Ph.D. ENTRANCE TEST

(Autumn Semester 2023-24)

SYLLABUS

PART – 1 (RESEARCH METHODOLOGY) (50 Marks)

1. Introduction

Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is done, Research Process, Criteria of Good Research.

2. Defining the Research Problem

What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem.

3. Research Design

Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs.

4. Sampling Design

Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample? , Random Sample from an Infinite Universe, Complex Random Sampling Designs.

5. Measurement and Scaling Techniques

Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques.

6. Methods of Data Collection

Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection of Secondary Data.

7. Processing and Analysis of Data

Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation Association in Case of Attributes, Other Measures.

8. Research paper/Thesis writing

Lay out of research paper/thesis Purpose, Contents, Problems, Interpretation of Report Writing, Techniques of Interpretation, Layout, Structure and Language of the Report, Illustrations and tables, Types of report, Technical reports and Thesis-Bibliography. Ethical Issues in Research-Meaning, Importance, Problems, Citation of Published Material, Ethical Issues Related to Publishing, Plagiarism and Self-Plagiarism, Citation and Acknowledgement-Accountability.

PART – 2 (50 Marks)

Engineering and Technology

Civil Engineering

Section 1: Engineering Mathematics

Linear Algebra: Matrix algebra; Systems of linear equations; Eigen values and Eigen vectors.

Calculus: Functions of single variable; Limit, continuity and differentiability; Mean value theorems, local maxima and minima; Taylor series; Evaluation of definite and indefinite integrals, application of definite integral to obtain area and volume; Partial derivatives; Total derivative; Gradient,Divergence and Curl, Vector identities; Directional derivatives; Line, Surface and Volume integrals.

Ordinary Differential Equation (ODE): First order (linear and non-linear) equations; higher order linear equations with constant coefficients; Euler-Cauchy equations; initial and boundary value problems.

Partial Differential Equation (PDE): Fourier series; separation of variables; solutions of one dimensional diffusion equation; first and second order one-dimensional wave equation and two dimensional Laplace equation.

Probability and Statistics: Sampling theorems; Conditional probability; Descriptive statistics –Mean, median, mode and standard deviation; Random Variables – Discrete and Continuous, Poisson and Normal Distribution; Linear regression.

Numerical Methods: Error analysis. Numerical solutions of linear and non-linear algebraic equations; Newton's and Lagrange polynomials; numerical differentiation; Integration by trapezoidal and Simpson's rule; Single and multi-step methods for first order differential equations.

Section 2: Structural Engineering

Engineering Mechanics: System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Frictions and its applications; Centre of mass; Free Vibrations of undamped SDOF system.

Solid Mechanics: Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, Transformation of stress; buckling of column, combined and direct bending stresses.

Structural Analysis: Statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.
Steel Structures: Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses; Concept of plastic analysis –beams and frames.

Section 3: Geotechnical Engineering

Soil Mechanics: Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification system; Permeability - one dimensional flow, Seepage through soils –two - dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force; Principle of effective stress and quicksand condition; Compaction of soils; One- dimensional consolidation, time rate of consolidation; Shear Strength, Mohr's circle, effective and total shear strength parameters, Stress-Strain characteristics of clays and sand; Stress paths.
Foundation Engineering: Sub-surface investigations - Drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Earth pressure theories - Rankine and Coulomb;
Stability of slopes – Finite and infinite slopes, Bishop's method; Stress distribution in soils – Boussinesq's theory; Pressure bulbs, Shallow foundations – Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays; Deep foundations – dynamic and static formulae, Axial load capacity of piles in sands and clays, pile load test, pile under lateral loading, pile group efficiency, negative skin friction.

Section 4: Water Resources Engineering

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum and energy equations and their applications; Potential flow, Laminar and turbulent flow;
Flow in pipes, pipe networks; Concept of boundary layer and its growth; Concept of lift and drag. Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Channel Hydraulics -

Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles.

Hydrology: Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, reservoir capacity, flood estimation and routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law.

Irrigation: Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapotranspiration; Gravity Dams and Spillways; Lined and unlined canals, Design of weirs on permeable foundation; cross drainage structures.

Section 5: Environmental Engineering

Water and Waste Water Quality and Treatment: Basics of water quality standards – Physical, chemical and biological parameters; Water quality index; Unit processes and operations; Water requirement; Water distribution system; Drinking water treatment.Sewerage system design, quantity of domestic wastewater, primary and secondary treatment. Effluent discharge standards; Sludge disposal; Reuse of treated sewage for different applications.

Air Pollution: Types of pollutants, their sources and impacts, air pollution control, air qualitystandards, Air quality Index and limits.Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes,engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Section 6: Transportation Engineering

Transportation Infrastructure: Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments. Geometric design of railway Track – Speed and Cant. Concept of airport runway length, calculations and corrections; taxiway and exit taxiway design.

Highway Pavements: Highway materials - desirable properties and tests; Desirable properties of bituminous paving mixes; Design factors for flexible and rigid pavements; Design of flexible and rigid pavement using IRC codes

Traffic Engineering: Traffic studies on flow and speed, peak hour factor, accident study, statistical analysis of traffic data; Microscopic and macroscopic parameters of

traffic flow, fundamental relationships; Traffic signs; Signal design by Webster's method; Types of intersections; Highway capacity.

Section 7: Surveying

Principles of surveying; Errors and their adjustment; Maps - scale, coordinate system; Distance and angle measurement - Leveling and trigonometric levelling; Traversing and triangulation survey; Total station; Horizontal and vertical curves. Photogrammetry and Remote Sensing - Scale, flying height; Basics of remote sensing and GIS.

Computer Science & Engineering, Information Technology and Computer application

Section 1: Engineering Mathematics

Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Monoids, Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Probability and Statistics: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Computer Science and Information Technology

Section 2: Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Section 3: Computer Organization and Architecture

Machine instructions and addressing modes. ALU, data- path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Section 4: Programming and Data Structures

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Section 5: Algorithms

Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide- and conquer. Graph traversals, minimum spanning trees, shortest paths

Section 6: Theory of Computation

Regular expressions and finite automata. Context-free grammars and push-down automata.Regular and contex-free languages, pumping lemma. Turing machines and undecidability.

Section 7: Compiler Design

Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimisation, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.

Section 8: Operating System

System calls, processes, threads, inter- process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Section 9: Databases

ER model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Section 10: Computer Networks

Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet,circuit and virtual circuitswitching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email

Mechanical Engineering

Section 1: Engineering Mathematics

Linear Algebra: Matrix algebra, systems of linear equations, eigenvalues and eigenvectors.

Calculus: Functions of single variable, limit, continuity and differentiability, mean value theorems, indeterminate forms; evaluation of definite and improper integrals; double and triple integrals; partial derivatives, total derivative, Taylor series (in one and two variables), maxima and minima,Fourier series; gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, applications of Gauss, Stokes and Green's theorems.

