Direct Recruitment of Teaching Post
(Assistant Professor)

Syllabus for Written Test

Acknowledgement

The syllabus has been developed with reference to the broad curriculum frameworks of UGC-NET, ICAR NET/ARS and the Uttar Pradesh Education Services Selection Commission (formerly Uttar Pradesh Higher Education Services Selection Commission), with suitable adaptation for this recruitment.

Maharaja Suhel Dev University, Azamgarh

CONTENT

1. ENGLISH

UNIT-I : Literature and Society in the following periods

(a) Renaissance (b) Reformation (c) Restoration
(d) Neo-classical Period (e) Romantic Period (f) Victorion Period
(g) Modern Period (h) Post-Modern Period

UNIT-II : British Drama

C. Marlowe : *Doctor Faustus*, *The Jew of Malta*
Ben Jonson : *Everyman in His Humour*
W. Shakespeare : *Hamlet*, *King Lear*, *The Twelfth Night*, *As You Like It*, *The Tempest*, *King Henry* IV, Part I & II
John Dryden : *All For Love*
W. Congreve : *The Way of the World*
John Webster : *The Duchess of Malfi*
John Galsworthy : *Strife*, *Escape*
George Bernard Shaw : *Candida*, *Saint Joan*, *Man and Superman*
John Synge : *The Playboy of the Western World*
T.S. Eliot : *Murder in the Cathedral*
Sammuel Beckett : *Waiting for Godot*
John Osborme : *Look Back in Anger*
Harold Pinter : *The Birthday Party*
Arnold Wesker : *Roots*

UNIT-III : British Prose and Fiction

Francis Bacon : 'Of Truth', 'Of Revenge', 'Of Studies', 'Of Marriage and Single Life', 'Of Regimen of Health'
John Milton : 'Areopagitica'
Addison and Steele : Essays dealing with Coverly Papers from 'The Spectator'.
Charles Lamb : 'The South Sea House', 'Dream Children', 'Christ Hospital Five and Thirty Years Ago', 'The Convalescent', 'Poor Relations', 'Imperfect Sympathies'
Thomas Carlyle : 'The Hero as a Poet'
William Hazlitt : 'Public Opinion', 'On Reading Old Books', 'On Reading New Books'
T.B. Macaulay : 'Minutes on Education' (1835)
Virginia Woolf : 'A Room of One's Own'
George Orwell : 'Politics and the English Language'
Henry Fielding : *Joseph Andrews*
Jane Austen : *Pride and Prejudice*
Charles Dickens : *Great Expectations*, *A Tale of Two Cities*
George Eliot : *Middle March*
Thomas Hardy : *Tess of the D'Urbervilles*
D.H. Lawrence : *Sons and Lovers*
Graham Greene : *The Power and the Glory*
William Golding : *Lord of the Flies*
Iris Murdoch : *The Sea*

UNIT-IV : British Poetry

G. Chaucer	: 'The Prologue to the Canterbury Tales'
E. Spenser	: 'The Faerie Queene Book I'
John Donne	: 'The Canonization', 'The Flea', 'A Valediction Forbidding Mourning', 'Goe and Catche a Falling Starre', 'A Hymme to God the Father'
J. Milton	: 'Paradise Lost', Book I & II
J. Dryden	: 'Absalom & Achitophel'
A. Pope	: 'The Rape of the Lock'
William Blake	: 'London'
Thomas Gray	: 'Elegy Written in a Country Churchyard'
William Wordsworth	: 'The Prelude' Book I, 'Tintern Abbey'
S.T. Coleridge	: 'The Rime of the Ancient Mariner', 'Kubla Khan'
P.B. Shelley	: 'Ode to the West Wind', 'Adonais', 'England in 1819'
John Keats	: 'Ode on a Grecian Urn', 'Ode to a Nightingale', 'Ode to Autumn'
A. Tennyson	: 'Lady of Shallot', 'Ulysses', 'The Princess', 'The Lotos Eaters'
Robert Browning	: 'Rabbi Ben Ezra', 'Prospice', 'A Grammarian's Funeral', 'The Last Ride Together', 'My Lat Duchess'
Matthew Arnold	: 'The Scholar Gypsy', 'Thyrsis', 'Dover Beach'
W.B. Yeats	: 'Easter 1916', 'The Second Coming', 'A Prayer for my Daughter', 'Among School Children', 'Sailing to Byzantium', 'Lapis Lazuli', 'Byzantium'
T.S. Eliot	: 'The Love Song of J. Alfred Prufrock', 'The Waste Land', 'Burnt Norton'
W.H. Auden	: 'Petition', 'In Memory of W.B. Yeats', 'Consider','The Shield of Achilles', 'Partition', 'The Unknown Citizen'
Philip Larkin	: 'The Whitsun Weddings', 'Ambulances', 'Church Going'
Ted Hughes	: 'The Crow', 'Hawk Roosting', 'The Thought Fox'

UNIT-V : Literary Theory and Criticism

Aristotle	: 'Poetics'
Longinus	: 'On the Sublime'
J. Dryden	: 'An Essay of Dramatic Poesy'
Dr Johnson	: 'Preface to Shakespeare'
W. Wordsworth	: 'Preface to Lyrical Ballads'
S.T. Coleridge	: *Biographia Literaria* (Chaps XIII, XIV, XVIII)
Matthew Arnold	: 'Study of Poetry', 'Shelley', 'Wordsworth', 'Culture and Anarchy'
T.S. Eliot	: 'Tradition and the Individual Talent', 'Hamlet', 'The Metaphysical Poets'
I.A. Richards	: *The Principles of Literary Criticism*
F.R. Leavis	: 'Johnson and Augustanism', 'Literature and Society', 'Literary Criticism and Philosophy'
Practical Criticism	

