Unit 5: purification of enzymes by down stream processing. Production of alcohol, lactic acid and acetic acid from various food materials.production of alcohol and brewing process in alcoholic beverages.</p> <p>Unit 6: Treatment for waste from food industries by biotechnological application, improvement of quality of food by biotechnological process.</p>				
--	--	--	---	--	--	--	--

			<p>Unit 7: bacteriocine production and uses in food preservation, biotechnological process for food fortification, prebiotics and oligosaccharides.</p> <p>Unit 8: Central dogma of molecular genetics, mutation, common recombination processes like conjugation, transduction, transformation, plasmid and phage vector in advances in biotechnology.</p> <p>PRACTICAL</p> <p>1 Preparation of common laboratory media and special media for cultivation of bacteria, yeast & molds.</p> <p>2 Staining of Bacteria: Simple staining, Gram's staining, Negative staining, acid -fast, spore, capsule, Motility of bacteria, Staining of yeast and molds.</p> <p>3 Isolation of microorganisms: Different methods and maintenance of cultures of microorganisms.</p> <p>4 Bacteriological analysis of Foods using conventional methods</p> <p>5 Coli forms analysis of milk and water samples by Most Probable Number (MPN) method</p> <p>6 To perform various biochemical tests used in identification of commonly found bacteria in foods: IMVIC, urease, H 2S, Catalase, coagulase, gelatin and fermentation (Acid/gas)</p> <p>7 Determination of thermal death characteristics of bacteria</p> <p>8 Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products.</p> <p>9. Starter Culture Activity and Purity Test</p> <p>10. Detection of some pathogenic bacteria like Staphylococcus aureus, Salmonella typhi, Bacillus cereus etc.</p> <p>11. Enumeration of microorganisms in air</p> <p>12. Visits (at least two) to food processing unit or any other organization dealing with advanced methods in food microbiology.</p>				
	FTNM15	Functional Foods and Nutraceuticals	<p>THEORY</p> <p>Unit -1</p> <p>Definition, classes of functional foods, status of functional foods in world and India. Concept of new product development, classes of nutraceuticals and functional foods. Safety; marketing strategy and consumer response; economic analysis and costing of novel foods, recent advances in different categories and type of dairy product. Regulatory issues for nutraceuticals including CODEX</p> <p>Unit -2</p> <p>Nutritional status and dietary requirement of different target group and deficiency diseases, in special reference to micronutrients. Dietary and therapeutic significance of dairy nutrients, bioactive components in dairy products like lactose, whey proteins, milk minerals, CLA, fermented milks etc.</p>	Apurba Giri+ Sucheta Sahoo	4(2+2)	6	15*6=90

			<p>Unit - 3</p> <p>Food fortification, techniques for fortifying dairy foods with minerals and vitamins, High protein foods prospective nutraceuticals for fortification of dairy foods. Nutritional significance of dietary fibers, classes of dietary fibers, fortification techniques for fibers in dairy foods.</p> <p>Unit - 4</p> <p>Infant nutrition and dietary formulations for meeting normal and special needs of infants, current status of infant foods, additives for infant foods. Foods for aged persons, design consideration, ingredients for geriatric foods.</p> <p>Unit - 5</p> <p>Technological aspects of reduced calorie foods, alternatives for calorie reduction, low calorie sweeteners, bulking agents and their application, fat replacers and their utilization in low calorie dairy foods.</p> <p>Unit - 6</p> <p>Nutritional and health significance of sodium in foods, Alternatives for sodium in foods, techniques for reducing sodium in processed dairy foods. Bio-flavours and flavour enhancers.</p> <p>Unit - 7</p> <p>Sports foods, ingredients for sports foods, dairy components in sports foods, sports drinks, design consideration, ergogenic aids in sports nutrition.</p> <p>Unit - 8</p> <p>Herbs, various classes of herbs, their therapeutic potential and application in foods with special reference to dairy products like functional drinks, herbal ghee etc.</p> <p>Unit - 9</p> <p>Prebiotic substances and their utilization in functional foods, symbiotic foods, technological aspects and recent development in probiotics, prebiotics and synbiotics.</p> <p>Unit - 10</p> <p>Definition and various classes of phytochemicals, their role in CVD, Cancer and immune system enhancer, utilization in functional foods, phytoestrogens, glucosinolates, lycopene, isoflavonoids, glucosamine, organosulphur compounds, flavonoids, chatchins, tannins carotenoids, Phytoestrogens, phytosterols, pigments (lycopene, carcurmin)etc. Phytatics ,Protease inhibitors, amalyse inhibitors, Heamagglutinins, Saponins. Non nutrient effect of PUFA and MUFA, Vitamins and Mineral as proteins, Peptides and Neucleotides</p> <p>Unit - 11</p> <p>Functional foods and nutraceuticals for management of cholesterol, CVD, cancer, IBD, diabetics, obesity, joint pain, age-related macular degeneration, endurance performance, persons suffering with milk</p>				
--	--	--	---	--	--	--	--

		<p>allergy and lactose intolerance with special emphasis on dairy nutrients and foods, mechanisms of action, dosage levels</p> <p>Unit - 12</p> <p>Nutrients as gene modulators: Its effect on puberty, reproduction, Polycystic Ovary and nutritional management. Mechanism of action of Xenoestrogen, Food sources of xenoestrogen, Nutrigenomics, Epigenetics</p> <p>Unit - 13</p> <p>Foodomics, Nutrigenomics, nutrimetabolomics, and nutriproteomics</p> <p>Unit - 14</p> <p>Food Nanotechnology: Functionality and applicability of food nanotechnology, Nanocarrier systems for delivery of nutrients and supplements, Nanocoatings on food contact surfaces, Safety concerns</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Determination of total fiber, neutral detergent fiber in foods 2. Manufacture of fiber enriched milk beverage 3. Manufacture of low calorie burfi/ice cream 4. Preparation of flavoured milk using artificial sweetener and its estimation 5. Determination of antioxidant activity of food/food components 6. Determination of bioavailability of nutrients 7. Development of malted milk food and weaning food 8. Determination of β-galactosidase activity and application of lactases for lactose free dairy products 9. Determination of prebiotic potential of certain plant/milk components and their application in synbiotics dairy foods 10. Preparation of sports beverage, herbal dairy drinks 11. Preparation of high protein products 12. Identification and estimation of lycopene 13. Identification and estimation of carotene 14. Determination of total antioxidant capacity of selected nutraceuticals 15. Determination of gamma oryzanol content in rice bran oil 16. Determination of tocopherol content in rice bran oil 17. Determination of tannin content, ascorbic acid content in aonla juice 18. Development of protein enriched biscuits as a functional food 19. Production of functional food for diabetic patient 20. Determination of dietary fibre content in selected functional food 21. Preparation of symbiotic yoghurt/ dahi and its sensory and microbiological evaluation 22. Production of flavonoid rich food product and evaluation of flavonoid content in it 23. Development of labels for health foods 24. Production of carotenoids from pumpkin powder 25. Production of ginger and turmeric oleoresins and their used in food products 26. Visit to Functional food/ Nutraceuticals manufacturing industry 				
--	--	--	--	--	--	--

	FTNM16	Communication skill development	PRACTICAL Communication Skills -Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.	Apurba Giri	3(0+3)	4	15*4=60
	FTNM17	Computer skill development	Computer skills – Components of computer, MS-Word, MS-Excel, MS-PowerPoint, Internet, typing	Monalisa Roy	3(0+3)	4	15*4=60
	FTNM18	Industrial training/Excursion			3(0+3)		
	FTNM21	Advances in food processing –I	THEORY Unit - 1 Status of food processing industry in India and abroad; prospects and constraints in development of Indian food industry. Unit - 2 Post-harvest management of fruits and vegetables, Harvesting indices, Biochemical and physical changes during ripening of fruits & vegetables, respiration and factors affecting it, role of ethylene in accelerated ripening, storage of agricultural produce, Factors affecting shelf life of agriculture produce as well as products post-harvest treatments for extension of shelf-life of fresh produce, Strategic interventions to minimize postharvest losses including vapour heat treatment, wax coating, chemicals, etc.Advances in fruits and vegetable selection, grading, sorting, blanching and other pre-processing steps in automation of processing line Storage of grains, biochemical changes during storage, production, distribution and storage capacity estimate models, storage capacity models, ecology, storage factors affecting losses, storage requirements. Bag and bulk storage, godowns, bins and silos, rat proof godowns and rodent control, method of stacking, preventive method, bio-engineering properties of stored products, function, structural and thermal design of structures, aeration system.Physical factors influencing flow characteristics, mechanics of bulk solids, flow through hoppers, openings and ducts; recent advances in handling of food materials, Grain markets, storage pests and control, BIS/FSSAI standards. Unit -3 Principles of chilling & refrigeration storage of foods, quality	Sucheta Sahoo + Apurba Giri	4(2+2)	6	15*6=90

		<p>changes in cold stored products, controlled and modified atmospheric storage. Freezing of foods, defects in frozen foods, re-crystallization, freezing of fruits and vegetables, freeze concentration of fruit juices.</p> <p>Unit - 4</p> <p>Application of heat energy to foods for preservation and processing</p> <p>UNIT - 5</p> <p>Basic principles involved in fermentation, Technological aspects of pickled vegetables like sauerkraut, cucumbers, Technology of wine, beer and distilled alcoholic beverages, defects in alcoholic beverages.</p> <p>Unit - 6</p> <p>Advances in milling of rice (solvent extractive milling) and Turbo milling of wheat. Bakery products; role of ingredients, changes during processing of bakery products. Utilization and importance of dairy ingredients in bakery products.</p> <p>Unit - 7</p> <p>Definition, classification and technologies of fabricated and formulated foods and their nutritional aspects. Imitation dairy products and dairy analogues. Principle of extrusion processing, design and working of extruder, classification, application in food and dairy processing. Food additives, including stabilizers, emulsifiers, antioxidants, preservatives, etc. for formulated foods.</p> <p>Unit - 8</p> <p>Important group of enzymes involved in food processing; Application of enzymes in food processes like enzymes juice extraction, juice clarification, in bread manufacture, meat tenderization, ice cream manufacture, de-sugaring of egg, etc.</p> <p>Unit - 9</p> <p>Membrane Technology in Food Processing:</p> <p>Membrane techniques: Introduction, principle and classification. Physical and chemical characteristics of membrane, components of a membrane processing system. Construction materials of membrane-cellulosic and non-cellulosic membrane, configuration of membranes. Techniques for membrane preparation. Functionality and selection of membrane, Applications of membranes for concentration and separation of food products. Factors affecting membrane fouling, flux enhancement and fouling control. Membrane maintenance-Physical and chemical cleaning</p> <p>Ultrafiltration and Nano filtration: concept and working principle Vs conventional filtration, Application in the food industry- fruit juices, soy sauce, vegetable oil. Reverse osmosis, and microfiltration: concept and working principle, Application in the food industry- fruit juices, milk. Whey processing soy sauce, vegetable oil. Developments in the manufacture and utilization of food grade lactose from UF permeate. Use of membrane in preparation of-organic acids, biopolymers, vitamins, amino acids, low lactose powder, casein etc. Membrane technology for food processing waste treatment, membrane bioreactor and its application Emerging application of</p>				
--	--	---	--	--	--	--