Differential Equations: First order equations (linear and nonlinear); higher order linear differential equations with constant coefficients; Euler-Cauchy equation; initial and boundary value problems; Laplace transforms; solutions of heat, wave and Laplace's equations.

Complex Variables: Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.

Probability and Statistics: Definitions of probability, sampling theorems, conditional probability; mean, median, mode and standard deviation; random variables, binomial, Poisson and normal distributions.

Numerical Methods: Numerical solutions of linear and non-linear algebraic equations; integration by trapezoidal and Simpson's rules; single and multi-step methods for differential equations.

Section 2: Applied Mechanics and Design

Engineering Mechanics: Free-body diagrams and equilibrium; friction and its applications including rolling friction, belt-pulley, brakes, clutches, screw jack, wedge, vehicles, etc.; trusses and frames; virtual work; kinematics and dynamics of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations; Lagrange's equation.

Mechanics of Materials: Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; concept of shear centre; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal

stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope.

Vibrations: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.

Machine Design: Design for static and dynamic loading; failure theories; fatigue strength and the SN diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears, rolling and sliding contact bearings, brakes and clutches, springs.

Section 3: Fluid Mechanics and Thermal Sciences

Fluid Mechanics: Fluid properties; fluid statics, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings; basics of compressible fluid flow.

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan-Boltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis

Thermodynamics: Thermodynamic systems and processes; properties of pure substances, behavior of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.

Applications: Power Engineering: Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. I.C. Engines: Air-standard Otto, Diesel and dual cycles. Refrigeration and air-conditioning: Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes. Turbomachinery: Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines; steam and gas turbines.

Section 4: Materials, Manufacturing and Industrial Engineering

Engineering Materials: Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.

Casting, Forming and Joining Processes: Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.

Machining and Machine Tool Operations: Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, jigs and fixtures; abrasive machining processes; NC/CNC machines and CNC programming.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; inter ferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly; concepts of coordinate-measuring machine (CMM).

Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools; additive manufacturing.

Production Planning and Control: Forecasting models, aggregate production planning, scheduling, materials requirement planning; lean manufacturing.

Inventory Control: Deterministic models; safety stock inventory control systems.

Operations Research: Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

PART – 2 (50 Marks)

Science

Chemistry

1. Inorganic Chemistry

(1) Chemical periodicity

(2) Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).

(3) Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.

(4) Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.

(5) Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.

(6) Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.

(7) Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.

(8) Cages and metal clusters.

(9) Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical methods.

(10) Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron- transfer reactions; nitrogen fixation, metal complexes in medicine.

(11) Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.

(12) Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

2. Physical Chemistry:

(1) Basic principles of quantum mechanics: Postulates; operator algebra; exactly-solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.

(2) Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.

(3) Atomic structure and spectroscopy; term symbols; manyelectron systems and antisymmetry principle.

(4) Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π-electron systems.

(5) Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.

(6) Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.

(7) Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.

(**8). Statistical thermodynamics:** Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities – calculations for model systems.

(9) Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye-Huckel theory; electrolytic conductance – Kohlrausch's law and its applications; ionicequilibria; conductometric and potentiometric titrations.

(10) Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision andtransition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.

(11) Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.

(12) Solid state: Crystal structures; Bragg's law and applications; band structure of solids.

(13) Polymer chemistry: Molar masses; kinetics of polymerization.

(14) Data analysis: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.

3. Organic Chemistry

(1) IUPAC nomenclature of organic molecules including regioand stereoisomers.

(2) Principles of stereochemistry: Configurationally and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.

(3) Aromaticity: Benzenoid and non-benzenoid compounds –generation and reactions.

(4) Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.

(5) Organic reaction mechanisms :involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.

(6) Common named reactions and rearrangements – applications in organic synthesis.

(7) Organic transformations and reagents: Functional group inter conversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organ metallic and enzymatic). Chemo, regio and stereo selective transformations.

(8) Concepts in organic synthesis: Retro synthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.

(9) Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.

(10) Pericyclic reactions – electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.

(11) Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).

(12) Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.

(13) Structure determination of organic compounds by IR, UVVis, 1H& 13C NMR and Mass spectroscopic techniques.

4. Interdisciplinary topics

(1) Chemistry in nano science and technology.

(2) Catalysis and green chemistry.

(3) Medicinal chemistry.

(4) Supramolecular chemistry.

(5) Environmental chemistry.

PART – 2 (50 Marks)

Management Studies

Management

Unit – I

Management – Concept, Process, Theories and Approaches, Management Roles and Skills. Functions – Planning, Organizing, Staffing, Coordinating and Controlling. Communication – Types, Process and Barriers. Decision Making – Concept, Process, Techniques and Tools. Organisation Structure and Design Types, Authority, Responsibility, Centralisation, Decentralisation and Span of Control. Managerial Economics – Concept & Importance. Demand analysis – Utility Analysis, Indifference Curve, Elasticity & Forecasting Market Structures – Market Classification & Price Determination. National Income – Concept, Types and Measurement Inflation – Concept, Types and Measurement Business Ethics & CSR. Ethical Issues & Dilemma Corporate Governance Value Based Organisation.

Unit – II

Organisational Behaviour – Significance & Theories. Individual Behaviour – Personality, Perception, Values, Attitude, Learning and Motivation. Group Behaviour – Team Building, Leadership, Group Dynamics Interpersonal Behaviour & Transactional Analysis Organizational Culture & Climate. Work Force Diversity & Cross Culture Organisational Behaviour Emotions and Stress Management. Organisational Justice and Whistle Blowing. Human Resource Management – Concept, Perspectives, Influences and Recent Trends.Human Resource Planning, Recruitment and Selection, Induction, Training and Development. Job Analysis, Job Evaluation and Compensation Management.

Unit – III

Strategic Role of Human Resource Management Competency Mapping & Balanced Scoreboard Career Planning and Development. Performance Management and Appraisal. Organization Development, Change & OD Interventions Talent

Management & Skill Development. Employee Engagement & Work Life Balance. Industrial Relations: Disputes & Grievance Management, Labour Welfare and Social Security. Trade Union & Collective Bargaining. International Human Resource Management – HR Challenge of International Business. Green HRM.

Unit– IV

Accounting Principles and Standards, Preparation of Financial Statements. Financial Statement Analysis – Ratio Analysis, Funds Flow and Cash Flow Analysis, DuPont Analysis. Preparation of Cost Sheet, Marginal Costing, Cost Volume Profit Analysis Standard Costing & Variance Analysis Financial Management, Concept & Functions. Capital Structure – Theories, Cost of Capital, Sources and Finance Budgeting and Budgetary Control, Types and Process, Zero base Budgeting. Leverages – Operating, Financial and Combined Leverages, EBIT–EPS Analysis, Financial Breakeven Point & Indifference Level.