UNIT-VI : Literary Theory and Literary Criticism

Structuralism, Deconstruction, Historicism, New Historicism, Feminism, Post-Colonialism, Cultural Theory,Russian Formalism, New Criticism, Psycho-analytical Criticism, Marxism, Reader-Response Theory, Technological Criticism, Indian Poetics – Rasa, Dhvani Schools

UNIT-VII : American Literature

R.W. Emerson	: 'Each and All', 'Hamatreya', 'Brahma', 'The Over Soul'
Walt Whitman	: 'One's Self I Sing', 'When Lilacs Last in the Dooryard Bloomed', 'A Passage to India', 'Crossing Brooklyn Ferry'
Emily Dickinson	: 'I never Lost as Much but Twice', 'Success is Counted Sweetest', 'I felt a Funeral in my Brain', 'If I should Die and you should Live'
Robert Frost	: 'Birches', 'Mending Wall', 'Stopping by Woods on a Snowy Evening', 'The Road not Taken', 'Mowing', 'The Death of the Hired Man'

Wallace Stevens : 'The Emperor of Ice Cream', 'Thirteen Ways of Looking at a Black Bird', 'The World as Meditation'
Eugene O' Neill : *The Hairy Ape*
Tennessee Williams : *The Glass Manegerie*
Arthur Miller : *Death of a Salesman*
N. Hawthorne : *The Scarlet Letter*
E. Hemingway : *The Old Man and the Sea*
H. Melville : *Moby Dick*
Mark Twain : *The Adventures of Huckleberry Finn*
H.D. Thoreau : *Civil Disobedience.*

UNIT-VIII : Indian Literature in English

Toru Dutt : 'Lakshman', 'The Lotus', 'Our Casuarina Tree'
Sarojini Naidu : 'Planquin Bearers', 'Bangle-sellers', 'Weavers', 'The Flute-Players', 'Of Vrindavan'
R.N. Tagore : *Gitanjali*
M.K. Gandhi : *Hind Swaraj*
Swami Vivekanand : 'Chicago Lecture'
Sri Aurodindo : *Savitri* Canto I, 'The Future Poetry', 'Is India Civilized'
Nissim Ezekiel : 'A Time to Change', 'Enterprise', 'Poet', 'Lover', 'Birdwatcher', 'Background', 'Casually'
Kamala Das : 'An Introduction', 'My Grandmother's House', 'Summer in Calcutta'
A.K. Ramanujan : 'Self – Portrait', 'A River', 'The Fall', 'Fear No Fall'
Raja Rao : *Kanthapura*
R.K. Narayan : *The Guide*
Anita Desai : *Cry the Peacock*
Shashi Deshpande : *That Long Silence*

UNIT-IX : Linguistics, Phonetics & Modern Grammar

1. Properties of Human Language
2. Scope and Branches of Linguistics
3. Language Varieties and Language Change
4. Saussure's Concept of Linguistic Sign, Immutability and Mutability of Sign.
5. Speech Mechanism and Phonemes in English
6. Consonant Clusters, Syllables and Word Stress
7. English Morphology and Syntax.
8. Chomsky's Transformational and Generative Grammar and Leech's Communicative Grammar
9. Stylistics and Literary Criticism, Discourse Analysis, ELT & ESP
10. Language Planning.

UNIT-X : New Literatures in English

Australian and New Zealand Literature

Patrick White : *Voss*
Sally Morgan : *My Place*
Peter Porter : 'Your Attention Please'
Pry Lawler : *Summer of the Seventeenth Doll*
Allen Curnow : 'Time', 'House and Land'

Canadian Literature

M.G. Vassanji : 'Am I a Canadian Writer ?'
Marshall McLuhan : *The Mechanical Bride : Folklore of Industrial Man*
Margaret Atwood : *Surfacing*
A.M. Klein : 'Indian Reservation : Caughnwaga'

P.K. Page : 'First Neighbours'
Earle Birney : 'Bushed', 'The Bear on the Delhi Road'

African and Caribbean Literature

Chinua Achebe : *Things Fall Apart*
Dennis Brutus : 'A Common Hate Enriched our Love and US'
Gabriel Okara : *The Mystic Drum*
David Diop : 'Africa'
Edward Braithwaite : 'Tizzic'
Derek Walcott : 'Ruins of a Great House'
Mervyn Morris : 'Judas'
Wole Soyinka : *Lion and the Jewel*
Nadine Gordimer : 'English Language Literature and Politics in South Africa'

2. ECONOMICS

Unit-1: Micro-Economic Analysis

- Demand Analysis - Marshallian, Hicksian and Revealed Preference Approach.
- Theory of Production and Cost Curves.
- Pricing and Output determination under Perfect, Monopoly, Monopolistic and Oligopoly Markets.
- General Equilibrium and Welfare Economics.
- Managerial Theories of the firm - Baumol, Marris and Williamson.

Unit-2: Macro-Economic Analysis

- Determination of Output and Employment - Classical approach, Keynesian & Post Keynesian approach, Consumption hypotheses.
- Phillips Curve Analysis.
- Business Cycle Models: Samuelson, Hicks and Kaldor.
- Fiscal and Monetary Policies and IS-LM Model.