			<p>membrane processing(osmo-distillation): Introduction, concept and working Various commercial application and future trends</p> <p>Unit - 10</p> <p>Newer concepts in food processing including organic foods, processing of organic raw material, genetically modified foods.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Determination of quality and maturity indices of selected foods 2. Measurement of respiration of fruits/grains in the laboratory and determination of shelf life 3. Determination of effects after different postharvest treatments 4. Study of evaporative cooling and cold storage systems for selected fruits and vegetables 5. Determination of WVTR & GTR in different packaging materials 6. Visits to traditional storage structures, CA storage , cold storage 7. Shelf life evaluation of packaged food products 8. MAP and its effect on shelf-life of fresh fruits and vegetables 9. Preparation of squash, cordial, nectar and whey beverages, whey based soups 10. Manufacture of bread, pizza base, biscuits and cake 11. Application of milk ingredients in caramel, egg-less cake, mayonnaise 12. Canning of fruits & vegetables 13. Manufacture of chicken soup, comminuted meat products 14. Enzymatic extraction and clarification of fruit juices 15. Preparation of soymilk and tofu 16. Drying of fruits & vegetables, efficacy of blanching treatment 17. Manufacture of sauerkraut/fermented vegetables 				
	FTNM2 2	Advances in food processing – II	<p>THEORY</p> <p>Unit -1</p> <p>Emerging technology in food processing- HPP, PEF, Ultra sound. Supercritical fluid extraction: Concept, property of near critical fluids NCF and extraction methods. Application of SCFE in food processing</p> <p>Unit -2</p> <p>Microwave and radio frequency, IR drying: Definition, Advantages, mechanism of heat generation, inductive heating in food processing and preservation. Application in food processing: microwave blanching, sterilization and finish drying. Hurdle technology: Types of preservation techniques and their principles, concept of hurdle technology and its application.</p> <p>Unit -3</p> <p>High Pressure processing: Types of equipment, mechanism of microbial inactivation Effect of HPP on -fruit juices, meat products, jam Ultrasonic processing: Properties of ultrasonic, types of equipment, effect of ultrasonic treatment on microbial inactivation, oil yield etc.</p>	Sruti Mandal	4(2+2)	5	15*5 =75

			<p>Unit -4</p> <p>High intensity light generation system, Application of high intensity light in food processing, Pulse electric field-mechanism of inactivation, PEF generation system, PEF treatment chambers, Mechanism of ohmic heating and its application in liquid food processing, Principle of cold plasma technology and its generation systems and its application Nanotechnology: Principles and its applications in foods.</p> <p>Unit -5</p> <p>Cryogenic grinding- Properties of cryogens, systems, and their different applications</p> <p>Unit -6</p> <p>RTE Food products; Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes. Coated & enrobing grains-salted, spiced and sweetened. Flour based snack– batter and dough based products; <i>savouryandfarsans</i>; formulated chips and wafers, papads.</p> <p>Technology for coated nuts – salted, spiced and sweetened products-<i>chikkis, Sing bhujia</i>. Technology of ready to eat fruits and vegetable based food products like, sauces, fruit bars, glazed candy etc. Technology of ready to eat canned value added fruits/vegetables and mixes and ready to serve beverages etc. Technology for ready-to-cook food products- different puddings and curried vegetables etc. Technology for ready-to-cook and ready to eat meat and meat food products</p> <p>Technology of ready- to- eat baked food products, drying, toasting roasting and flaking, coating, chipping.</p> <p>Extruded snack foods: Formulation and processing technology, colouring, flavouring and packaging Products and Byproduct of cereal and millets: infant foods from cereals and millets, breakfast cereal foods – flaked, puffed, expanded, and shredded products, etc.</p> <p>Technology for preparation of instant cooked rice, carrot and other cereals based food products. Technology of ready to eat instant premixes based on cereals, pulses etc.</p> <p>Technology for RTE puffed snack- sand puffing, hot air puffing, explosion puffing, gun puffing etc. Technology for preparation of traditional Indian dairy products</p> <p>Unit -7</p> <p>Applications of nanotechnology in food technology and nutrition</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. To evaluate the characteristics of treated water using RO system 2. To carry out ultrafiltration study on fruit juices 3. To carry out nanofiltration study on liquid foods 4. To study super critical fluid extraction system and to carry out extraction of eugenol from Basil leaves 				
--	--	--	--	--	--	--	--

			<ol style="list-style-type: none"> 5. To carry out extraction of lycopene from tomato using SCFE system 6. To study microwave system and to evaluate the effect of different power on drying characteristics of selected vegetable product 7. To study microwave blanching of fruits and vegetable and determination of blanching efficacy 8. To study the ultrasonicator and evaluate the effect of ultrasonication on micro-organism present in idli batter 9. To study the ultrasonicator and to evaluate the effect of ultrasonication on extracted juice yield from fruit pomace 10. To evaluate the different pre-treatment on oil yield from oil seed cake 11. To study cryogenic grinding of selected spices 12. To compare the yield and quality of bioactive compounds obtained from cryogenically ground spice 13. To prepare nano emulsion and study of their characteristics 14. To study ohmic heating system and to study the processing of fruit pup using ohmic heating system 15. Determination of Hardness in water. 16. Determination of Chloride content in water. 17. To visit food industries utilizing advance food processing techniques 				
	FTNM2 3	Advances in food packaging	<p>THEORY To impart basic and advanced knowledge in food packaging.</p> <p>Unit- 1 Status of current packaging; types of packaging materials; criteria for selection of proper packaging; testing of packaging materials.</p> <p>Unit - 2 Adhesives; graphics; coding, and labeling used in food packaging.</p> <p>Unit - 3 Protective packaging of foods; packaging of food products sensitive to oxygen, light, moisture; active packaging; special problems in canned foods.</p> <p>Unit - 4 Packaging of dairy products; packaging of convenience foods, packaging of fruits, vegetables, and fruit juices.</p> <p>Unit - 5 Packaging of fats and oils; packaging of spices; packaging of meat and poultry; packaging of fish and other seafoods.</p> <p>Unit - 6 Modified atmosphere packaging, controlled atmosphere packaging, shrink and stretch packaging.</p> <p>Unit - 7 Retort pouch technology, microwavable, biodegradable, and edible packages.</p> <p>Unit - 8 Industrial packaging: unitizing, palletizing, containerising, distribution systems for packaged foods including prevention of shock damage to articles during transportation</p> <p>Unit - 9 Safety aspects of packaging materials; sources of toxic materials and migration of toxins into food materials.</p> <p>Unit –10 Active and intelligent packaging systems, Advances in Active packaging techniques and Intelligent packaging techniques. Current use of novel packaging techniques in different food products,</p>	Sruti Mandal	3 (2+1)	5	15*5 =75

		<p>consumers acceptance of novel food packaging</p> <p>Unit –11</p> <p>Oxygen and ethylene, scavenging technology, concept and its food applications. Carbon dioxide, odor and flavour absorber and other scavengers, ethanol emitters and preservative releaser, and their food packaging uses. Antimicrobial food packaging: concept and mechanism, Factors affecting the effectiveness of antimicrobial packaging.</p> <p>Unit –12</p> <p>Non-migratory bioactive polymers (NMBP) in food packaging, Advantages and limitations. Inherently bioactive synthetic polymers: types and applications, Polymers with immobilized bioactive compounds.</p> <p>Unit –13</p> <p>Time-temperature indicators (TTIs), Definition and classification of TTIs, Requirement, development and current TTI systems, effectiveness of TTIs, Application of TTIs- to monitor shelf-life, and optimization of distribution and stock rotation</p> <p>Unit –14</p> <p>Packaging-flavour interactions, Factors affecting flavour absorption, Role of the food matrix and different packaging materials. Case studies: Packaging and lipid oxidation, Modelling lipid oxidation and absorption. Shelf life evaluation of packaged food</p> <p>Unit –15</p> <p>Permeability properties of polymer packaging, measurement of permeability – water and gases. Selection criteria of packaging films. Novel MAP gases, Testing novel MAP applications, Novel MAP applications for fresh and prepared food products,</p> <p>Unit –16</p> <p>Aseptic packaging technology-advances, systems and its food applications, packaging for high pressure processing</p> <p>Unit –17</p> <p>Process of packaging: bottling, canning, labelling form fill sealed and cartooning machineries, vacuum and gas packaging, CAP, lined cartooning, system. PET, pre form, tetra pack, flash 18 process, biocomposite and alternative packaging.</p> <p>Unit –18</p> <p>Packaging standards and regulation: laws, specifications and quality control, collection, separation, disposal and recycling of packaging materials. Effect of packaging materials on environment.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Testing of packaging materials for quality assurance like determination of thickness, GSM, bursting strength, tearing resistance, puncture resistance, Dart impact test, Scotch test 2. Estimation of shelf life of vegetables and seasonal fresh fruits; 3. Packaging of turmeric powder and ground red chilli powder, 4. Vacuum packaging of dairy products. 5. Determination of WVTR in different packaging materials 6. Determination of GTR in different packaging materials. 7. Development of ethylene scavengers for fresh fruits and vegetables 8. Development of oxygen scavengers systems for food products 9. Application of anti-microbial packaging for moisture sensitive foods 10. Evaluation of chemical residue migration from package to food 11. Application of MAP packaging in selected foods 				
--	--	---	--	--	--	--