Unit –V

Value & Returns – Time Preference for Money, Valuation of Bonds and Shares, Risk and Returns; Capital Budgeting – Nature of Investment, Evaluation, Comparison of Methods; Risk and Uncertainly Analysis. Dividend – Theories and Determination. Mergers and Acquisition – Corporate Restructuring, Value Creation, Merger Negotiations, Leveraged Buyouts, Takeover. Portfolio Management – CAPM, APT. Derivatives – Options, Option Payoffs, Option Pricing, Forward Contracts & Future Contracts. Working Capital Management – Determinants, Cash, Inventory, Receivables and Payables Management, Factoring. International Financial Management, Foreign exchange market.

Unit - VI

Strategic Management – Concept, Process, Decision & Types. Strategic Analysis – External Analysis, PEST, Porter's Approach to industry analysis, Internal Analysis – Resource Based Approach, Value Chain Analysis. Strategy Formulation – SWOT Analysis, Corporate Strategy – Growth, Stability, Retrenchment, Integration and Diversification, Business Portfolio Analysis - BCG, GE Business Model, Ansoff's Product Market Growth Matrix. Strategy Implementation – Challenges of Change,

Developing Programs Mckinsey 7s Framework. Marketing – Concept, Orientation, Trends and Tasks, Customer Value and Satisfaction. Market Segmentation, Positioning and Targeting. Product and Pricing Decision – Product Mix, Product Life Cycle, New Product development, Pricing – Types and Strategies. Place and promotion decision – Marketing channels and value networks, VMS, IMC, Advertising and Sales promotion.

Unit –VII

Consumer and Industrial Buying Behaviour: Theories and Models of Consumer Behaviour. Brand Management – Role of Brands, Brand Equity, Equity Models, Developing a Branding Strategy; Brand Name Decisions, Brand Extensions and Loyalty. Logistics and Supply Chain Management, Drivers, Value creation, Supply Chain Design, Designing and Managing Sales Force, Personal Selling. Service Marketing – Managing Service Quality and Brands, Marketing Strategies of Service Firms. Customer Relationship Marketing – Relationship Building, Strategies, Values and Process. Retail Marketing – Recent Trends in India, Types of Retail Outlets. Emerging Trends in Marketing – Concept of e-Marketing, Direct Marketing, Digital Marketing and Green Marketing. International Marketing – Entry Mode Decisions, Planning Marketing Mix for International Markets.

Unit –VIII

Statistics for Management: Concept, Measures Of Central Tendency and Dispersion, Probability Distribution – Binominal, Poison, Normal and Exponential. Data Collection & Questionnaire Design Sampling – Concept, Process and Techniques. Hypothesis Testing – Procedure; T, Z, F, Chi-square tests Correlation and Regression Analysis. Operations Management – Role and Scope. Facility Location and Layout – Site Selection and Analysis, Layout – Design and Process. Enterprise Resource Planning – ERP Modules, ERP implementation Scheduling; Loading, Sequencing and Monitoring. Quality Management and Statistical Quality Control, Quality Circles, Total Quality Management – KAIZEN, Benchmarking, Six Sigma; ISO 9000 Series Standards. Operation Research – Transportation, Queuing Decision Theory, PERT / CPM.

Unit –IX

International Business – Managing Business in Globalization Era; Theories of International Trade; Balance of payment. Foreign Direct Investment – Benefits and Costs. Multilateral regulation of Trade and Investment under WTO International Trade Procedures and Documentation; EXIM Policies Role of International Financial Institutions – IMF and World Bank. Information Technology – Use of Computers in Management Applications; MIS, DSS. Artificial Intelligence and Big Data. Data Warehousing, Data Mining and Knowledge Management – Concepts Managing Technological Change.

Unit – X

Entrepreneurship Development – Concept, Types, Theories and Process, Developing Entrepreneurial Competencies. Intrapreneurship – Concept and Process. Women Entrepreneurship and Rural Entrepreneurship. Innovations in Business – Types of Innovations, Creating and Identifying Opportunities, Screening of Business Ideas. Business Plan and Feasibility Analysis – Concept and Process of Technical, Market and Financial Analysis. Micro and Small Scale Industries in India; Role of Government in Promoting SSI Sickness in Small Industries – Reasons and Rehabilitation. Institutional Finance to Small Industries – Financial Institutions, Commercial Banks, Cooperative Banks, Micro Finance.

PART – 2 (50 Marks)

Commerce

Unit1:BusinessEnvironmentandInternationalBusiness

- Concepts and elements of business environment: Economic environment-Economic systems, Economic policies (Monetaryandfiscalpolicies);Politicalenvironment-Roleofgovernmentinbusiness;Legalenvironment-ConsumerProtectionAct,FEMA;Socio-culturalfactorsandtheirinfluenceonbusiness;CorporateSocialResponsibility(CSR)
- Scope and importance of international business; Globalization and its drivers; Modes of entry into international business
- Theories of international trade; Government intervention in international trade; Tariff and non-tariff barriers; India's foreign trade policy
- Foreigndirectinvestment(FDI)andforeignportfolioinvestment(FPI);TypesofFDI, Costs and benefits of FDI to home and host countries; Trends in FDI; India's FDI policy
- Balance of payments(BOP):Importance and components of BOP
- RegionalEconomicIntegration:LevelsofRegionalEconomicIntegration;Tradecreation and diversion effects; Regional Trade Agreements: European Union (EU),ASEAN,SAARC, NAFTA
- International Economic institutions: IMF, World Bank, UNCTAD
- World Trade Organization (WTO): Functions and objectives of WTO; Agriculture Agreement;GATS; TRIPS; TRIMS

Unit2:AccountingandAuditing

- Basic accounting principles; concepts and postulates
- Partnership Accounts: Admission, Retirement, Death, Dissolution and Insolvency of partnership firms
- CorporateAccounting:Issue,forfeitureandreissueofshares;Liquidationofcompanies;Acquisition,merger, amalgamation and reconstruction of companies
- Holding company accounts
- CostandManagementAccounting:MarginalcostingandBreak-evenanalysis;Standard costing; Budgetary control; Process costing; Activity

Based Costing (ABC);Costing for decision-making; Life cycle costing, Target costing, Kaizen costing and JIT

- Financial Statements Analysis: Ratio analysis; Funds flow Analysis; Cash flow analysis
- Human Resources Accounting; Inflation Accounting; Environmental Accounting
- Indian Accounting Standards and IFRS
- Auditing:Independentfinancialaudit;Vouching;Verificationadvaluationofassetsandliabilities; Audit of financial statements and audit report; Cost audit
- Recent Trends in Auditing: Management audit; Energy audit; Environment audit; Systems audit; Safety audit

Unit3: Business Economics

- Meaning and scope of business economics
- Objectives of business firms
- Demandanalysis:Lawofdemand;Elasticityofdemandanditsmeasurement;Relationshipbetween AR and MR
- Consumer behavior: Utility analysis; Indifference curve analysis
- Law of Variable Proportions: Law of Returns to Scale
- Theory of cost: Short-run and long-run cost curves
- Pricedeterminationunderdifferentmarketforms:Perfectcompetition;Monopolistic competition;Oligopoly- Price leadership model; Monopoly; Price discrimination
- Pricing strategies: Prices skimming; Price penetration; Peak load pricing