Unit-3: Development and Planning

- Measurement of Development: Conventional, HDI and Quality of Life Indices.
- Theories of Development - Classical, Marx and Schumpeter;
- Approaches to development: Vicious circle of poverty, Theory of Circular and cumulative causation Myrdal, Balanced growth, Critical Minimum Effort, Big Push, Unlimited supply of labour, Unbalanced Growth, low income equilibrium trap.
- Choice of techniques and appropriate technology - Investment criteria - Elementary idea of cost, benefit analysis.
- Development Techniques of planning; Planning in a market - oriented economy.
- NITI Ayog: Objectives and Features

Unit-4: Growth Economics

- Economic Growth, Economic Development and Sustainable Development
- Models of Economic Growth - Harrod - Domar Model, Neoclassical Growth Model – Solow

Unit-5: Money and Banking

- Demand for Money - Fisher and Cambridge versions, Approaches of Keynesian, Friedman, Baumol and Tobin.
- Supply of Money, Determinants of Money Supply, High - powered money, Money Multiplier.
- Money and banking - Concepts of Money Supply, Organisation of India's Money Market, Changing role of RBI, Inflation - Concept, Trends, Estimates, Consequences and Remedies; Monetary Policy and Financial Sector Reforms.

Unit-6: Public Finance

- Role of the Government in an Economy - Allocation, distribution and stabilization functions; Private, Public and Merit goods.
- Budget - Components of Budget, Kinds of Budgets, Zero - Base Budgeting, Concept of Deficit, Types and effects of Deficit; Budgets of the Union Government in India; Formulation and Enactment
  Public Expenditure: Meaning and Scope, Theories of Public Expenditure.

- Public Revenue - Different approaches to the division of tax burden, incidence and effects of taxation; elasticity and buoyancy; taxable capacity
  Public Debt - Objectives and Importance, Sources, Effects, Burden and its management.
- Fiscal Federalism - Concept, Theory and Problems; Problems of Centre - State Financial relations in India, Role of Finance Commission in India
- Fiscal Policy - Objectives and Instruments of Fiscal Policy, Compensatory Fiscal Policy,
- Concept of Functional Finance; Role of Fiscal Policy in a Developing Economy like India.

Unit-7: International Economics

- Theories of International Trade: Neo-Classical (Haberler) and Modern Theory of Trade (Heckscher-Ohlin); Terms of Trade and Gains from Trade; Terms of Trade and Economic Growth; Factors Influencing Terms of Trade.
- Balance of Payment - Overview, Adjustment and Equilibrium in BOP, Elasticity, Absorption and Monetary Approaches for adjustment in the Balance of Payments; Exchange Rate.
- Impact of Tariff and Non- Tariff Barriers, Partial and General Equilibrium Analysis of Tariff and Non-Tariff Barriers.
- Theory of regionalism at Global level - Collapse of Bretton - Woods System -Recent.
- Role of Multilateral Development Bodies (MDBs) like WTO, IMF, World Bank in economic development.

Unit-8: Indian Economy - I

- Characteristics of a Developing Economy; Basic Economic Indicators - National income,
  Performance of different sectors; Concept of Energy - Renewable and Non-Renewable Sources of Energy.
- Agriculture - Institutional and Technological Aspects, Agricultural Policy in India, Land Reforms in India, Rural Credit, Agricultural Price Policy, Public Distribution System (PDS) and Food Security in India.
- Population Growth - Characteristics of India's population through recent census.

Unit-9: Indian Economy - II

- Industry - Industrial Policy Reforms, Reservation Policy, Competition Policy, MSME Act.
- Foreign Trade - Trends, Balance of payments and Trade Reforms in India, Foreign exchange rate reforms; Composition and Direction of India's Foreign Trade, India and WTO
  Requirements, Bilateral Trade Agreements, FDI.
- Poverty, Unemployment, and Human Development - Estimates of Inequality and Poverty measures for India, HDI and India's ranking in HDI.

Unit-10: Statistical Methods

- Measures of Central tendency, dispersion, skewness and kurtosis.
- Elementary theory of probability - Binomial, Poisson and Normal distributions.
- Simple correlation and regression analysis.
- Statistical inferences - Applications, sampling distributions (t, x2 and F tests) sampling of attributes, testing of Hypothesis.
- Index numbers and time series analysis.
- Sampling and census methods, types of sampling and errors.

3. History

1 : Medieval Indian History :

I. Sources

Epigraphic and numismatic materials and monuments.
Literary sources- Persian, Sanskrit and Regional languages.
Foreign traveller's accounts.

II. Political Developments

The Sultanate – the Ghorids, the Turks, the Khaljis, the Tughlaqs, the Sayyids and the Lodis.
Foundation of the Mughal Empire – Babur, Humayun and the Suris ; expansion from Akbar to Aurangzeb.
Challenges to the Mughal Power & its decline – political, administrative and economic & cultural causes, Challenges by Ahoms, Bundelas, Sikhs and Jats, Later Mughals and disintegration of the Mughal empire.
The Vijayanagara and the Bahmanis – rise, expansion and disintegration. The Maratha movement, the foundation of Swaraj by Shivaji ; its expansion under the Peshwas ; Maratha
Confederacy – causes of decline.

III. Administration

Administration under the Sultanate – civil, judicial, revenue, fiscal and military.
Sher Shah's administrative reforms; Mughal administration – land revenue and other sources of income; Mansabdari and Jagirdari.
Administrative system in the Deccan – the Vijayanagara, the Bahmanis and the Marathas.