			12. Study of time temperature indicators 13. Determination of oxidative changes in packaged foods 14. Comparative evaluation of flexible and rigid packages for fragile foods 15. Packaging of foods under inert atmosphere. 16. To study textural characteristics of selected fruit/ vegetable under MAP storage 17. Shelf life evaluation of packaged food product. 18. Study of aseptic packaging system 19. Determination of oil and grease resistant test for packaging films 20. Determination of respiration rate in fresh fruits and vegetables 21. Visit to food packaging material manufacturing industry				
	FTNM2 4	Food quality manag ement system s	THEORY Unit - 1 Introduction to food - its nutritional, technological and safety aspects. Introduction to Indian legal system, an overview of food regulations in India. Food safety and standards act and role of FSSAI. Various food plant inspection bodies and legislations. Unit - 2 International Standards: Codex Alimentarius: Structure of organization, standards related to Indian foods. Unit - 3 Introduction to food safety: definition, food safety issues, factors affecting food safety, importance of safe foods. Shelf life of food products: factors affecting shelf life and methods to check the shelf life. Unit - 4 Food contaminants of natural origin- seafood toxins, toxic amino acids and others. Indirect additives: pesticides, pesticide residues, metallic contamination, radionuclides, other adulterants. Unit - 5 Good Hygienic Practices (GHP), Good Manufacturing Practices (GMP), Food Safety Plan, Food Safety Management Risk Analysis. Traceability, food product recall. Unit - 6 Food safety Management Systems: ISO 22000: Importance of implementing a HACCP system and how it can be applied to various products, develop a HACCP plan including a HACCP team, produce product workflow diagrams for a range of products and their verification processes etc. Audits: Introduction, objectives, documentation, responsibilities, management review, audit certification and its importance etc. Unit - 7 ISO 14000: Introduction, various standards among 14000 series, certification and its importance, various clauses of 14001. ISO 17025 - General requirements for the competence of testing and calibration laboratories. ISO 9000 – Quality Management System	Monalisa Roy	3 (2+1)	5	15*5 =75

		<p>Unit - 8</p> <p>Good agricultural practices for crops, land animals, human beings, finished goods etc. Good manufacturing practices: Concept, current problems in food industry and solutions using good manufacturing practices.</p> <p>Unit - 9</p> <p>World Trade Organization (WTO), Sanitary and Phytosanitary Measures and Technical Barriers to Trade, Food and Agriculture Organization (FAO), World Health Organization (WHO), World Animal Health Organization, International Plant Protection Convention (IPPC) Export – Import of Food.</p> <p>Unit – 10</p> <p>Six sigma, 5-S, Kizen</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Preparation of quality manual of a food company 2. Shelf life study of any food product. 3. Study of food regulations in various countries 4. Study of nutritional labeling of packaged food items by visiting food market, 5. Visit the websites of FSSAI, BIS, AGMARK, ISO, Codex Alimentarius Commission, USFDA 6. HACCP plan for any food industry 7. Licensing and registration process 8. Adulteration test of food sample [Physical test, chemical test, DART (Detect adulteration with rapid test)] 9. Methods to eliminate anti-nutritional factors from foods 				
	FTNM2 5	<p>Mechanical operation and chemical engineering fundamentals</p> <p>THEORY</p> <p>Unit 1</p> <p>Engineering properties of biological materials and their significance in equipment design; processing and handling of products.</p> <p>Unit 2</p> <p>Fluid flow operations: food rheology, mechanical energy balance, piping system, flow measurement and pumping equipment</p> <p>Unit 3</p> <p>Mechanical processing: Size reduction, size enlargement, mixing and forming, conveying of solids and separations.</p> <p>Unit 4</p> <p>Heat transfer: coefficients, heat exchangers, electrical/radiation heating and applications</p> <p>Unit 5</p> <p>Mass transfer: vapour/liquid equilibria, distillations, solvent extraction, gas/liquid absorption, adsorption and ion exchange, crystallization and osmo concentration of food</p> <p>Unit 6</p> <p>Thermal processing: kinetics of thermal inactivation, heat transfer considerations, equipment, in-container sterilization, continuous-flow sterilization, pasteurization, baking, roasting and frying.</p>	Sayan Das	4(2+2)	5	15*5 =75

			<p>Unit 7</p> <p>Drying: Psychrometrics, drying kinetics, dryer design, drying equipment, energy efficiency in drying</p> <p>Unit 8</p> <p>Process analysis: spreadsheet applications, heat exchanger problem formulation & solution, psychrometric calculation, fitting curves and statistical quality control</p> <p>Unit 9</p> <p>Electrical conductivity of the fluid, Theory of electrolytic activity, dielectric properties of basic food principle, Assessment of Food quality using dielectric properties.</p> <p>Unit 10</p> <p>Hydraulic separation and expansion-mechanics of settling, Hydraulic pressing, heavy media separation, elutriation and tabling.</p> <p>Unit 11</p> <p>Sedimentation and flocculation- free and hindered settling, thickening, counter current decantation , flow through packed bed and pressure drop calculations, flocculation and flocculating agents.</p> <p>Unit 12</p> <p>Basic concepts of Filtration and centrifugation.</p> <p>Unit 13</p> <p>Mixing of solids, liquids and slurries- agitating, kneading, blending and homogenizing.</p> <p>PRACTICAL</p> <p>1 Determination of particle density / true density, bulk density and specific gravity of solid grains / fruits and vegetable</p> <p>2 Determination of coefficient of friction, angle of internal friction and aerodynamic property (Terminal Velocity) of grain sample</p> <p>3 Determination of viscosity of food materials</p> <p>4 Study of various types of heat exchangers</p> <p>5 Mixing – determining \mixing parameters</p> <p>6 Chemical kinetics in food processinga) Determining rate constants of zero, first order reactions and half-life of reactions</p> <p>7 Microbial destruction in thermal processing of foodsa) Determining decimal reduction time from microbial survival datab) Thermal resistance factor, z-value, in thermal processing of foodsc) Determining process lethality for conduction heating food with a microorganism with a z-valued) Determining center and mass-averaging sterilizing value for a thermal process</p> <p>8Mechanical transport of liquid foodsa) Measuring viscosity of liquid foods using a capillary tube viscometerb) Rheological properties of power law fluids</p> <p>9 Steady state heat transfer in food processinga) Reducing heat transfer through a wall using insulation b) Selecting insulation to reduce heat loss from cylindrical pipesc) Convective heat transfer coefficient in laminar flow conditionsd) Convective heat transfer coefficient in turbulent flow conditions</p>				
--	--	--	--	--	--	--	--

			<p>10 Transient heat transfer in food processinga) Predicting temperature in a liquid food heated in a steam jacketed kettleb) Transient heat transfer in spherical shaped foodsc) Transient heat transfer in a cube</p> <p>11 Solving simultaneous equations in designing multiple-effect evaporators</p>				
	FTNM2 6	Food plant layout and management	<p>Food Plant Layout and Management</p> <p>Unit- 1</p> <p>Introduction: definition, basic concepts of plant layout and design with special reference to food process industries. Application of haccp concept, iso, fpo&mpo requirements in food plant layout and design.</p> <p>Unit -2</p> <p>Plant location: influence of location on plant layout, location factors, location theory and models, economic plant size, types of manufacturing processes like continuous, repetitive and intermittent processes.</p> <p>Unit -3</p> <p>Plant layout: preparation of a plant layout, plant layout problem, importance, objectives, classical types of layouts. Evaluation of layout. Advantages of good layout</p> <p>Unit - 4</p> <p>Plant building: considerations in building design, type of factory buildings, choice of building construction, material for floors, foundation, walls, doors, windows, drains etc, ventilation, fly control, mold prevention and illumination in food processing industries.</p> <p>Unit -5</p> <p>Plant layout& Equipment Layout: Plant layout and design of bakery and biscuit industries; fruits and vegetables processing industries including beverages; milk and milk products; meat, poultry and fish processing industries.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Preparation of project report 2. Preparation of feasibility report Layout of food storage wares and godowns 3. Visit to food storage wares and godowns 4. Layout and design of cold storage 5. Visit to cold storage plant 6. Layout of preprocessing house 7. Layout of milk and milk product plant 8. Visit of milk processing plant Layout and design of bakery and related product plant 9. Visit to bakery unit 10. Layout and design of fruit processing plant 11. Layout and design of vegetable processing plant 12. Visit to fruit and vegetable processing plant Design and layout of multiproduct and composite food plant <p>Waste treatment and management of food plant</p>	Sruti Mandal	3(1+2))	5	15*5 =75

	FTNM2 7	Research methodology and statistics	<p>THEORY</p> <p>Experimental Designs</p> <p>UNIT I Need for designing of experiments, characteristics of a good design. Basic principles of designs- randomization, replication and local control.</p> <p>UNIT II</p> <p>Uniformity trials, size and shape of plots and blocks; Analysis of variance; Completely randomized design, randomized block design and Latin square design.</p> <p>UNIT III</p> <p>Factorial experiments, (symmetrical as well as asymmetrical). orthogonality and partitioning of degrees of freedom, Confounding in symmetrical factorial experiments, Factorial experiments with control treatment.</p> <p>UNIT IV</p> <p>Split plot and strip plot designs; Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications ~ Lattice design, alpha design - concepts, randomisation procedure, analysis and interpretation of results. Response surfaces.Experiments with mixtures.</p> <p>UNIT V</p> <p>Bioassays- direct and indirect, indirect assays based on quantal dose response, parallel line and slope ratio assays potency estimation.</p> <p>UNIT VI</p> <p>Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.</p> <p>Statistics</p> <p>Unit 1</p> <p>Applications of statistical procedures in food processing, Descriptive statistics, Analysis of differences, Types of significance test, Association, correlation and regression and Experimental design</p> <p>Unit 2</p> <p>Sensory and consumer data: Introduction, The quality and nature of sensory and consumer data, Experimental design issues, Consumer data (sensory and survey), Trained panel sensory data, Analysis of relationships</p> <p>Unit 3</p> <p>Instrumental data: Introduction, Quality and nature of instrumental data, Sampling and replication, Experimental design issues, Statistical analysis of instrumental data, Chemical analysis applications,</p>	Apurba Giri	4(1+3)	5	15*5 =75
--	------------	-------------------------------------	---	----------------	------------	---	-------------