Unit4:Business Finance

- Scope and sources of finance; Lease financing
- Cost of capital and time value of money Capital structure
- Capital budgeting decisions: Conventional and scientific techniques of capital budgeting analysis
- Working capital management; Dividend decision: Theories and policies
- Risk and return analysis; Asset securitization
- International monetary system
- Foreign exchange market; Exchange rate risk and hedging techniques
- International financial markets and instruments: Euro currency; GDRs; ADRs
- International arbitrage; Multinational capital budgeting

Unit5: Business Statistics and Research Methods

- Measures of central tendency
- Measures of dispersion
- Measures of skewness
- Correlation and regression of two variables

- Probability: Approaches to probability; Bayes'theorem
- Probability distributions: Binomial, Poisson and normal distributions
- Research: Concept and types; Research designs
- Data: Collection and classification of data
- Sampling and estimation: Concepts; Methods of sampling - probability and non-probability methods; Sampling distribution; Central limit theorem; Standard error ;Statistical estimation
- Hypothesis testing: z-test; t-test; ANOVA; Chi–square test; Mann-Whitney test (U-test);Kruskal-Wallis test (H-test); Rank correlation test
- Report writing

Unit6: Business Management and Human Resource Management

- Principles and functions of management
- Organization structure: Formal and informal organizations; Span of control
- Responsibility and authority: Delegation of authority and decentralization
- Motivation and leadership: Concept and theories
- Corporate governance and business ethics
- Human resource management: Concept, role and functions of HRM; Human resource planning; Recruitment and selection; Training and development; Succession planning
- Compensation management: Job evaluation; Incentives and fringe benefits
- Performance appraisal including 360 degree performance appraisal
- Collective bargaining and workers' participation in management
- Personality: Perception; Attitudes; Emotions; Group dynamics; Power and politics; Conflict and negotiation; Stress management
- Organizational Culture: Organizational development and organizational change

Unit7: Banking and Financial Institutions

- Overview of Indian financial system
- Types of banks: Commercial banks; Regional Rural Banks(RRBs); Foreign banks; Cooperative banks
- Reserve Bank of India: Functions; Role and monetary policy management
- Banking sector reforms in India: Risk management; NPA management
- Financial markets: Money market; Capital market; Government securities market
- Financial Institutions: Development Finance Institutions (DFIs); Non-Banking Financial Companies (NBFCs); Mutual Funds; Pension Funds
- Financial Regulators in India
- Financial sector reforms including financial inclusion
- Digitization of banking and other financial services: Internet banking; mobile banking; Digital payments systems

- Insurance: Types of insurance- Life and Non-life insurance; Risk classification and management; Factors limitingtheinsurabilityofrisk;Re-insurance;Regulatoryframeworkofinsurance-IRDAand its role

Unit8: Marketing Management

- Marketing: Concept and approaches; Marketing channels; Marketing mix; Strategic marketing planning; Market segmentation, targeting and positioning
- Product decisions: Concept; Product line; Product mix decisions;Product lifecycle; New product development
- Pricing decisions: Factors affecting price determination; Pricing policies and strategies Promotion decisions: Role of promotion in marketing; Promotion methods-Advertising; Personal selling; Publicity; Sales promotion tools and techniques; Promotion mix
- Distribution decisions: Channels of distribution; Channel management
- Consumer Behavior; Consumer buying process; factors influencing consumer buying decisions Service marketing
- Trends in marketing: Social marketing; Online marketing; Green marketing; direct marketing; Rural marketing; CRM Logistics management

Unit9: Legal Aspects of Business

- Indian Contract Act, 1872: Elements of a valid contract; Capacity of parties; Free consent; Discharge of a contract; Breach of contract and remedies against breach;
- Special contracts: Contracts of indemnity and guarantee; contracts of bailment and pledge; Contracts of agency
- Sale of Goods Act, 1930: Sale and agreement to sell; Doctrine of Caveat Emptor; Rights of unpaid seller and rights of buyer
- Negotiable Instruments Act, 1881: Types of negotiable instruments; Negotiation and assignment; Dishonor and discharge of negotiable instruments
- The Companies Act, 2013: Nature and kinds of companies; Company formation Management, meetings and winding up of a joint stock company Limited Liability Partnership: Structure and procedure of formation of LLP in India The Competition Act, 2002: Objectives and main provisions
- TheInformationTechnologyAct, 2000 Objectives and main provisions; Cybercrimes and penalties
- The RTI Act, 2005: Objectives and main provisions
- Intellectual Property Rights (IPRs) : Patents, trademarks and copyrights; Emerging issues in intellectual property
- Goods and Services Tax (GST): Objectives and main provisions; Benefits of GST; Implementation mechanism; Working of dual GST

Unit10: Income-tax and Corporate Tax Planning

- Income-tax: Basic concepts; Residential status and tax incidence; Exempted incomes; Agricultural income; Computation of taxable income under various heads; Deductions from Gross total income; Assessment of Individuals; Clubbing of incomes
- International Taxation: Double taxation and its avoidance mechanism; Transfer pricing
- Corporate Tax Planning: Concepts and significance of corporate tax planning; Tax avoidance versus tax evasion; Techniques of corporate tax planning; Tax considerations in specific business situations: Make or buy decisions; Own or lease an asset; Retain; Renewal or replacement of asset; Shut down or continue operations
- Deductionandcollectionoftaxatsource;Advancepaymentoftax;E-filingofincome-tax returns

PART – 2 (50 Marks)

Arts

Psychology

1. Emergence of Psychology

Psychological thought in some major Eastern Systems: Bhagavad Gita, Buddhism, Sufism and Integral Yoga. Academic psychology in India: Pre-independence era; post-independence era; 1970s: The move to addressing social issues; 1980s: Indigenization; 1990s: Paradigmatic concerns, disciplinary identity crisis; 2000s: Emergence of Indian psychology in academia. Issues: The colonial encounter; Post colonialism and psychology; Lack of distinct disciplinary identity.

Western: Greek heritage, medieval period and modern period. Structuralism, Functionalism, Psychoanalytical, Gestalt, Behaviorism, Humanistic- Existential, Transpersonal, Cognitive revolution, Multiculturalism. Four founding paths of academic psychology - Wundt, Freud, James, Dilthey. Issues: Crisis in psychology due to strict adherence to experimental- analytical paradigm (logical empiricism). Indic influences on modern psychology.

Essential aspects of knowledge paradigms: Ontology, epistemology, and methodology. Paradigms of Western Psychology: Positivism, Post-Positivism, Critical perspective, Social Constructionism, Existential Phenomenology, and Co- operative Enquiry. Paradigmatic Controversies. Significant Indian paradigms on psychological knowledge: Yoga, Bhagavad Gita, Buddhism, Sufism, and Integral Yoga. Science and spirituality (avidya and vidya). The primacy of self-knowledge in Indian psychology.