IV. Economic Aspects :

Agricultural production – village economy ; peasantry.
Urban centres and population.
Industries – cotton textiles, handicrafts, agro – based industries, organization, factories, technology.
Trade and commerce – State policies, internal and external trade; European trade, trade centres and ports, transport and communication.
Financing trade, commerce and industries; Hundi (Bills of Exchange) and Insurance.
Currency.

V. Society and Culture

The Sufis – their orders, beliefs, practices and their activities. Famous Sufi Saint
Bhakti movement – Shaivism and its branches; Vaishnavism and its branches.
The Saints of the medieval period – north and south – their impact on socio – political and religious life.
The Sikh movement – Guru Nanak Dev and his teachings and practices, Adi Granth; the Khalsa.
Classification – ruling class, major religious groups, the mercantile and professional classes.
Rural society – petty chieftains, village officials, cultivators and non – cultivating classes, artisans.
Position of women and the Harem in Medieval India.
Educational Systems and their motivations.
Literature – Persian, Sanskrit and Regional languages.

Fine Arts – Major schools of painting ; music.
Decay of Ancient monuments and development of new architecture in North and South India; Indo – Islamic architecture.

2 : History of Modern India

I. Rise of British Power :

European traders in India in the 17th and 18th centuries – Portuguese, Dutch, French and the British, The cultural & economic base of Colonialism.
The establishment and expansion of British dominion in India.
British relations with the major powers of India and their modernization. Bengal, Oudh, Hyderabad, Mysore, Marathas and the Sikhs.
Administration under the Company and the Crown.
Evolution of central and provincial structure under the East India Company, 1773 – 1853.
Paramountcy, Civil Service, Judiciary, Police and the Army under the Company and Crown.
Local Self – Government.
Constitutional changes, 1909 – 1935.

II. Economic and Society :

Changing composition, volume and direction of trade; The Tribute. Expansion and commercialisation of agriculture, land rights, land settlements, rural indebtedness, landless labour.
Decline of industries and Modernization Myth; changing socio – economic conditions of artisans; De – industrialisation.
British Industrial Policy; major modern industries; nature of factory legislation; labour and trade union movements.
Monetary policy, banking, currency and exchange, Railways and Road Transport.
Growth of new urban centres; new features of town planning and architecture.
Famines, and epidemics and the government policy.
Economic Thought – English utilitarians; Indian economic historians ; the Drain theory.
Contact with Christianity – the Missions- construction of the myth – Bharat a Pagan society, critique of Indian social, Religious and Cultural practices educational and other activities.
Colonial Education –Content, structure and objectives
Nationalist initiatives in education.
Socio-religious reforms : Reforms breaking away from tradition and socio-religious reforms in defense of tradtion ; emergence of middle class; caste associations and caste mobility.
Women's Question – Nationalist Discourse; Women's Organisations; British legislations concerning women; Constitutional position.
Development of the Press –Pro Imperialist and Nationalist, Measures by colonial Government to subjugate the Nationalist expreesion-Press Laws
Vernacular literature and its literary forms – reorientation in painting, music and performing arts, revival of folk arts during Swadeshi movement.

III. National Movement

Different interpretations of Indian Nationalism, Rise of Indian nationalism, Resistance to Colonial Milieu - social, cultural and economic bases of nationalism.
First War of Independence: 1857 participation of different social classes, Geographical extent of 1857
Resistance by Tribals and peasants to the Colonial Government
Ideologies and programmes of the Indian National Congress, 1885 – 1920, with special reference to Tilak's idea of Swaraj and Gokhale's vision of India and Sri Arbonod's political philosophy, Home Rule movement .

Idelogy of Swadeshi and trends in the Swadeshi movement, Government response to Swadeshi movement
Ideologies and programs of Indian revolutionaries in India and abroad.
Gandhian Mass Movements.
Subhash Chand Bose-fallout with Congress and INA
Ideology and program of the Justice Party.
Left Wing Politics- The Communist ideology and politics in the national movement; Role of Congress Socialist Party
Movement of the Depressed classes.
Communal politics and genesis of Pakistan.
Towards Independence and Partition.

IV. India after Independence (1947 – 1964)

Question of Refugees and Rehabilitation after Partition.
Integration of the Indian States; The Kashmir Question, the Hyderabad Question and Sardar Patel
The making of the Indian Constitution.
The structure of Bureaucracy and the Police.
The demographic trends.
Debates on the question on Development; Economic policies and the planning process.
Linguistic reorganisation of States.
Foreign policy initiatives.

V. World History : Concepts, Ideas and Terms & Research in History :

Feudalism
Non - alignment
Parliamentary Democracy
Nazism
Commonwealth
Colonialism
Neo-colonialism
Mercantilism
Imperialism
Capitalism
Socialism
Balance of Power
Apartheid
Human Rights
Cold War
Post – modernism
Globalization
Scope and value of History
Objectivity and Bias in History
History and its auxiliary sciences

4. COMPUTER SCIENCE

Unit - 1 : Discrete Structures and Optimization

Mathematical Logic: Propositional and Predicate Logic, Propositional Equivalences, Normal Forms, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference.

Sets and Relations: Set Operations, Representation and Properties of Relations, Equivalence Relations, Partially Ordering.

Counting, Mathematical Induction and Discrete Probability: Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Inclusion- Exclusion Principle, Mathematical Induction, Probability, Bayes' Theorem.