			<p>Analysis of relationships</p> <p>Unit 4</p> <p>Food product formulation: Introduction, Design application in food product development, Single ingredient effects, Two or more ingredients, Screening of many ingredients, Formulation by constraints</p> <p>Unit 5</p> <p>Statistical quality control: Introduction, Types of statistical quality control, Sampling procedures, Control charts, Acceptance sampling</p> <p>Unit 6</p> <p>Multivariate applications: Introduction, Multivariate methods and their characteristics, Multivariate modes, Relationship of consumer preference with sensory measures</p> <p>Unit 7: Correlation analysis, regression analysis, test of hypothesis, Chi-Square test, F-test, Non-parametric test, t-test, one way ANOVA, Two way ANOVA, quantification of experimental data by statistical method like Response Surface methodology, use of Design expert, use of ORIGIN, use of ms Excel in statistical aspects.</p> <p>Unit 8</p> <p>Principal component analysis, Chemometrics, Partial least square, Response surface methodology, Mixture design, Fractal analysis, Cluster analysis, ANN and Fuzzy logic</p>				
	FTNM28	Technical writing	<p>PRACTICAL</p> <p>Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article</p>	Apurba Giri	2(0+2)	3	15*2=30
	FTNM29	Industrial training/Excursion		Sruti Mandal	3(0+3)		
	FTNM31	Sensory evaluation	<p>THEORY</p> <p>Unit -1</p> <p>General testing conditions, Requirements of sensory laboratory; Organizing sensory evaluation program, Development of sensory testing, human subjects as instruments (test design, instrumentation, interpretation of results)</p> <p>Unit -2</p> <p>Sensory attributes, appearance (colour, size and shape, surface</p>	Monalisa Roy	3(2+1)	3	15*3=45

		<p>texture, clarity, carbonation), odour/ aroma/ fragrance, consistency and texture, noise Human senses (sense of vision, sense of touch, olfactory sense, sense of taste, sense of hearing)</p> <p>Unit -3</p> <p>Test controls, test room design, location, the booth, descriptive analysis and training area, preparation area, storage. General design factor, colour and lightning, air circulation, temperature and humidity, construction material. Sample preparation, supplies and equipment, materials, preparation procedure, sample preparation, order, coding, number of samples, product sampling</p> <p>Unit -4</p> <p>Panelist control, Panel training orientation, Factors affecting sensory verdicts, physiological factors, psychological factors, poor physical condition,</p> <p>Unit -5</p> <p>Different tests for sensory evaluation, Difference (Qualitative test: Paired comparison, duo-Trio, Triangle test). Rating (Quantitative: Ranking, single, two and multiple sample, hedonic, Numerical scoring, composite), Sensitivity (Threshold, dilution)</p> <p>Unit -6</p> <p>Applications and Advances in Electronic-Nose Technologies, Aroma Types and Characteristics, Conceptual Development of the Electronic Nose and instrumentation, Data Analysis for Electronic Noses, E nose applications. Electronic tongue</p> <p>Unit -7</p> <p>Computer-aided sensory evaluation of food & beverage, statistical analysis of sensory data.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1. Selection and training of sensory panel 2. Detection and threshold tests 3. To study the masking effect of different taste 4. To study Paired comparison test 5. To study Duo-Trio test 6. Ranking tests for taste, aroma colour and texture 7. To study hedonic rating test 8. Sensory evaluation of various food products using hedonic scales 9. Sensory evaluation of various food products using different scales, score cards and tests 10. Sensory evaluation of various food products using fuzzy logic 11. Objective estimation of color and texture 12. Subjective estimation of color and texture 13. To study single sample test 14. Statistical analysis of single sample test 15. To study two sample difference test 16. Statistical analysis of single sample test 					
	FTNM3 2	Food emulsions, foams, gels and food rheology and micros	<p>THEORY</p> <p><i>A. Technology of Food Emulsions, Foams and Gels</i></p> <p>UNIT -1</p> <p>Food dispersions, their characteristics and factors affecting food dispersions.</p> <p>UNIT -2</p> <p>Food emulsions- conventional and nano emulsions; emulsifiers and their functions in foods; HLB concept in food emulsifiers; Emulsion formation and stability; Examples of emulsions in food- mayonnaise,</p>	Sruti Mandal	5(4+1)	5	15*5 =75

		<p>structure</p> <p>sauce, beverages Polymers and surfactants.</p> <p>UNIT -3</p> <p>Foam morphology- dry and wet, Structure of foams- ordered and disordered, foam formation and stability, Foam ripening and coalesce, Advantage and disadvantages of foam in food processing, Foam generation, Foaming agents, antifoaming agents Egg foams and uses, milk foams and their applications,</p> <p>UNIT -4</p> <p>Theory of gel formation; pectic substances and jellies; fruit pectin gels; fruit jellies.</p> <p>UNIT -5</p> <p>Structure of foods representing emulsions, foams and gels; Physical structure of fat rich, concentrated, fermented, coagulated and dried products.</p> <p>UNIT -6</p> <p>Techniques for evaluation of structure for food emulsions, foams and gels.</p> <p>UNIT -7</p> <p>Application of foams in other food processing application Case study foam mat drying</p> <p><i>B. Food Rheology and Microstructure</i></p> <p>Unit -1</p> <p>Introduction to rheology of foods: Definition of “texture”, “rheology” and “psychophysics” – their structural basis; salient definitions – Stress tensor and different kinds of stresses.</p> <p>Unit -2</p> <p>Rheological classification of fluid foods : Shear-rate dependence and time dependence of the flow-curve; Non-Newtonian fluids; thixotropy; Mechanisms and relevant models for non-Newtonian flow; Effect of temperature; Compositional factors affecting flow behaviour; Viscosity of food dispersions – dilute and semidilute systems, concentration effects.</p> <p>Unit -3</p> <p>Rheology of semi-solid and solid food; Rheological characterization of foods in terms of stress-strain relationship; rheology and flow characteristics of food powders, Viscoelasticity; Transient tests - Creep Compliance and Stress Relaxation Mechanical models for viscoelastic foods: Maxwell, Kelvin, Burgers and generalized models and their application; Dynamic measurement of viscoelasticity.</p> <p>Unit -4</p> <p>Large Deformations and failure in foods: Definitions of fracture, rupture and other related phenomena; Texture Profile Analysis; Instrumental measurements – Empirical and Fundamental methods; Rheometers and Texture Analyzers; Measurement of Extensional viscosity; Acoustic measurements on crunchy foods.</p> <p>Unit -5</p> <p>Rheological and textural properties of selected food products: Measurement modes and techniques; Effect of processing and additives (stabilizers and emulsifiers) on food product rheology; Relationship between instrumental and sensory data.</p> <p>Unit -6</p> <p>Examining food microstructures: history of food microstructure studies, light microscopy, transmission electron microscopy, scanning electron microscopy, other instrumentation and techniques, image analysis: image acquisition, image processing, measurement analysis.</p>				
--	--	--	--	--	--	--

			<p>Unit -7</p> <p>Food structure: traditional food structure and texture improvement, approaches to food structure, extrusion and spinning, structured fat products, structure and stability, gels, gelation mechanisms, mixed gels, the microstructure of gels, structure-property relations in gels.</p> <p>PRACTICAL</p> <p>A. Technology of Food Emulsions, Foams and Gels</p> <ol style="list-style-type: none"> 1. Determination of the rate of formation and stability of emulsions 2. Determination of creaming index for an emulsion 3. Determination of emulsion stability index of emulsifier 4. Determination of emulsion capacity of an emulsifier 5. Determination of HLB value for an emulsifier 6. Preparation of mayonnaise (o/w emulsion) 7. To study role of emulsifier food emulsions 8. To carry out ringing test for beverage emulsions 9. Particle size characterization in beverage emulsion 10. To examine foam formation and determination of foam stability 11. To study foaming in food systems (Foam mat drying to product instant tomato powder) 12. To study gel formation and gel properties 13. Preparation of gelatine based food gels 14. Preparation of pectin based food gels 15. To study properties of various gelling agents for foods. <p>B. Food Rheology and Microstructure</p> <ol style="list-style-type: none"> 1. Viscosity measurements of fruit juices using ostwaldvisometer 2. Viscosity measurements of liquid food products using Brookefield viscometer 3. To study the effect of temperature on viscosity of liquid foods 4. Development of stress and strain curve for Newtonian fluids 5. Development of stress and strain curve for Non Newtonian fluids 6. Determination of thermal conductivity of selected food products 7. Determination of specific heat of selected food products using differential scanning calorimetry(DSC) 8. Texture analysis of fruits, vegetables and their products 9. Texture analysis of baked products (bread/ biscuit) 10. Starch characterization using starch master 11. Dough rehology using doughlab 12. Preparation of food emulsions and their stability study 13. Preparation of food gels and their characteristics 14. Determination of microstructures in selected foods using light microscopy 15. TEM and SEM, image analysis and image processing techniques 16. Evaluation of phase transition in colloidal systems, evaluation of structure texture function relations 17. To correlate subjective sensory evaluation with textural analyzer 18. Visit to food microstructure laboratory 				
	FTNM3 3	Instru mentat ion in nutritio	<p>THEORY</p> <p>Unit 1</p>	Tanmoy Kumar Giri	4(3+1)	5	15*5 =75

		n	<p>Introduction to Food Analysis: Introduction to food and its components, Sampling, Sample preservation, Extraction, Proximate analysis</p> <p>Unit 2</p> <p>Spectroscopic Techniques: Introduction & theory of spectroscopic techniques, - Principle, Instrumentation, application of each technique.</p> <p>UV-Visible, IR, Raman, & Mass spectroscopy, flame photometry, CD spectroscopy, NMR – Principle, Instrumentation, application of each technique.</p> <p>Potentiometry: principle, various electrodes; electrometric measurements of pH, buffers.</p> <p>Fluorescence, Turbidoimetric techniques – Principle, Instrumentation, application of each technique.</p> <p>AAS – Principle, Instrumentation, applications.</p> <p>NMR/ESR spectroscopy – Principle, Instrumentation, application.</p> <p>Unit 3</p> <p>Chromatographic Techniques: Introduction, column, gel-permeation, HPLC, GC, Paper chromatography, TLC/HPTLC, Ion chromatography, Flash chromatography – Principle, Instrumentation, applications of each technique.</p> <p>Unit 4</p> <p>Biological Techniques: Electrophoresis, PCR/RT-PCR, Immunoassays - Principle, Instrumentation, applications of each technique</p> <p>Unit 5</p> <p>Recent Techniques: Rheology, DSC/DTA/TGA/TMA, XRD/XRF, Electron microscopy, Refractivity, Polarimetry - Principle, Instrumentation, applications of each technique, Radio immuno assay (RIA), Enzyme linked immunosorbent assay (ELISA). Circular dichroism (CD), Protein sequencing, X-ray crystallography.</p> <p>PRACTICAL</p> <ol style="list-style-type: none"> 1 Determination of moisture by Karl Fischer method 2 Determination of carotenes (spectrophotometric) 3 Determination of Vitamin C (spectrophotometric) 4 Determination of gingerol by HPLC 5 Determination of minerals by AAS 6 Fatty acid profile in lipids by GC 7 Determination of Chloride content by Ion Chromatography 8 Determination of thermal properties using DSC 9 Determination of rancidity using Rancimat 10 Determination of sugar concentration and solids using Refractometer 11 Separation of amino acids using TLC/HPTLC 12 Separation of food colors using TLC/HPTLC 13 Demonstration of PCR for Gene amplification 14 Agarose Gel Electrophoresis 15 Demonstration of ELISA test 				
--	--	---	---	--	--	--	--