2. Psychological testing

Types of tests

Test construction: Item writing, item analysis

Test standardization: Reliability, validity and Norms

Areas of testing: Intelligence, creativity, neuropsychological tests, aptitude, Personality assessment, interest inventories

Attitude scales – Semantic differential, Staples, Likert scale. Computer-based psychological testing Applications of psychological testing in various settings: Clinical, Organizational and business, Education, Counseling, Military. Career guidance.

3. Biological basis of behavior

Sensory systems: General and specific sensations, receptors and processes

Neurons: Structure, functions, types, neural impulse, synaptic transmission. Neurotransmitters.The Central and Peripheral Nervous Systems – Structure and functions. Neuroplasticity.

Methods of Physiological Psychology: Invasive methods – Anatomical methods, degeneration techniques, lesion techniques, chemical methods, microelectrode studies. Non-invasive methods – EEG, Scanning methods.

Muscular and Glandular system: Types and functions Biological basis of Motivation: Hunger, Thirst, Sleep and Sex.

Biological basis of emotion: The Limbic system, Hormonal regulation of behavior.

Genetics and behavior: Chromosomal anomalies;Nature-Nurture controversy [Twin studies and adoption studies]

4. Attention, Perception, Learning, Memory and Forgetting

Attention: Forms of attention, Models of attention

Perception: Approaches to the Study of Perception: Gestalt and physiological approaches

Perceptual Organization: Gestalt, Figure and Ground, Law of Organization Perceptual Constancy: Size, Shape, and Color; Illusions Perception of Form, Depth and Movement Role of motivation and learning in perception

Signal detection theory: Assumptions and applications Subliminal perception and related factors, information processing approach to perception, culture and perception, perceptual styles, Pattern recognition, Ecological perspective on perception.

Learning Process: Fundamental theories: Thorndike, Guthrie, Hull

Classical Conditioning: Procedure, phenomena and related issues Instrumental learning: Phenomena, Paradigms and theoretical issues; Reinforcement: Basic variables and schedules; Behaviour modification andits applications

Cognitive approaches in learning: Latent learning, observational learning. Verbal learning and Discrimination learning

Recent trends in learning: Neurophysiology of learning

Memory and Forgetting

Memory processes: Encoding, Storage, Retrieval

Stages of memory: Sensory memory, Short-term memory (Working memory), Long-term Memory (Declarative – Episodic and Semantic; Procedural)

Theories of Forgetting: Interference, Retrieval Failure,Decay, Motivated forgetting

5. Thinking, Intelligence and Creativity

Theoretical perspectives on thought processes: Associationism, Gestalt, Information processing, Feature integration model Concept formation: Rules, Types, and Strategies; Role of concepts in thinking Types of Reasoning Language and thought

Problem solving: Type, Strategies, and Obstacles Decision-making: Types and models

Metacognition: Metacognitive knowledge and Metacognitive regulation

Intelligence: Spearman; Thurstone; Jensen; Cattell; Gardner; Stenberg; Goleman; Das, Kar & Parrila

Creativity: Torrance, Getzels & Jackson, Guilford, Wallach & Kogan Relationship between Intelligence and Creativity

6. Personality, Motivation, emotion, stress and coping

Determinants of personality: Biological and socio-cultural

Approaches to the study of personality: Psychoanalytical, Neo-Freudian, Social learning, Trait and Type, Cognitive, Humanistic, Existential, Transpersonal psychology.

Other theories: Rotter's Locus of Control, Seligman's Explanatory styles, Kohlberg's theory of Moral development.

Basic motivational concepts: Instincts, Needs, Drives, Arousal, Incentives, Motivational Cycle.

Approaches to the study of motivation: Psychoanalytical, Ethological, S-R Cognitive, Humanistic Exploratory behavior and curiosity Zuckerman's Sensation seeking Achievement, Affiliation and Power Motivational Competence Self-regulation Flow

Emotions: Physiological correlates

Theories of emotions: James-Lange, Canon-Bard, Schachter and Singer, Lazarus, Lindsley.

Emotion regulation

Conflicts: Sources and types

Stress and Coping: Concept, Models, Type A, B, C, D behaviors, Stress management strategies [Biofeedback, Music therapy, Breathing exercises, Progressive Muscular Relaxation, Guided Imagery, Mindfulness, Meditation, Yogasana, Stress Inoculation Training].

7. Social Psychology

Nature, scope and history of social psychology

Traditionaltheoretical perspectives: Field theory, Cognitive Dissonance, Sociobiology, Psychodynamic Approaches, Social Cognition. Social perception [Communication, Attributions]; attitude and its change within cultural context; prosocial behavior

Group and Social influence [Social Facilitation; Social loafing]; Social influence [Conformity, Peer Pressure, Persuasion, Compliance, Obedience, Social Power, Reactance]. Aggression. Group dynamics, leadership style and effectiveness. Theories of intergroup relations [Minimal Group Experiment and Social Identity Theory, Relative Deprivation Theory, Realistic Conflict Theory, Balance Theories, Equity Theory, Social Exchange Theory]

Applied social psychology: Health, Environment and Law; Personal space, crowding, and territoriality.

8. Human Development and Interventions

Developmental processes: Nature, Principles, Factors in development, Stages of Development. Successful aging.

Theories of development: Psychoanalytical, Behavioristic, and Cognitive Various aspects of development: Sensory-motor, cognitive, language, emotional, social and moral.

Psychopathology: Concept, Mental Status Examination, Classification, Causes

Psychotherapies: Psychoanalysis, Person-centered, Gestalt, Existential, Acceptance Commitment Therapy, Behavior therapy, REBT, CBT, MBCT, Play therapy, Positive psychotherapy, Transactional Analysis, Dialectic behavior therapy, Art therapy, Performing Art Therapy, Family therapy.Applications of theories of motivation and learning in School Factors in educational achievement

Teacher effectiveness Guidance in schools: Needs, organizational set up and techniques

Counselling: Process, skills, and techniques

9. Emerging Areas

Issues of Gender, Poverty, Disability, and Migration: Cultural bias and discrimination. Stigma, Marginalization, and Social Suffering; Child Abuse and Domestic violence.

Peace psychology: Violence, non-violence, conflict resolution at macro level, role of media in conflict resolution.

Wellbeing and self-growth: Types of wellbeing [Hedonic and Eudemonic], Character strengths, Resilience and Post-Traumatic Growth.

Health: Health promoting and health compromising behaviors, Life style and Chronic diseases [Diabetes, Hypertension, Coronary Heart Disease], Psychoneuroimmunology [Cancer, HIV/AIDS]

Psychology and technology interface: Digital learning; Digital etiquette: Cyber bullying; Cyber pornography: Consumption, implications; Parental mediation of Digital Usage.