Group Theory: Groups, Subgroups, Semi Groups, Product and Quotients of Algebraic Structures, Isomorphism, Homomorphism, Automorphism, Rings, Integral Domains, Fields, Applications of Group Theory.

Graph Theory: Simple Graph, Multigraph, Weighted Graph, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Planner graph, Graph Coloring, Bipartite Graphs, Trees and Rooted Trees, Prefix Codes, Tree Traversals, Spanning Trees and Cut-Sets.

Boolean Algebra: Boolean Functions and its Representation, Simplifications of Boolean Functions.

Optimization: Linear Programming - Mathematical Model, Graphical Solution, Simplex and Dual Simplex Method, Sensitive Analysis; Integer Programming, Transportation and Assignment Models, PERT-CPM: Diagram Representation, Critical Path Calculations, Resource Levelling, Cost Consideration in Project Scheduling.

Unit - 2 : Computer System Architecture

Digital Logic Circuits and Components: Digital Computers, Logic Gates, Boolean Algebra, Map Simplifications, Combinational Circuits, Flip-Flops, Sequential Circuits, Integrated Circuits, Decoders, Multiplexers, Registers and Counters, Memory Unit.

Data Representation: Data Types, Number Systems and Conversion, Complements, Fixed Point Representation, Floating Point Representation, Error Detection Codes, Computer Arithmetic - Addition, Subtraction, Multiplication and Division Algorithms.

Register Transfer and Microoperations: Register Transfer Language, Bus and Memory Transfers, Arithmetic, Logic and Shift Microoperations.

Basic Computer Organization and Design: Stored Program Organization and Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Interrupt.

Programming the Basic Computer: Machine Language, Assembly Language, Assembler, Program Loops, Subroutines, Input-Output Programming.

Microprogrammed Control: Control Memory, Address Sequencing, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC Computer, CISC Computer.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing Array Processors.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Serial Communication.

Memory Hierarchy: Main Memory, Auxillary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration, Interprocessor Communication and Synchronization, Cache Coherence, Multicore Processors.

Unit - 3 : Programming Languages and Computer Graphics

Language Design and Translation Issues: Programming Language Concepts, Paradigms and Models, Programming Environments, Virtual Computers and Binding Times, Programming Language Syntax, Stages in Translation, Formal Transition Models.

Elementary Data Types: Properties of Types and Objects; Scalar and Composite Data Types.

Programming in C: Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions, File Handling, Command Line Argumaents, Preprocessors.

Object Oriented Programming: Class, Object, Instantiation, Inheritance, Encapsulation, Abstract Class, Polymorphism.

Programming in C++: Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.

Web Programming: HTML, DHTML, XML, Scripting, Java, Servlets, Applets.

Computer Graphics: Video-Display Devices, Raster-Scan and Random-Scan Systems; Graphics Monitors, Input Devices, Points and Lines; Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms; Scan Line Polygon Fill Algorithm, Boundary-Fill and Flood-Fill.

2-D Geometrical Transforms and Viewing: Translation, Scaling, Rotation, Reflection and Shear Transformations; Matrix Representations and Homogeneous Coordinates; Composite Transforms, Transformations Between Coordinate Systems, Viewing Pipeline, Viewing Coordinate Reference Frame, Window to View-Port Coordinate Transformation, Viewing Functions, Line and Polygon Clipping Algorithms.

3-D Object Representation, Geometric Transformations and Viewing: Polygon Surfaces, Quadric Surfaces, Spline Representation, Bezier and B-Spline Curves; Bezier and B-Spline Surfaces; Illumination Models, Polygon Rendering Methods, Viewing Pipeline and Coordinates; General Projection Transforms and Cipping.

Unit – 4 : Database Management Systems

Database System Concepts and Architecture: Data Models, Schemas, and Instances; Three-Schema Architecture and Data Independence; Database Languages and Interfaces; Centralized and Client/Server Architectures for DBMS.

Data Modeling: Entity-Relationship Diagram, Relational Model - Constraints, Languages, Design, and Programming, Relational Database Schemas, Update Operations and Dealing with Constraint Violations; Relational Algebra and Relational Calculus; Codd Rules.

SQL: Data Definition and Data Types; Constraints, Queries, Insert, Delete, and Update Statements; Views, Stored Procedures and Functions; Database Triggers, SQL Injection.

Normalization for Relational Databases: Functional Dependencies and Normalization; Algorithms for Query Processing and Optimization; Transaction Processing, Concurrency Control Techniques, Database Recovery Techniques, Object and Object-Relational Databases; Database Security and Authorization.

Enhanced Data Models: Temporal Database Concepts, Multimedia Databases, Deductive Databases, XML and Internet Databases; Mobile Databases, Geographic Information Systems, Genome Data Management, Distributed Databases and Client-Server Architectures.

Data Warehousing and Data Mining: Data Modeling for Data Warehouses, Concept Hierarchy, OLAP and OLTP; Association Rules, Classification, Clustering, Regression,

Support Vector Machine, K-Nearest Neighbour, Hidden Markov Model, Summarization, Dependency Modeling, Link Analysis, Sequencing Analysis, Social Network Analysis.

Big Data Systems: Big Data Characteristics, Types of Big Data, Big Data Architecture, Introduction to Map-Reduce and Hadoop; Distributed File System, HDFS.
NOSQL: NOSQL and Query Optimization; Different NOSQL Products, Querying and Managing NOSQL; Indexing and Ordering Data Sets; NOSQL in Cloud.