			16 Preparation of a buffer and measurement of its pH electro-metrically and using indicators 17 SDS gel electrophoresis and molecular weight determination 18 Determination of sodium and potassium by flame photometry 19 Separation of milk proteins using ion-exchange chromatography				
	FTNM3 4	Software packages for statistical computing	PRACTICAL Unit 1 Research Design: Qualitative and quantitative research, measurement scale, concept of theory, construct and variables Unit 2 Descriptive statistics, introduction to SPSS, data entry, data managing, creating graphs, assumptions of parametric tests (SPSS) Unit 3 Parametric tests-dependent & independent sample t-test, ANOVA, Repeated measures ANOVA (SPSS) Nonparametric tests-Mann Whitney, Kruskal-Wallis, Wilcoxon signed-rant test, Friedman ANOVA and Chi Square test (SPSS) Unit 4 Multiple Regression Analysis (SPSS) Unit 5 Discriminant Analysis, Logistic Regression Analysis (SPSS) Unit 6 Introduction to mediation analysis, Testing simple mediation models. Introduction to moderation analysis, testing moderation models (Process Macro) Unit 7 Exploratory Factor Analysis, Cluster Analysis (SPSS) Unit 8 Introduction to CB-SEM: Concept of Confirmatory Factor Analysis (Measurement Model) and Structural Equation Model. CFA & SEM with case study, interpreting and writing (AMOS) Unit 9 Smart PLS: Introduction to PLS-SEM, Formative and Reflective measurement, Measurement Model Evaluation: (a) Convergent validity-three approaches, factor loading, variance extracted, reliability, (b) Discriminant validity (c) Cross-loadings	Apurba Giri	3(0+3)	5	15*5 =75
	FTNM3 5	Seminar		Sayan Das	3(0+3)		
	FTNM3	Comprehensive		Monalisa	1(0+1)		

	6	ve viva- voce		Roy			
	FTNM3 7	Industr ial trainin g and its report /Resea rch		Sruti Mandal	8(0+8)		
	FTNM3 8	Industr ial excursi on		Sruti Mandal	3(0+3)		
	FTNM4 1	Resear ch Project /Thesis /Disser tation		Apurba Giri Sucheta Sahoo Monalisa Roy Sruti Mandal	15(0+ 15)		
	FTNM4 2	Intelle tual propert y and its manag ement	Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and biodiversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement	Sruti Mandal	4(4+0)	3	96
	FTNM4 3	Entrep reneurs hip Develo pment Progra m	THEORY Unit-1 Business Management: introduction, theories and functions, food industry management, marketing management and human resource development, personal management. Sectors in food industry and scale of operations in India. International trade & global food consumption. Chance of Entrepreneur Entrepreneurship Development in Economic Develop Characteristics, qualities and pre-requisite of entrepreneur: new generation entrepreneurship vs. social entrepreneurship. Women entrepreneurship. Tour entrepreneurship, contemporary issues in family business.	Tanmoy Kumar Giri	5(5+0)	3	96

			<p>Unit - 2</p> <p>Methods and procedures to start and expand one's own business; environmental factors affecting success of a new business: reasons for the failure and problems for new business</p> <p>Unit – 3</p> <p>Preparation of Feasibility Reports: Project Reports: Market Potential Measurement, Economic. Technical. Financial Marketing and Managerial Feasibility of Project, Preparation of Detailed Project Report.</p> <p>Unit - 4</p> <p>Pitching, Elevator pitching, Angel investors, venture capital funds, Incubators and its roles. Student start up, technopreneurs, social entrepreneurs and its distinct advantage. Working capital estimation, policy & programmes and agencies promoting entrepreneurship KVIC. NABARD, NSIC, SIDBI, EDII, NIESBUD, DIC etc.</p> <p>Unit -5</p> <p>Legal issues, environmental clearance, quality standards, and government stores purchase schemes (e-tender process), exemption from income tax, industrial parks & Food Park.</p>				
	FTNM 44	Semin ar		Sayan Das	3(0+3)	1	15
	FTNM 45	Indust rial excurs ion		Sruti Mandal	3 (0+3)		

**Department of History (CBCS) HONS
2021-2022**

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
CC-1:	Unit – I Greek and Roman Historians New form of inquiry (historia) in Greece in the sixth century BCE 1.1 Logographers in ancient Greece. 1.2 Hecataeus of Miletus, the most important predecessor of Herodotus 1.3 Charon of Lampsacus 1.4 Xanthus of Lydia Module II Herodotus and his Histories 2.1 A traveller's romance? 2.2 Herodotus' method of history writing – his catholic inclusiveness 2.3 Herodotus' originality as a historian – focus on the struggle between the East and the West Module III Thucydides: the founder of scientific history writing 3.1A historiography on Thucydides 3.2History of the Peloponnesian War - a product of rigorous inquiry and examination 3.3 Thucydides' interpretive ability – his ideas of morality, Athenian imperialism, culture and democratic institutions 3.4 Description of plague in a symbolic way – assessment of the demagogues 3.5 A comparative study of the two greatest Greek historians Module IV Next generation of Greek historians 4.1 Xenophon and his History of Greece (<i>Hellenica</i>) – a description of events 410BCE – 362 BCE -- writing in the style of a high-class journalist – lack of analytical skill 4.2 Polybius and the “pragmatic” history 4.3 Diodorus Siculus and his <i>Library of History</i> – the Stoic doctrine of the brotherhood of man	P.G	6	4	4×15 = 60
	Unit II Roman Historiography Module I Development of Roman historiographical tradition 1.1 Quintus Fabius Pictor of late third century BCE and the “Graeci annals” – Rome's early history in Greek. 1.2 Marcus Porcius Cato (234 – 149 BCE) and the first Roman history in Latin – influence of Greek historiography 1.3 Marcus Tullius Cicero and the speculation on the theory of history – distinguishing history from poetry – the genre of moral historiography at Rome Module II Imperial historians 2.1 Livy and the History of Rome – a work on enormous scale - Livy's style of writing: honest but uncritical - Livy's comprehensive treatment: details of Roman religion and Roman law 2.2 Tacitus' history of the Roman empire - the greatest achievement of Roman historiography? His moral and political judgements on the past -- a “philosophical historian”?	S.A		4	4×15 = 60

	Module III Historical methods in ancient Rome 3.1 Research and accuracy 3.2 Literary artistry 3.3 The use of dramatic elements				
CC-2	CC-2: Early Historic India (proto history to 6th century B.C) Unit-1 Module 1 Understanding early India 1.1 : Historical theories and interpretations about the Indian past 1.2 The idea of Bharatavarsha: Indian subcontinent with all its diversity and cultural traditions 1.3 An overview of literary and archaeological sources Module-II Neolithic to Chalcolithic settlements 2.1 The earliest village farming community in India—transition from pastoral life to the practice of agriculture: Mehrgarh and its various cultural phases 2.2 The first urbanization in the Indian subcontinent—Indus civilization: contemporary perspectives through a historiography 2.3 The early Harappan, Harappan and late Harappan phases: technology, architecture, religion and maritime trade. 2.4 End/transformation of the Indus civilization: different theories. Module-III The Aryans in India: Vedic Age 3.1 The historiography of the concept Aryan 3.2 The spread of Aryan settlements in India 2.3 The period of the Vedas, Brahmanas and Upanishads: pastoralism, agriculture and other occupations 3.4 Political development, culture and rituals Module-IV North India in sixth century BCE 4.1 Establishment of kingdoms, oligarchies and chiefdoms: sixteen Mahajanapadas 4.2 The autonomous clans 4.3 Rise of Magadhan imperialism Unit II Module I Ideas and institutions in early India 1.1 Varna and Jati: the issue of upward mobility among the Shudras 1.2 Slavery: ancient forms and modern debates 1.3 Untouchables 1.4 Women	KBD BRC SJ		4	4×15=60

	<p>1.5 Forms of marriage</p> <p>Module II Cults, doctrines and metaphysics</p> <p>2.1 The religion of the Vedas 2.2 The unorthodox sects – Buddhism, Jainism and the doctrine of the Ajivikas 2.3 Scepticism and materialism</p> <p>Module III Aspects of economy in the age of Buddha</p> <p>3.1 Economic changes: use iron, rural economy, trade and crafts, guilds 3.2 Taxation 3.3 The second urbanization</p> <p>Module IV The cultural milieu</p> <p>4.1 Education 4.2 Language and literature 4.3 Science and technology</p>				
GE-1	<p>GE-1: Theories of the Modern State</p> <p>1. The State Definitions and Elementary Concepts – Sovereignty and autonomy –state and the community – the nation state</p> <p>2. The Absolutist State: Bodin, Hobbes and Hegel: the state, class and civil Society</p> <p>3. The Liberal State – the utilitarian version: Bentham and John Stuart Mill – John Mill and democracy: the tyranny of the majority</p> <p>4. The state and class Marxist perspective – the problem of Bonapartism – Max Weber and the bureaucratic order</p> <p>5. The ideological basis of the Welfare State and its comparison with Communism – John Rawls and the theory of justice</p>	KBD PG SA	6	4	4×15=60
CC-3	<p>CC-3: Mauryan and Gupta Empire</p> <p>I. Empire Building in India- Mahajanapadas to Kingdom</p> <p>II. Formation of Mauryan Empire – Polity, Economy, Socio-Cultural Aspects, Downfall</p> <p>III. Post Mauryan Empire – Sungas & Kanvas, the Indo Greeks, Kushanas & Satavahanas</p> <p>IV. Imperial Guptas – Classical Age, Polity, Economy, Socio-Cultural Aspects, Downfall</p>	KBD+B RC+SJ	6	4	4×15=60
CC-4	<p>CC-4: Political History of Early Medieval India (600 AD to 1200 AD)</p> <p>UNIT-I MODULE-I Understanding the ‘early medieval’ phase in the Indian history</p> <p>1.1 Different perceptions on the early medieval situations 1.2 Literary and archaeological sources 1.3 Development of regional cultures: an overview</p> <p>Module II Shift of political power from Pataliputra to Kanauj</p> <p>2.1 Gauda under Sasanka: the most formidable power in eastern India 2.2 The Gauda-Kanyakubja struggle and the emergence of Harshavardhana 2.3 Military and political supremacy of Kanauj</p> <p>Module III An overview of politics in the Deccan and south India</p>	PG & SA	6	4	4×15=60