SOCIOLOGY

Unit -1 : Sociological Theory

1. **Classical Sociological Traditions :** Emile Durkheim,Max Weber**,**Karl Marx

2. **Structure- Functionalism and Structuralism:** Bronislaw Malinowski, A.R. Radcliffe- Brown, Talcott Parsons, Robert K. Merton, Claude Levi Strauss
3. **Hermeneutic and Interpretative Traditions:** G.H. Mead, Karl Manheim , Alfred Schutz, Harold Garfinkel, Erving Goffman, Clifford Geertz
4. **Post Modernism**, Post Structuralism and Post Colonialism, Edward Said, Pierre Bourdieu, Michel Foucault, Jurgen Habermas,Anthony Giddens, Manuel Castells
5. **Indian Thinkers:** M.K. Gandhi, B.R. Ambedkar, Radha Kamal Mukherjee, G. S. Ghurye, M.N. Srinivas, Irawati Karve

Unit - 2 : Research Methodology and Methods

1. **Conceptualizing Social Reality:** Philosophy of Science, Scientific Method and Epistemology in Social Science, Hermeneutic Traditions, Objectivity and Reflexivity in Social Science, Ethics and Politics
2. **Formulating Research Design:** Reading Social Science Research, Data and Documents, Induction and Deduction, Fact, Concept and Theory, Hypotheses, Research Questions, Objectives
3. **Quantitative and Qualitative Methods:** Ethnography, Survey Method Historical Method, Comparative Method
4. **Techniques:** Sampling, Questionnaire and Schedule, Statistical Analysis Observation, Interview and Case study, Interpretation, Data Analysis and Report Writing

Unit -3 : Basic Concepts and Institutions

1. **Sociological Concepts :** Social Structure, Culture, Network, Status and Role, Identity, Community, Diaspora, Values, Norms and Rules , Personhood, Habitus and Agency, Bureaucracy, Power and Authority
2. **Social Institutions:** Marriage, Family and Kinship, Economy, Polity, Religion Education, Law and Customs
3. **Social Stratification:** Social Difference, Hierarchy, Inequality and Marginalization, Caste and Class, Gender, Sexuality and Disability, Race, Tribe and Ethnicity
5. **Social Change and Processes:** Evolution and Diffusion, Modernization and Development, Social Transformations and Globalization, Social Mobility

Unit – 4 : Rural and Urban Transformations

1. **Rural and Peasant Society:** Caste-Tribe Settlements**,** Agrarian Social Structure and Emergent Class Relations**,** Land Ownership and Agrarian Relations**,** Decline of Agrarian Economy, De-Peasantization and Migration Agrarian Unrest and Peasant Movements**,** Changing Inter-Community Relations and Violence
2. **Urban Society:** Urbanism, Urbanity and Urbanization**,** Towns, Cities and Mega-Cities**,** Industry, Service and Business**,** Neighborhood, Slums and Ethnic Enclaves**,** Middle Class and Gated Communities**,** Urban Movements and Violence

Unit – 5 : State, Politics and Development

1. **Political Processes in India:** Tribe, Nation State and Border**,** Bureaucracy Governance and Development**,** Public Policy: Health, Education and Livelihoods Political Culture, Grass-root Democracy, Law and Society, Gender and Development, Corruption, Role of International Development Organizations
2. **Social Movements and Protests:** Political Factions, Pressure Groups **,** Movements based on Caste, Ethnicity, Ideology, Gender, Disability, Religion and Region**,** Civil Society and Citizenship**,** NGOs, Activism and Leadership **,** Reservations and Politics

Unit – 6: Economy and Society

Exchange, Gift , Capital, Labour and Market,Mode of Production Debates, Property and Property Relations, State and Market: Welfarism and Neoliberalism, Models of Economic Development, Poverty and Exclusion Factory and Industry Systems, Changing Nature of Labour Relations, Gender and Labour Process, Business and Family, Digital Economy, E-Commerce , Global Business and Corporates, Tourism, Consumption

Unit - 7: Environment and Society

Social and Cultural Ecology: Diverse Forms, Technological Change, Agriculture and Biodiversity, Indigenous Knowledge Systems and Ethno-Medicine, Gender and Environment, Forest Policies, Adivasis and Exclusion, Ecological Degradation and Migration, Development, Displacement and Rehabilitation,

Water and Social Exclusion, Disasters and Community Responses, Environmental Pollution, Public Health and Disability, Climate Change and International Policies, Environmental Movements

Unit - 8: Family, Marriage and Kinship

Theoretical Approaches: Structure-Functionalist, Alliance and Cultural, Gender Relations and Power Dynamics, Inheritance, Succession and Authority, Gender, Sexuality and Reproduction, Children, Youth and Elderly, Emotions and Family Emergent Forms of Family, Changing Marriage Practices, Changing Care and Support Systems, Family Laws, Domestic Violence and Crime against Women Honour Killing

Unit - 9: Science, Technology and Society

History of Technological Development, Changing notions of Time and Space Flows and Boundaries, Virtual Community, Media: Print and Electronic, Visual and Social Media, E-Governance and Surveillance Society, Technology and Emerging Political Processes, State Policy,

Unit - 10: Culture and Symbolic Transformations

Signs and Symbols, Rituals, Beliefs and Practices, Changing Material Culture Moral Economy, Education: Formal and Informal, Religious Organizations, Piety and Spirituality, Commodification of Rituals, Communalism and Secularism, Cultural Identity and Mobilization, Culture and Politics Gender, Body and Culture, Art and Aesthetics, Ethics and Morality, Sports and Culture Pilgrimage and Religious Tourism Religion and Economy Culture and Environment , New Religious Movements

SANSKRIT

विषय: संस्कृत

पाठ्यक्रम

इकाई-I

वैदिक-साहित्य

(क) वैदिक-साहित्य का सामान्य परिचय :-

- वेदों का काल : मैक्समूलर, ए.वेबर, जैकोबी, बालगंगाधर तिलक, एम.विन्टरनिट्ज, भारतीय परम्परागत विचार
- संहिता साहित्य
- संवाद सूक्त : पुरुरवा-उर्वशी, यम-यमी, सरमा-पणि, विश्वामित्र- नदी
- ब्राह्मण साहित्य
- आरण्यक साहित्य
- वेदांग : शिक्षा, कल्प, व्याकरण, निरुक्त, छन्द, ज्योतिष

इकाई-II

(ख) वैदिक साहित्य का विशिष्ट अध्ययन :-

1. निम्नलिखित सूक्तों का अध्ययन :-

- **ऋग्वेद**: - अग्नि (1.1), वरुण (1.25), सूर्य (1.125), इन्द्र (2.12), उषस् (3.61), पर्जन्य (5.83), अक्ष (10.34), ज्ञान (10.71), पुरुष (10.90), हिरण्यगर्भ (10.121), वाक् (10.125), नासदीय (10.129)

- **शुक्लयजुर्वेद**: - शिवसंकल्प, अध्याय - 34 (1-6),

  प्रजापति, अध्याय - 23 (1-5)
- **अथर्ववेद**: - राष्ट्राभिवर्धनम् (1.29), काल (10.53), पृथिवी (12.1)