Unit – 5 : System Software and Operating System

System Software: Machine, Assembly and High-Level Languages; Compilers and Interpreters; Loading, Linking and Relocation; Macros, Debuggers.

Basics of Operating Systems: Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot.
Process Management: Process Scheduling and Operations; Interprocess Communication, Communication in Client–Server Systems, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores, Synchronization.

Threads: Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.

CPU Scheduling: Scheduling Criteria and Algorithms; Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling.

Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance and Detection; Recovery from Deadlock.

Memory Management: Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.

Storage Management: Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure.

File and Input/Output Systems: Access Methods, Directory and Disk Structure; File-System Mounting, File Sharing, File-System Structure and Implementation; Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance; Recovery, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

Security: Protection, Access Matrix, Access Control, Revocation of Access Rights, Program Threats, System and Network Threats; Cryptography as a Security Tool, User Authentication, Implementing Security Defenses.

Virtual Machines: Types of Virtual Machines and Implementations; Virtualization.

Linux Operating Systems: Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output; Interprocess Communication, Network Structure.

Windows Operating Systems: Design Principles, System Components, Terminal Services and Fast User Switching; File System, Networking.

Distributed Systems: Types of Network based Operating Systems, Network Structure, Communication Structure and Protocols; Robustness, Design Issues, Distributed File Systems.

Unit – 6 : Software Engineering

Software Process Models: Software Process, Generic Process Model – Framework Activity, Task Set and Process Patterns; Process Lifecycle, Prescriptive Process Models, Project Management, Component Based Development, Aspect-Oriented Software Development, Formal Methods, Agile Process Models – Extreme Programming (XP), Adptive Software Development, Scrum, Dynamic System Development Model, Feature Driven Development, Crystal, Web Engineering**.**

Software Requirements: Functional and Non-Functional Requirements; Eliciting Requirements, Developing Use Cases, Requirement Analysis and Modelling; Requirements Review, Software Requirment and Specification (SRS) Document.

Software Design: Abstraction, Architecture, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Cohesion and Coupling; Object-Oriented Design, Data Design, Architectural Design, User Interface Design, Component Level Design.

Software Quality: McCall's Quality Factors, ISO 9126 Quality Factors, Quality Control, Quality Assurance, Risk Management, Risk Mitigation, Monitoring and Management (RMMM); Software Reliability.

Estimation and Scheduling of Software Projects: Software Sizing, LOC and FP based Estimations; Estimating Cost and Effort; Estimation Models, Constructive Cost Model (COCOMO), Project Scheduling and Staffing; Time-line Charts.

Software Testing: Verification and Validation; Error, Fault, Bug and Failure; Unit and Integration Tesing; White-box and Black-box Testing; Basis Path Testing, Control Structure Testing, Deriving Test Cases, Alpha and Beta Testing; Regression Testing, Performance Testing, Stress Testing.

Software Configuration Management: Change Control and Version Control; Software Reuse, Software Re-engineering, Reverse Engineering.

Unit – 7 : Data Structures and Algorithms

Data Structures: Arrays and their Applications; Sparse Matrix, Stacks, Queues, Priority Queues, Linked Lists, Trees, Forest, Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree, B Tree, B+ Tree, B* Tree, Data Structure for Sets, Graphs, Sorting and Searching Algorithms; Hashing.

Performance Analysis of Algorithms and Recurrences: Time and Space Complexities; Asymptotic Notation, Recurrence Relations.

Design Techniques: Divide and Conquer; Dynamic Programming, Greedy Algorithms, Backtracking, Branch and Bound.

Lower Bound Theory: Comparison Trees, Lower Bounds through Reductions.

Graph Algorithms: Breadth-First Search, Depth-First Search, Shortest Paths, Maximum Flow, Minimum Spanning Trees.

Complexity Theory: P and NP Class Problems; NP-completeness and Reducibility.

Selected Topics: Number Theoretic Algorithms, Polynomial Arithmetic, Fast Fourier Transform, String Matching Algorithms.

Advanced Algorithms: Parallel Algorithms for Sorting, Searching and Merging, Approximation Algorithms, Randomized Algorithms.

Unit – 8 : Theory of Computation and Compilers

Theory of Computation: Formal Language, Non-Computational Problems, Diagonal Argument, Russels's Paradox.

Regular Language Models: Deterministic Finite Automaton (DFA), Non-Deterministic Finite Automaton (NDFA), Equivalence of DFA and NDFA, Regular Languages, Regular Grammars, Regular Expressions, Properties of Regular Language, Pumping Lemma, Non-Regular Languages, Lexical Analysis.

Context Free Language: Pushdown Automaton (PDA), Non-Deterministic Pushdown Automaton (NPDA), Context Free Grammar, Chomsky Normal Form, Greibach Normal Form, Ambiguity, Parse Tree Representation of Derivation Trees, Equivalence of PDA's and Context Free Grammars; Properties of Context Free Language.

Turing Machines (TM): Standard Turing Machine and its Variations; Universal Turing Machines, Models of Computation and Church-Turing Thesis; Recursive and Recursively-Enumerable Languages; Context-Sensitive Languages, Unrestricted Grammars, Chomsky Hierarchy of Languages, Construction of TM for Simple Problems.

Unsolvable Problems and Computational Complexity: Unsolvable Problem, Halting Problem, Post Correspondence Problem, Unsolvable Problems for Context-Free Languages, Measuring and Classifying Complexity, Tractable and Intractable Problems.