	<p>3.1 The Chalukyas of Badami</p> <p>3.2 Chalukya-Pallava struggle</p> <p>3.3 Rashtrakuta- Pratihara rivalry</p> <p>3.4 Rise of the Cholas as the premier power of the south</p> <p>MODULE-4</p> <p>4.1 The Palas and the tripartite struggle</p> <p>4.2 Expansion of Pala power towards paramountcy</p> <p>4.3 The Senas of Bengal</p> <p>Module V</p> <p>The struggle for empire</p> <p>5.1 The Ghaznavid raids</p> <p>5.2 The Ghurids</p> <p>5.3 Qutb-ud-din Aibak's conquests</p> <p>UNIT-II</p> <p>Module I</p> <p>Political processes and structure of polity</p> <p>1.1 Absence of vast territorial empires -- a 'dark period'?</p> <p>1.2 Emergence of feudal polity -- nature and structure of Indian feudalism</p> <p>1.3 Zenith of political feudalism: 1000 - 1200 CE</p> <p>1.4 The concept of segmentary state and the Indian experience</p> <p>Module II</p> <p>The urban scenario</p> <p>2.1 Debates on the decay of urban centres</p> <p>2.2 A third phase of urbanization?</p> <p>Module III</p> <p>3.1 The Chola experiment -- a centralised state?</p> <p>3.2 Land revenue system</p> <p>3.3 Military organisation and administration of justice</p> <p>Module IV</p> <p>4.1 Conditions in India during the pre-Sultanate period</p> <p>4.2 An overview of the cultural scenario</p>				
GE-2	<p>GE- 2: Science and Empire</p> <p>1. History and Development of Science under the Colonial Empire-Perspectives and Recent Historical Debates/ Discourse/ Trajectories.</p> <p>2. Science and Colonial Empire: Concepts and Contours-Different Colonial Experiments in India-Fundamental Research in Science in India.</p> <p>3. Colonial Science: Indian and Western Interaction-Role of Institutions in Promoting Scientific Knowledge (Botanical Garden, Medical Colleges, Calcutta School of Tropical Medicine, Bose Institute, Indian Institute of Science etc.)</p> <p>4. Science and Empire-Indian Responses and Resistance-Ideas of Mahatma Gandhi and Jawaharlal Nehru.</p> <p>5. Scientific Activities under the Empire-Social, Political and Cultural Implication and Historical Debates.</p>	KBD+P G+SA	6	4	4×15= 60
CC-5	<p>CC-5: Delhi Sultanate</p> <p>I. Interpreting the Delhi Sultanate – A Survey of Sources: literary and archaeological.</p> <p>II. Foundation, Consolidation and Challenges to the Delhi Sultanate</p> <p>(a) The State in the Thirteenth & Fourteenth Century – The Mameluks, Khaljis and Tughlaqs – Theories of Kingship – Ruling Elites, Ulama & the Political Authority</p>	SA SJ BRC	6	4	4×15= 60

	<p>(b) Mongol Threat –Timur’s Invasion</p> <p>(c) Revival and Disintegration – Foundation of the Mughal Rule</p> <p>III. Emergence of Regional States: Vijayanagara, Bahmani Kingdom, Bengal</p> <p>IV. Society and Economy – Iqta System, Agricultural Production, Technology, Monetization, market, growth of urban centres; trade and commerce; Indian Ocean trade</p> <p>V. Religion, Society and Culture</p> <p>a) Sufism – silsilas, doctrines and practice – Socio-cultural impact</p> <p>b) Bhakti movements in south and north India – Kabir, Nanak and Sant tradition</p> <p>c) Art, architecture and literature – Consolidation of regional identities.</p>				
CC-6	<p>CC-6 : The Feudal Society</p> <p>1. Muhammad and Charlemagne: Islam and the Holy Roman Empire—coronation of Charlemagne—Frankish institutions—the Carolingian Renaissance—treaty of Verdun—dissolution of the Carolingian Empire—the Saxon Empire. (7 lectures)</p> <p>2. Europe besieged: invasions of Norsemen, Magyars, Arabs and Saracens. (3 lectures)</p> <p>3. Feudal Society and Economy (c.800—c.1100): Feudalism—origin and features; manorialism—chivalry and romanticism—emergence of towns—trade and commerce—guilds. (8 lectures)</p> <p>4. Emergence of National Kingship: Germany and Hohenstaufens—France under Valois. (4 lectures)</p> <p>5. Religion and Culture: Cluniac Reforms—Investiture Contest—Monasticism—popular religion and heresy—Crusades—the order of ‘Warrior Monks’: the Knights Templar, the Knights Hospitallers and the Teutonic Knights—Schoolmen—Universities—Twelfth-century Renaissance. (8 lectures)</p>	KBD PG	6	4	4×15= 60
CC-7	<p>CC-7: Akbar and the Making of Mughal India</p> <p>I. Sources and Historiography- Persian chronicles and tradition of history writing</p> <p>II. Establishment of Mughal Rule in India</p> <p>III. Formation of Imperial authority & Consolidation under Akbar- Campaigns and Conquests: tactics and technology-Evolution of administrative institutions: zabt, mansab, jagir, madad-i-maash- Revolts and resistance</p> <p>IV. Expansion and integration- Incorporation of Rajputs and other indigenous groups in Mughal nobility- North-West frontier, Gujarat, Deccan and Bengal</p> <p>V. Rural Society and Economy- Land rights and land revenue, zamindars and peasants-Agricultural production; crop patterns- Trade routes, overseas trade; Rise of Surat</p> <p>VI. Religion and Culture- Religious tolerance and Sulh-i-kul, Din-i-ilahi, Sufi mystical and intellectual interventions-Development of Mughal painting and architecture</p>	SA PG	6	4	4×15= 60
GE-3	<p>GE 3 : Some Perspectives on Women’s Rights in India</p> <p>I. Definition of Human Rights Human Rights and Women, a survey of the Charter Interrogating Human Rights vis-à-vis personal laws in India UN Convention and Indian Context</p> <p>II. Indian Constitution and Women’s Rights Fundamental Rights and Women</p>	KBD SA	6	4	4×15= 60

	<p>Directive Principles and Women Major legal cases defending women's rights vis-à-vis the Constitution</p> <p>III. Preventive Acts Minimum Wage Act 1948, Family Courts Act 1986, PNDT Act 1994, Latest Measures</p> <p>IV. Issues of Violence against Women and Remedial Measures Domestic Violence Act, Prevention of Sexual Harassment at Workplace Practical application and Problems, Remedial Measures</p> <p>V. Role of Non-Government Institutions Non-Government Organizations and Human Rights Women and Non-Government Organizations – Participations</p> <p>VI. Present Status Issues of enabling and empowering modalities – Debate on uniform civil code</p>				
SEC-1	<p>SEC- 1: Art Appreciation an introduction to Indian art</p> <p>I. Prehistoric and protohistoric art: _Rock art; Harappan arts and crafts</p> <p>II. Indian art (c. 600 BCE – 600 CE): World Heritage Site Managers, UNESCO World Heritage Manuals [can be downloaded/ accessed at www.unesco.org]. Notions of art and craft_Canons of Indian paintings_Major developments in stupa, cave, and temple art and architecture Early Indian sculpture: style and iconography_Numismatic art</p> <p>III. Indian Art (c. 600 CE – 1200 CE) : Temple forms and their architectural features_Early illustrated manuscripts and mural painting traditions Early medieval sculpture: style and iconography_Indian bronzes or metal icons</p> <p>IV. Indian art and architecture (c. 1200 CE – 1800 CE) : Sultanate and Mughal architecture_Miniature painting traditions: ughal, Rajasthani, Pahari Introduction to fort, palace and haveli architecture</p> <p>V. Modern and Contemporary Indian art and Architecture: The Colonial Period_Art movements: Bengal School of Art, Progressive Artists Group, etc. Major artists and their artworks_Popular art forms (folk art traditions)</p>	SA PG	2	4	4×15= 60
CC-8	<p>CC-8: Renaissance and Reformation</p> <ol style="list-style-type: none"> 1. Political and social background – political system in early modern Europe – collapse of feudalism – and the changing economic life in the 15th and 16th century – commerce and navigation – monarchies and city states – features of the early modern state – the printing revolution. 2. Italian city states, the merchants, the church and the social context of the renaissance – origins of humanism – rediscovery of the classes – the impact of humanism on art, education and political thought – Machiavelli and the idea of a modern state. 3. The background to the reformation – intellectual and popular anti-clericalism – Martin Luther and the reformation – reformation in the national context: France, Switzerland and England – the distinctiveness of the English reformation – Radical reformation –the Anabaptists, etc. - counter reformation. 4. Renaissance science and the emergence of a secular culture 	KBD PG	6	4	4×15= 60
CC-9	<p>CC-9: The French Revolution & Napoleon Bonaparte</p> <ol style="list-style-type: none"> I. Historiography of the French Revolution II. Crisis of the Ancien Regime III. Intellectual impetus IV. Socio-economic background 	SJ BRC	6	4	4×15= 60