2. **ब्राह्मण-साहित्य** : प्रतिपाद्य विषय, विधि एवं उसके प्रकार, अग्निहोत्र, अग्निष्टोम, दर्शपूर्णमास यज्ञ, पंचमहायज्ञ, आख्यान (शुन:शेप, वाङ्मनस्)।
3. **उपनिषद्-साहित्य** : निम्नलिखित उपनिषदों की विषयवस्तु तथा प्रमुख अवधारणाओं का अध्ययन : ईश, कठ, केन, बृहदारण्यक, तैत्तिरीय, श्वेताश्वतर ।
4. **वैदिक व्याकरण, निरुक्त एवं वैदिक व्याख्या पद्धति** :
   - **ऋक्प्रातिशाख्य** : निम्नलिखित परिभाषाएँ –

     समानाक्षर, सन्ध्यक्षर, अघोष, सोष्म, स्वरभक्ति, यम, रक्त, संयोग, प्रगृह्य, रिफित ।
   - निरुक्त (अध्याय 1 तथा 2)

     चार पद – नाम विचार, आख्यात विचार, उपसर्गों का अर्थ, निपात की कोटियाँ,
   - निरुक्त अध्ययन के प्रयोजन
   - निर्वचन के सिद्धान्त
   - निम्नलिखित शब्दों की व्युत्पत्ति :

     आचार्य, वीर, ह्रद, गो, समुद्र, वृत्र, आदित्य, उषस्, मेघ, वाक्, उदक, नदी, अश्व, अग्नि, जातवेदस्, वैश्वानर, निघण्टु।
   - निरुक्त (अध्याय 7 दैवत काण्ड)
   - वैदिक स्वर : उदात्त, अनुदात्त तथा स्वरित।
   - वैदिक व्याख्या पद्धति : प्राचीन एवं अर्वाचीन

इकाई-III

दर्शन-साहित्य

(क) प्रमुख भारतीय दर्शनों का सामान्य परिचय :

प्रमाणमीमांसा, तत्त्वमीमांसा, आचारमीमांसा
(चार्वाक, जैन, बौद्ध, न्याय, सांख्य, योग, न्याय, वैशेषिक, मीमांसा के संदर्भ में)

इकाई-IV

(ख) दर्शन-साहित्य का विशिष्ट अध्ययन :

- ईश्वरकृष्ण; सांख्यकारिका - सत्कार्यवाद, पुरुषस्वरूप, प्रकृतिस्वरूप, सृष्टिक्रम, प्रत्ययसर्ग, कैवल्य।
- सदानन्द; वेदान्तसार : अनुबन्ध-चतुष्ट्य, अज्ञान, अध्यारोप-अपवाद, लिंगशरीरोत्पात्ति, पंचीकरण, विवर्त, महावाक्य, जीवन्मुक्ति।
- अन्नंभट्ट; तर्कसंग्रह/ केशव मिश्र; तर्कभाषा : पदार्थ, कारण, प्रमाण (प्रत्यक्ष, अनुमान, उपमान, शब्द), प्रामाण्यवाद, प्रमेय।

1. लौगाक्षिभास्कर; अर्थसंग्रह
2. पतंजलि; योगसूत्र, - (व्यासभाष्य) : चित्तभूमि, चित्तवृत्तियाँ, ईश्वर का स्वरूप, योगाङ्ग, समाधि, कैवल्य।
3. बादरायण; ब्रह्मसूत्र 1.1 (शांकरभाष्य)
4. विश्वनाथपंचानन; न्यायसिद्धान्तमुक्तावली (अनुमानखण्ड)
5. सर्वदर्शनसंग्रह; जैनमत, बौद्धमत

इकाई-V

व्याकरण एवं भाषाविज्ञान

(क) सामान्य-परिचय : निम्नलिखित आचार्यों का परिचय -

- पाणिनि, कात्यायन, पतंजलि, भर्तृहरि, वामनजयादित्य, भट्टोजिदीक्षित, नागेशभट्ट, जैनेन्द्र, कैय्यट, शाकटायन, हेमचन्द्रसूरि, सारस्वतव्याकरणकार।
- पाणिनीय शिक्षा
- भाषाविज्ञान :

  भाषा की परिभाषा, भाषा का वर्गीकरण (आकृतिमूलक एवं पारिवारिक), ध्वनियों का वर्गीकरण : स्पर्श, संघर्षी, अर्धस्वर, स्वर (संस्कृत ध्वनियों के विशेष संदर्भ में), मानवीय ध्वनियंत्र, ध्वनि परिवर्तन के कारण, ध्वनि नियम (ग्रिम, ग्रासमान, वर्नर)

अर्थ परिवर्तन की दिशाएँ एवं कारण, वाक्य का लक्षण व भेद, भारोपीय परिवार का सामान्य परिचय, वैदिक संस्कृत एवं लौकिक संस्कृत में अन्तर, भाषा तथा वाक् में अन्तर, भाषा तथा बोली में अन्तर।

इकाई-VI

(ख) व्याकरण का विशिष्ट अध्ययन :

- **परिभाषाएँ** – संहिता, संयोग, गुण, वृद्धि, प्रातिपदिक, नदी, घि, उपधा, अपृक्त, गति, पद, विभाषा, सवर्ण, टि, प्रगृह्य, सर्वनामस्थान, भ, सर्वनाम, निष्ठा।
- **सन्धि** - अच् सन्धि, हल् सन्धि, विसर्ग सन्धि (लघुसिद्धान्तकौमुदी के अनुसार)
- **सुबन्त** - अजन्त – राम, सर्व (तीनों लिंगों में), विश्वपा, हरि, त्रि (तीनों लिंगों में), सखि, सुधी, गुरु, पितृ, गौ, रमा, मति, नदी, धेनु, मातृ, ज्ञान, वारि, मधु।

  हलन्त – लिह्, विश्ववाह्, चतुर् (तीनों लिंगों में), इदम्(तीनों लिंगों में), किम्(तीनों लिंगों में), तत्(तीनों लिंगों में), राजन्, मघवन्, पथिन्, विद्वस्, अस्मद्, युष्मद्।
- **समास –** अव्ययीभाव, तत्पुरुष, बहुव्रीहि, द्वन्द्व, (लघुसिद्धान्तकौमुदी के अनुसार)
- **तद्धित** - अपत्यार्थक एवं मत्वर्थीय (सिद्धान्तकौमुदी के अनुसार)
- **तिङन्त –** भू, एध्, अद्, अस्, हु, दिव्, षुञ्, तुद्, तन्, कृ, रुध्, क्रीञ्, चुर् ।
- **प्रत्ययान्त** - णिजन्त; सन्नन्त; यङन्त; यङ्लुगन्त; नामधातु।
- **कृदन्त** – तव्य / तव्यत्; अनीयर्; यत्; ण्यत्; क्यप्; शतृ; शानच्; क्त्वा; क्त; क्तवतु; तुमुन्; णमुल्।
- **स्त्रीप्रत्यय** - लघुसिद्धान्त कौमुदी के अनुसार
- **कारक प्रकरण** - सिद्धान्तकौमुदी के अनुसार
- **परस्मैपद एवं आत्मनेपद विधान** - सिद्धान्तकौमुदी के अनुसार
- **महाभाष्य (पस्पशाह्निक) –** शब्दपरिभाषा, शब्द एवं अर्थ संबंध, व्याकरण अध्ययन के उद्देश्य, व्याकरण की परिभाषा, साधु शब्द के प्रयोग का परिणाम, व्याकरण पद्धति।
- **वाक्यपदीयम् (ब्रह्मकाण्ड) –** स्फोट का स्वरूप, शब्द-ब्रह्म का स्वरूप, शब्द-ब्रह्म की शक्तियाँ, स्फोट एवं ध्वनि का संबंध, शब्द-अर्थ संबंध, ध्वनि के प्रकार, भाषा के स्तर।