Syntax Analysis: Associativity, Precedence, Grammar Transformations, Top Down Parsing, Recursive Descent Predictive Parsing, LL(1) Parsing, Bottom up Parsing, LR Parser, LALR(1) Parser.

Semantic Analysis: Attribute Grammar, Syntax Directed Definitions, Inherited and Synthesized Attributes; Dependency Graph, Evaluation Order, S-attributed and L-attributed Definitions; Type-Checking.

Run Time System: Storage Organization, Activation Tree, Activation Record, Stack Allocation of Activation Records, Parameter Passing Mechanisms, Symbol Table.

Intermediate Code Generation: Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls.

Code Generation and Code Optimization: Control-flow, Data-flow Analysis, Local Optimization, Global Optimization, Loop Optimization, Peep-Hole Optimization, Instruction Scheduling.

Unit – 9 : Data Communication and Computer Networks

Data Communication: Components of a Data Communication System, Simplex, Half-Duplex and Duplex Modes of Communication; Analog and Digital Signals; Noiseless and Noisy Channels; Bandwidth, Throughput and Latency; Digital and Analog Transmission; Data Encoding and Modulation Techniques; Broadband and Baseband Transmission; Multiplexing, Transmission Media, Transmission Errors, Error Handling Mechanisms.

Computer Networks: Network Topologies, Local Area Networks, Metropolitan Area Networks, Wide Area Network, Wireless Networks, Internet.

Network Models: Layered Architecture, OSI Reference Model and its Protocols; TCP/IP Protocol Suite, Physical, Logical, Port and Specific Addresses; Switching Techniques.

Functions of OSI and TCP/IP Layers: Framing, Error Detection and Correction; Flow and Error Control; Sliding Window Protocol, HDLC, Multiple Access – CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, CDMA, TDMA, Network Devices, Backbone Networks, Virtual LANs.
IPv4 Structure and Address Space; Classful and Classless Addressing; Datagram, Fragmentation and Checksum; IPv6 Packet Format, Mapping Logical to Physical Address (ARP), Direct and Indirect Network Layer Delivery; Routing Algorithms, TCP, UDP and SCTP Protocols; Flow Control, Error Control and Congestion Control in TCP and SCTP.

World Wide Web (WWW): Uniform Resource Locator (URL), Domain Name Service (DNS), Resolution - Mapping Names to Addresses and Addresses to Names; Electronic Mail Architecture, SMTP, POP and IMAP; TELNET and FTP.

Network Security: Malwares, Cryptography and Steganography; Secret-Key Algorithms, Public-Key Algorithms, Digital Signature, Virtual Private Networks, Firewalls.

Mobile Technology: GSM and CDMA; Services and Architecture of GSM and Mobile Computing; Middleware and Gateway for Mobile Computing; Mobile IP and Mobile Communication Protocol; Communication Satellites, Wireless Networks and Topologies; Cellular Topology, Mobile Adhoc Networks, Wireless Transmission and Wireless LANs; Wireless Geolocation Systems, GPRS and SMS.

Cloud Computing and IoT: SaaS, PaaS, IaaS, Public and Private Cloud; Virtualization, Virtual Server, Cloud Storage, Database Storage, Resource Management, Service Level Agreement, Basics of IoT.

Unit – 10 : Artificial Intelligence (AI)

Approaches to AI: Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.

Knowledge Representation: Logic, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency and Ontologies; Expert Systems, Handling Uncertainty in Knowledge.

Planning: Components of a Planning System, Linear and Non Linear Planning; Goal Stack Planning, Hierarchical Planning, STRIPS, Partial Order Planning.

Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Prgamatics.
Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools.

Fuzzy Sets: Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems.

Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.

Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi Layer Perceptron, Self Organizing Maps, Hopfield Network.

5. MATHEMATICS

Unit- 1. ALGEBRA :

Cyclic groups, permutation groups, Cayley's Theorem, Fundamental Theorem of homomorphism, Group action, class equation, Sylow theorems and their applications; Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain, Polynomial rings, Fields, finite fields, field extensions, Modules, Noetherian modules, Hilbert basis theorem.

Unit-2. LINEAR ALGEBRA :

Linear transformations, Algebra of linear transformations, kernel, range, Rank-Nullity Theorem, Matrix representation of a linear transformation, change of bases, linear functionals, dual spaces, rank, system of linear equations, eigen values and eigen vectors, Cayley – Hamilton Theorem, diagonalization, Hermitian, Skew- Hermitian and Unitary matrices, Finite dimensional inner product spaces, Gram Schmidt-Quadratic forms, reduction and classification of quadratic forms. Rational and Jordan canonical forms

Unit-3. ANALYSIS :

Sequence and series of functions, uniform convergence, Fourier series, Riemann integral, improper integrals, functions of bounded variations, Lebesgue measure, measurable functions, Lebesgue integral, Multivariable calculus- functions of several variables, directional derivative, partial derivative and total derivative, maxima and minima, Elements of metric spaces- convergence, continuity, uniform continuity, compactness, connectedness, completeness.

Normed linear spaces, Banach spaces, open mapping theorem, closed graph theorem, Hahn- Banach theorem, Hilbert spaces, Orthogonal complement of a subspace in a Hilbert space, Orthogonal basis, Gram-Schmidt orthogonalization process.

Unit-4. COMPLEX ANALYSIS :

Analytic functions, Cauchy - Riemann equations, Cauchy’s theorem, Morera's theorem, Liouville's theoren, Cauchy's Integral formula, zeros of analytic functions, Taylor series, Laurent series, Calculus of residues, contour integration, conformal mappings, Mobius transformations.