	<p>V. Phases of the French Revolution – 1788-99</p> <p>VI. Rise of Napoleon – Empire building & consolidation</p> <p>VII. Impact of the French Revolution and Napoleon Bonaparte outside France</p> <p>VIII. Fall of Napoleon & Restoration of old order – Vienna Congress (1815)&Metternich</p>				
CC-10	<p>CC-10: 19th Century Revolutions in Europe</p> <p>I. The Greek War of Independence, the Revolutions of 1830, the Revolutions of 1848 –A possible turning point?</p> <p>II. The Age of Nationalism: The Second Empire in France and Louis Napoleon; Unification of Italy and Germany; The Third Republic and the Paris Commune;</p> <p>III. Russia—Tsarist autocracy and reforms, the emergence of the revolutionary movement; the Eastern Question—the Crimean War, the Treaty of Paris, Balkan nationalism.</p> <p>IV. Society and Economy in Nineteenth Century Europe: industrial transformation in Britain; difference in industrialisation process between England and the Continental powers – France, Germany and Russia – the emergence of the working class and its movements – The impact of ideology: Louis Blanc,</p> <p>V. Nationalism in Eastern and South Western Europe: Czech, Hungarian and Serbian</p>	SA PG	6	4	4×15= 60
GE-4	<p>GE-4 : History of Indian Journalism</p> <p>I. History of Indian Journalism: Colonial & Post Colonial Period.</p> <p>II. Pre-colonial History of written records & modalities of Dissemination</p> <p>III. Advent of Print media: Imperialist Ideologies</p> <p>IV. Nationalism & Print Culture: Selective study of prominent newspapers: Tribune, Amrita Bazar Patrika, and Hindustan Times</p> <p>V. Writing & Reporting Experiences</p>	SA KBD	6	4	4×15= 60
SEC-2	<p>SEC- 2 : The Making of Indian Foreign Policy</p> <p>1. Historical Factors in India's foreign policy priorities – pan Asianism</p> <p>2. The State India and the Third World – Non-alignment – Regional Cooperation</p> <p>3. India and South Asia: Relationship with the Neighbours</p> <p>4. India and the Great Powers – (a) United States (b) Soviet Union (c) China</p> <p>5. India and Globalisation – Economic Diplomacy – The Look East Policy and the European Union</p> <p>6. India's Nuclear Policy</p>	SA KBD SJ	2	4	4×15= 60
CC-11	<p>CC-11: Select Themes in the Colonial Impact on Indian Economy and Society</p> <p>1. Colonial State institutions and ideologies: Colonial Economic interests, Company's Commerce, Mercantilism to Free trade, Deindustrialisation and Drain of Wealth.</p> <p>2. Land Settlements and agricultural change— Commercialisation of Agriculture.</p> <p>3. Modern Industrialisation — Long term Constraints</p> <p>4. Census and Caste — Colonial ethnology — Sanskritisation, Westernisation and Social reform— Brahma Samaj & Parthana Samaj</p> <p>5. Reformism and Revivalism: The Aryadharma and Ramkrishna Vivekananda Movement.</p> <p>6. Islamic reform in India: The Reformers and the Orthodox</p>	SA KBD	6	4	4×15= 60
CC-12	CC-12: Peasant and Tribal Uprisings in Colonial	PG	6	4	4×15=

	<p style="text-align: center;">India in the 19th Century</p> <ol style="list-style-type: none"> 1. The early colonial rule and revenue operations, revenue demands and settlements – “restorative rebellions” – peasant –landlord combination against colonial rule in north and south India; 2. Peasant movements in Bengal and Malabar – religious appeal for the liberation of a region or an ethnic group under a new form of government. . 3. Tribal movements in pre-1857 western and eastern India – Ho, Tamar, (1820-1832), Kol and Bhumij (1825-1835) revolts , Kherwar movement of the Santals (1833), Santhal Revolt (1855), Bhil revolt (1819-1840), Kolis (1824-1848), Khasis (1829-30), Koyas (1840-1858), Konds (1846-1855) <p>The Late 19th century</p> <ol style="list-style-type: none"> 1. Tribal movements – Nalkdas of Panch Mahal (1858-59), (Bokta risings of 1858-95, millenarian movement of the Mundas (1895-1900), Kuch Nagas of Kachhar (1882), 2. Peasant movements in late 19th century – conflict between landlords and tenants – resistance to taxation – emergence of substantial peasantry – the role of moneylenders and struggle against them. 3. The revolutionary potential of Indian peasantry – Barrington Moore Jr. and Eric Stokes - Classification of types of revolt and movements – Kathleen Gough, AR Desai, DNDhanagare and Ranajit Guha. 	KBD			60
DSE-1	<p style="text-align: center;">DSE-1 : Modern Transformation of China (1839-1949)</p> <ol style="list-style-type: none"> 1. Pre-colonial China: Structure of the traditional Chinese society; Taoism, Confucius, the peasantry and the gentry; State and bureaucracy, economic structure. 2. Foreign Contact and Anglo-Chinese Relations: The Tribute System; the Canton Trade and its collapse; Background and Impact of First and Second Anglo-Chinese Wars (Opium Wars), ‘Open Door’ policy. 3. Rebellion and Restoration: Taiping rebellion—background and causes, nature, failure; Tung-chih Restoration and the Self-strengthening Movement – causes, feature and impact. 4. Movements, Reform and Restoration in China: The Reform Movement of 1898; Boxer Rebellion—causes, nature and failure; Chinese Revolution of 1911—role of Dr. Sun Yat-sen; Yuan Shih-Kai and Warlordism; May 4th Movement; the rise of the Kuo- Min Tang Party; the First United Front; Chiang Kai-shek; financial imperialism in China. 5. Formation of Communist Republics in China: Foundation of the Communist Party; Mao Tse-Tung and the making of the Red Army; the Second United Front; Long March and the Yen-an experiment; the Chinese Revolution (1949)—ideology, causes and significance; the establishment of the People’s Republic of China 	SJ BRC	6	4	4×15= 60
DSE-2	<p style="text-align: center;">DSE-2 : Modern Transformation of Japan</p> <p>. Pre-Meiji Japan: Tokugawa Shogunate—the feudal society and the government, economic condition; encounter with the West; the Perry Mission; the opening up of Japan to the West; the crisis and fall of the Shogunate.</p> <ol style="list-style-type: none"> 1. Meiji Restoration: Causes, Nature; Process of modernization—social, economic, political and military reforms; Meiji Constitution; rise of political parties. 2. Popular and Democratic Movements: Satsuma Rebellion and Popular Rights Movement. (3 lectures) 	SA	6	4	4×15= 60

	<p>3. Emergence of Japan as an Imperial Power: Sino-Japanese War (1894-'95); Anglo- Japanese Alliance; the Russo-Japanese War.</p> <p>4. Japan through the two World Wars: Japan and World War I; Twenty-One Demands; Washington Conference; Manchurian Crisis—the role of the League of Nations; the failure of the democratic system; the rise of militarism in the 1930s and 1940s; Japan and World War II – from Pearl Harbour to Hiroshima-Nagasaki.</p>				
CC-13	<p style="text-align: center;">CC-13 : International Relations after the Second World War</p> <p>Unit I: Module I Through war to peace 1914 - 1920 1.1 The condition of Europe in 1914 1.2 The First World War: issues and stakes - appraisals and reappraisals 1.3 The dynamics of the war: Wilson's Fourteen Points 1.4 The Versailles Settlement of 1919: context, provisions and evaluation 1.5 Other treaties 1.6 Aftermath of the war Module II Revolution and transformation in Russia 2.1 War- time politics in Russia 2.2 The provisional government under Kerensky 2.3 The Bolshevik Revolution: Lenin and Trotsky 2.4 The new Soviet Order 2.5 From Lenin to Stalin 2.6 Soviet foreign policy 1917-1939 Module III The inter-war period 3.1 The new balance of power 3.2 League of Nations 3.3 Draft Treaty of Mutual Assistance, 1923 3.4 Geneva Protocol, 1924 3.5 Locarno Treaties, 1925 3.6 Pact of Paris, 1928 Unit II Module I Road to another global war 1.1 Economic depression, 1929-32: prelude to the Second World War 1.2 Rise of dictatorship in Germany and Italy - a study in tyranny 1.3 Spain on fire: the Civil War, 1936-39 1.4 Diplomatic moves: the Nazi-Soviet Nonaggression Pact and the Rome-Berlin-Tokyo Axis Module II The gathering storm 2.1 A historiography of the Second World War 2.2 Hitler's foreign policy and origins of the war 2.3 With the Old Breed: from the Pacific Theatre to the Eastern and Western fronts 2.4 Reappraisal of the concept of appeasement Module III Wartime politics in Europe 3.1 Coming of the Grand Alliance and conferences at Tehran, Yalta and Potsdam 3.2 The Lend-Lease policy of the United States 3.3 The allied victory and the collapse of wartime alliance</p>	KBD	6	4	4×15=60
CC-14	<p style="text-align: center;">CC- 14: Modern Nationalism in India</p> <p>1. Emergence of Nationalism in India and its historiography.</p>	SJ BRC	6	4	4×15=60

	2. Anti-partition movement in 1905. 3. Gandhian Mass Movements— Non cooperation, Civil Disobedience , Quit India,Movement. 4. Roots of Communalism and Communal Award 5. Demand for Pakistan : Pakistan Movement from Cripps Mission to Cabinet MissionPlan. 6. Partition and its Aftermath.				
DSE-3	<p style="text-align: center;">DSE 3 : The Russian Revolution</p> 1. The Background: The Economic and Social development of Russia in the 19 th century – reform of Alexander II – the evolution of serfdom: Industrialisation and the working class: the Russian intelligentsia and Slavophiles, Westernisers, the populists and the social democrats. 2. Nicholas II and the Revolution of 1905 – Russian constitutionalism and modern politics 3. The Revolutions of 1917 4. The nature of the Bolshevik state and Soviet Democracy – war communism, thenew economic policy and the rise of the planned economy. 5. Nationalities and Nationalism in Russia before and after 1917.	PG	6	4	4×15=60
DSE-4	<p style="text-align: center;">DSE4: Pre-colonial South East Asia</p> 1. The state system – mainland SE Asia in the ancient period – early kingdoms and cultural diversity – Indian influence and the Hindu-Khmer of Cambodia, Mons of Burma and Buddhism, Indianised kingdom of Champa in Vietnam, the Chinese in Malaya and Vietnam, Srivijaya kingdom of Sumatra, the Majapahits of Java, Chola- Srivijaya struggle; the intervention of the Cholas (11 th century) 2. Economy – wet rice cultivation, upland shifting and cultivation ib the plains and seafaring – sawah agriculture and household based production; trade and markets; structural changes in SE Asian economy between 1 st century CE to 1500 CE- Funan (Cambodia), Srivijaya maritime empire, Java. SE Asian maritime economy, international trade and commercial expansion in the mainland, Arabs and Chinese (1100-1300) 3. Religion: Theravada and Mahayana Buddhism in mainland SE Asia – Mon kingdoms and dissemination of Theravada Buddhism; links with Sri Lanka (12 th century onwards); Islam in the 9 th century in Malayan and Indonesian archipelago – Sufi mystical influence – Indonesian <i>tarekat</i> - toleration of non-Muslim practices and beliefs. 4. Europeans – Portuguese in the 16 th century; Dutch and English in the 17 th century.	KBD PG	6	4	4×15=60