इकाई-VII

संस्कृत-साहित्य, काव्यशास्त्र एवं छन्दपरिचय :

(क) निम्नलिखित का सामान्य परिचय :

• भास, अश्वघोष, कालिदास, शूद्रक, विशाखदत्त, भारवि, माघ, हर्ष, बाणभट्ट, दण्डी, भवभूति, भट्टनारायण, बिल्हण, श्रीहर्ष, अम्बिकादत्तव्यास, पंडिता क्षमाराव, वी. राघवन्, श्रीधरभास्कर वर्णेकर ।

• काव्यशास्त्र : रससम्प्रदाय, अलंकारसम्प्रदाय, रीतिसम्प्रदाय, ध्वनिसम्प्रदाय, व्रकोक्तिसम्प्रदाय, औचित्यसम्प्रदाय ।

• पाश्चात्य काव्यशास्त्र : अरस्तू, लॉन्जाइनस, क्रोचे ।

इकाई-VIII

(ख) निम्नलिखित का विशिष्ट अध्ययन :

- **पद्य** : बुद्धचरितम् (प्रथम) रघुवंशम् (प्रथमसर्ग), किरातार्जुनीयम् (प्रथमसर्ग), शिशुपालवधम्, (प्रथमसर्ग), नैषधीयचरितम् (प्रथमसर्ग)
- **नाट्य** : स्वप्नवासवदत्तम्, अभिज्ञानशाकुन्तलम्, वेणीसंहारम्, मुद्राराक्षसम्, उत्तररामचरितम्, रत्नावली, मृच्छकटिकम्।
- **गद्य** : दशकुमारचरितम् (अष्टम-उच्छ्वास), हर्षचरितम् (पञ्चम-उच्छ्वास), कादम्बरी (शुकनासोपदेश)
- **चम्पूकाव्य** : नलचम्पू: (प्रथम-उच्छ्वास)
- **साहित्यदर्पण**:

  काव्यपरिभाषा, काव्य की अन्य परिभाषाओं का खण्डन, शब्दशक्ति – (संकेतग्रह, अभिधा, लक्षणा, व्यंजना), काव्यभेद (चतुर्थ परिच्छेद) श्रव्यकाव्य (गद्य, पद्य, मिश्र काव्य-लक्षण)

- **काव्यप्रकाश**:

  काव्यलक्षण, काव्यप्रयोजन, काव्यहेतु, काव्यभेद, शब्दशक्ति, अभिहितान्वयवाद, अन्विताभिधानवाद, रसस्वरूप एवं रससूत्र विमर्श, रसदोष, काव्यगुण, व्यंजनावृत्ति की स्थापना (पञ्चम उल्लास)

  अंलकार:-

  वक्रोक्ति, अनुप्रास, यमक, श्लेष, उपमा, रूपक, उत्प्रेक्षा, समासोक्ति, अपह्नुति, निदर्शना, अर्थान्तरन्यास, दृष्टान्त, विभावना, विशेषोक्ति, स्वभावोक्ति, विरोधाभास, सकंर, संसृष्टि।

- **ध्वन्यालोक: (प्रथम उद्योत)**
- **वक्रोक्तिजीवितम् (प्रथम उन्मेष)**
- **भरत-नाट्यशास्त्रम् (द्वितीय एवं षष्ठ अध्याय)**
- **दशरूपकम् (प्रथम तथा तृतीय प्रकाश)**
- **छन्द परिचय –**

  आर्या, अनुष्टुप्, इन्द्रवज्रा, उपेन्द्रवज्रा, वसन्ततिलका, उपजाति, वंशस्थ, द्रुतविलम्बित, शालिनी, मालिनी, शिखरिणी, मन्दाक्रान्ता, हरिणी, शार्दूलविक्रीडित, स्रग्धरा।

इकाई-IX

पुराणेतिहास, धर्मशास्त्र एवं अभिलेखशास्त्र

(क) निम्नलिखित का सामान्य परिचयः

- **रामायण** – विषयवस्तु, काल, रामायणकालीन समाज, परवर्ती ग्रन्थों के लिए प्रेरणास्त्रोत, साहित्यिक महत्त्व, रामायण में आख्यान
- **महाभारत** – विषयवस्तु, काल महाभारतकालीन समाज, परवर्ती ग्रन्थों के लिए प्रेरणास्त्रोत, साहित्यिक महत्त्व, महाभारत में आख्यान।
- **पुराण** – पुराण की परिभाषा, महापुराण – उपपुराण, पौराणिक सृष्टि-विज्ञान, पौराणिक आख्यान।
- **प्रमुख स्मृतियों का सामान्य परिचय।**
- **अर्थशास्त्र का सामान्य परिचय।**
- **लिपि :** ब्राह्मी लिपि का इतिहास एवं उत्पत्ति के सिद्धान्त।
- **अभिलेख का सामान्य परिचय**

इकाई-X

(ख) निम्नलिखित ग्रन्थों का विशिष्ट अध्ययन

- कौटिलीय-अर्थशास्त्रम् (प्रथम-विनयाधिकारिक)
- मनुस्मृतिः - (प्रथम, द्वितीय तथा सप्तम अध्याय)
- याज्ञवल्क्यस्मृतिः - (व्यवहाराध्याय)
- लिपि तथा अभिलेख -
  - गुप्तकालीन तथा अशोककालीन ब्राह्मी लिपि।
  - अशोक के अभिलेख - प्रमुख शिलालेख, प्रमुख स्तम्भलेख
  - मौर्योत्तरकालीन अभिलेख – कनिष्क के शासन वर्ष 3 का सारनाथ बौद्ध प्रतिमा लेख, रुद्रदामन् का गिरनार शिलालेख, खारवेल का हाथीगुम्फा अभिलेख
  - गुप्तकालीन एवं गुप्तोत्तरकालीन अभिलेख – समुद्रगुप्त का इलाहाबाद स्तम्भलेख, यशोधर्मन् का मन्दसौर शिलालेख, हर्ष का बांसखेड़ा ताम्रपट्ट अभिलेख, पुलकेशिन् द्वितीय का ऐहोल शिलालेख