Department of History (CBCS) GENERAL

Course	Course Contents/Syllabus	Allotted Teacher	Credit	Class Allotted per Week	Total Class
DSC-1A: (CC-1):	<p>DSC1AT: Ancient India</p> 1. Harappan Civilisation: Features & Town Planning, Decline 2. Vedic Age: Corpus of Vedic Literature, Society, Economy and Polity in Early & LaterVedic Period	KBD PG SJ	6	4	4×15=60

	3. State Formation in Early India: Mahajanapadas 4. Mauryan Empire: Chandragupta Maurya to Asoka: Polity, Administration, Society, Culture and Mauryan decline 5. Gupta Empire: Chandragupta I to Skandagupta: Polity, Administration, Society, Culture and Downfall 6. India after the Guptas				
DSC-1B (CC- 2)	DSC1BT: Medieval India 1. Arab Conquest of Sindh: Nature and Impact 2. Causes and Consequences of Early Turkish invasion 3. Mahmud of Ghazni and Shihab-ud-din of Ghur 4. Establishment and consolidation of the Sultanate: Qutb-ud-din Aibak to Firuz Shah Tughluqs, polity, economy, culture 5. Emergence of regional powers: Vijaynagar and Bahamani Kingdoms, Hussain Shahi and Illiyas Shahi Dynasties. 6. Mughal Imperialism: Establishment and consolidation - Greater Mughals; Polity, economy, culture 7. Socio-cultural syncretism, Bhakti & Sufi movements.	SA BRC	6	4	4×15=60
DSC-1C (CC- 3):	C1CT: Select themes in the Colonial impact on Indian Economy and Society 1. Colonial State institutions and ideologies: Colonial Economic interests, Company's Commerce, Mercantilism to Free trade, Deindustrialisation and Drain of Wealth. 2. Land Settlements and agricultural change— Commercialization of Agriculture. 3. Modern Industrialisation — Long term Constraints 4. Census and Caste — Colonial ethnology — Sanskritisation, Westernisation and Social Reform - Young Bengal, Brahma Samaj & Prarthana Samaj 5. Reformism and Revivalism: The Aryadharma and Ramkrishna Vivekananda Movement. 6. Islamic reform in India : The Reformers and the Orthodox.	KBD BRC SJ	6	4	4×15=60
SEC- 1 :	The Making of Indian Foreign Policy 1. Historical Factors in India's foreign policy priorities –pan Asianism 2. The State India and the Third World –Non-alignment – Regional Cooperation 3. India and South Asia: Relationship with the Neighbours 4. India and the Great Powers –(a) United States (b) Soviet Union (c) China 5. India and Globalisation–Economic Diplomacy –The Look East Policy and the European Union 6. India's Nuclear Policy	SA SJ	6	4	4×15=60
DSC-1D (CC- 4):	Modern Nationalism in India 1. Emergence of Nationalism in India and its historiography. 2. Economic Nationalism and Cultural Nationalism	PG SJ	6	4	4×15=60

	3. Rise of the Indian National Congress 4. Anti-partition movement in 1905- Concept of Swadeshi and atmashakti 5. Gandh's Rise to power; Gandhian Mass Movements—Non-cooperation, Civil Disobedience, Quit India Movement. 6. Roots of Communalism and Communal Award 7. Demand for Pakistan : Pakistan Movement from Cripps Mission to Cabinet Mission Plan. 8. Partition and its Aftermath				
SEC- 2 :	Understanding Heritage I. Defining Heritage Meaning of 'antiquity', 'archaeological site', 'tangible heritage', 'intangible heritage' and 'arttreasure' II. Evolution of Heritage Legislation and the Institutional Framework: Conventions and Acts - National and International Heritage related government departments, museums, regulatory bodies etc. Conservation Initiatives III. Challenges facing Tangible and Intangible Heritage Development, antiquity smuggling, conflict (to be examined through specific case studies) V. Challenges facing Tangible and Intangible Heritage: Development, antiquity smuggling, conflict (to be examined through specific case studies) VI. Heritage and Travel: Viewing Heritage Sites - The relationship between cultural heritage, landscape and travel recent trends	KBD SA BRC	6	4	4×15= 60
DSE-1A:	Renaissance and Reformation 1) Political and social background – political system in early modern Europe – collapse of feudalism – and the changing economic life in the 15 th and 16 th century – commerce and navigation – monarchies and city states –features of the early modern state – the printing revolution. 2) Italian city states, the merchants, the church and the social context of the renaissance – origins of humanism – rediscovery of the classes –the impact of humanism on art, education and political thought –Machiavelli and the idea of a modern state. 3) The background to the reformation –intellectual and popular anti-clericalism – Martin Luther and the reformation –reformation in the national context: France, Switzerland and England – the distinctiveness of the English reformation –Radical reformation – theAnabaptists, etc. - counter reformation. 4) Renaissance science and the emergence of a secular culture	KBD PG	6	4	4×15= 60
GE- 1 :	Theories of the Modern State 1. The State Definitions and Elementary Concepts – Sovereignty	PG SJ	6	4	4×15= 60

	<p>and autonomy – state and the community – the nation state.</p> <ol style="list-style-type: none"> 2. The Absolutist State: Bodin, Hobbes and Hegel: the state, class and civil society. 3. The Liberal State – the state, individualism and citizenship – the constitutional and the contractual state: John Locke – liberalism and the democratic order: Rousseau and the General Will. 4. The Liberal State – the utilitarian version: Bentham and John Stuart Mill – John Mill and democracy: the tyranny of the majority. 5. The state and class Marxist perspective – the problem of Bonapartism – Max Weber and the bureaucratic order. 6. The ideological basis of the Welfare State and its comparison with Communism – John Rawls and the theory of justice. 				
SEC- 3 :	<p>Colonial Science in India: Institutions and Practices</p> <ol style="list-style-type: none"> 1: Science in Colonial India: Problems and Perspectives 2: Science and Colonial Explorations: Science and Orientalism-Early European Scientists: Surveyors, Botanists, Doctors under the East India Company Service 3: Science in Practice: Botanical Garden, Geological Survey of India, Medical College, and Indian Association for the Cultivation of Science. 4: Science and Indigenous Personality: Prafulla Chandra Ray, Jagadish Bose, Mahendra Lal Sarkar, Maghnad Saha, C.V. Raman- Emergence of National Science 5: Colonial Science in India: Science and Indian Nationalism- Response and Resistance-Ideas of Mahatma Gandhi and other Indian Nationalists. 	KBD PG SA	6	4	4×15= 60
DSE-1B:	<p>Modern Europe</p> <ol style="list-style-type: none"> 1. French Revolution and Napoleon: Crisis of Ancient Regime: Socio-Political and Economic Condition, Intellectual Impetus: The Revolution in the making, Phases of the French Revolution: the Aristocratic Revolution, The rise of Napoleon Bonaparte: Napoleonic Empire and Europe, Fall of Napoleon: Continental System, Impact of Napoleon in Europe 2. Restoration and reaction in Europe: Vienna Congress, Metternich Era. 3. Movements of National Aspirations: Unification of Italy, Unification of Germany, The Third Republic and the Paris Commune, The Eastern Question. 4. Causes of the two World Wars 	KBD PG	6	4	4×15= 60
GE- 2:	<p>Some Perspectives on Women's Rights in India</p> <p>I. Definition of Human Rights</p> <ol style="list-style-type: none"> 1. Human Rights and Women, a survey of the Charter 2. Interrogating Human Rights vis-à-vis personal laws in India 3. UN Convention and Indian Context <p>II. Indian Constitution and Women's Rights</p>	KBD SA	6	4	4×15= 60

	<ol style="list-style-type: none"> 1. Fundamental Rights and Women 2. Directive Principles and Women 3. Major legal cases defending women's rights vis-à-vis the Constitution <p>III. Preventive Acts Minimum Wage Act 1948, Family Courts Act 1986, PNDT Act 1994, Latest Measures</p> <p>IV. Issues of Violence against Women and Remedial Measures</p> <ol style="list-style-type: none"> 1. Domestic Violence Act, Prevention of Sexual Harassment at Workplace 2. Practical application and Problems, Remedial Measures <p>V. Role of Non-Government Institutions</p> <ol style="list-style-type: none"> 1. Non-Government Organizations and Human Rights 2. Women and Non-Government Organizations – Participations <p>VI. Present Status Issues of enabling and empowering modalities – Debate on uniform civil code</p>				
SEC- 4:	<p>Art appreciation an introduction to Indian art</p> <p>I. Prehistoric and proto historic art: Rock art; Harappan arts and crafts</p> <p>II. Indian art (c. 600 BCE – 600 CE): World Heritage Site Managers, UNESCO World Heritage Manuals [can be downloaded/ accessed at www.unesco.org]. Notions of art and craft - Canons of Indian paintings - Major developments in stupa, cave, and temple art and architecture Early Indian sculpture: style and iconography - Numismatic art</p> <p>III. Indian Art (c. 600 CE – 1200 CE) : Temple forms and their architectural features - Early illustrated manuscripts and mural painting traditions Early medieval sculpture: style and iconography - Indian bronzes or metal icons</p> <p>IV. Indian art and architecture (c. 1200 CE – 1800 CE): Sultanate and Mughal architecture - Miniature painting traditions: Mughal, Rajasthani, Pahari Introduction to fort, palace and Haveli architecture</p> <p>V. Modern and Contemporary Indian art and Architecture: The Colonial Period - Art movements: Bengal School of Art, Progressive Artists Group, etc. Major artists and their art works - Popular art forms (folk art traditions)</p>	SA PG	6	4	4×15= 60



Soniram
13.04.2023
Principal
Mugheria Gangadhar Mahavidyalaya