Unit-5. TOPOLOGY & DIFFERENTIAL GEOMETRY:

Basic concepts of Topology, Continuity, Homeomorphism, connectedness, compactness, countability, separation axioms, subspaces, product spaces, quotient spaces, Tychonoff's theorem, Urysohn's Metrization theorem.

Space curves - Their curvature and torsion, Serret - Frenet formulae, First and Second fundamental forms, Gaussian curvatures, Principal directions and principal curvatures, Geodesics, Manifolds.

Unit-6. DIFFERENTIAL EQUATIONS :

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ordinary differential equations, General theory of homogeneous and non-homogenous linear ordinary differential equations, Strum-Liouville boundary value problem.

Lagrange and Charpit methods for solving first order partial differential equations, General solution of higher order partial differential equations with constant coefficients, classification of second order partial differential equations, Method of separation of variables for Laplace, Heat and Wave equations.

Unit-7. MATHEMATICAL METHODS:

Calculus of variations- Linear functionals, Necessary and sufficient conditions for extrema, Euler-Lagrange equation, Linear integral equations of Fredholm and Volterra type, solution by successive substitutions and successive approximations, solution of integral equations with separable Kernels, Laplace transforms.

Unit-8. MECHANICS:

Generalised coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's variational principle, Euler's dynamical equations of motion of a rigid body, theory of small oscillations, Poisson bracket, Canonical transformations.

Equation of continuity in fluid motion, Euler's equation of motion for perfect fluid, Two- dimensional fluid motion, complex potential, source and sink, doublets, motion of sphere in perfect fluid and motion of liquid past a sphere, vorticity, Navier-Stokes' equations for viscous flows.

Unit-9. OPERATION RESEARCH & NUMERICAL ANALYSIS :

Linear programming problem, solution of linear programming problem by graphical and simplex methods, M-technique, Two-phase method, Dual problem and duality theorem, convex set theory, balanced and unbalanced transportation problems, Hungarian method for solving assignment problems, Game theory.

Numerical solutions of algebraic equations, Fixed point iteration and Newton-Raphson methods, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolations, Numerical differentiation and integration, Numerical solutions of ordinary differential equitation using Picard, Euler, modified Euler and Runge-Kutta methods.

Unit-10. VEDIC MATHEMATICS AND NUMBER THEORY :

Contributions of ancient Indian mathematicians, Basic concepts of vedic mathematics, Contribution of Ramanujan in number theory, Fundamental theorem of arithmetic, arithmetical functions, Mobious inversion, Congruences, Chinese remainder theorem, Quadratic reciprocity law and its applications.

NOTE : Syllabus contains 10 Units. In preparation of question paper, it is suggested that at least 06 questions should be asked from each unit.

6. HOME SCIENCE

Unit– I : Food Science

Food Groups
Food Preparation
Food Preservation
Food Processing
Food Analysis

Unit– II : Nutrition Science

Fundamentals of Nutrition
Nutritional Biochemistry
Food Microbiology
Public Nutrition
Therapeutic Nutrition

Unit– III : Institutional Management

Institutional Food Service management.
Management of Social Institutes – family as Institute, child care and Geriatric institutes, Panchayats.
Management of Educational Institutes – Pre – school, Primary and Secondary Schools, (Colleges and Universities) Higher Educational Institutes.
Management of Special Institutes for physically, mentally and socially challenged.
Challenges and problems faced by Institutions.

Unit– IV : Clothing

Principles of clothing – Socio – Psychological aspects of Clothing, selection of Fabrics, Clothing and Family Clothing. Advanced dyeing and printing.
Clothing Construction – basic principles of drafting, flat pattern and draping methods.
Textile Design – principles and concepts.
Fashion Design – fashion cycles.
Care and maintenance of textile materials and garments; laundry agents – methods and equipments.

Unit– V : Textiles

General Properties and Fine Structure of all Textile Fibers.
Processing and Manufacture of all natural and man – made fibers.
Definition and Classification of Yarns; Identification of yarns and its use in various fabrics.
Fabric construction, definition and types of woven, non – woven, knitted and other construction techniques.
Testings of fibers, yarns and fabric.

Unit– VI : Resource Management

Concept of Home management and steps.
Management of Human Resources; Classification of Resources; Basic Characteristics of Resources.
Decision making in family; Steps in decision making; Methods of resolving conflicts.

Work simplification; Importance of work simplification in home; Mundel's classes of change; Simple pen and pencil technique in work simplification.
Advanced Housing, Interior Design, Principles of Interior Design, Various Colours and Colour Schemes.
Consumer ergonomics.

Unit– VII : Human Development

Child Growth and Development – Principles and Stages.
Life Span Development – Theories of Human Development and Behaviour.
Child rearing, Socialization practices and Dynamics.
Early Childhood Care and Education – Emerging trends.
Development problems and disabilities during childhood and adolescence, guidance and counselling.
Advanced Child Study methods and assessment.
Women's Studies, Family Welfare Program and Human Right– Recent Approaches and legal aspects (Rights of Children, Rights of Women, Status of Women, Gender Issues)

Unit– VIII : Non – Formal Education and Extension Education

History and Development of Home Science in Formal / Non – formal and Extension Education.
Theory and Practices of Program / Curriculum planning and development.
Management and Administration of Formal / Non – formal and Extension Education.
Monitoring, Supervision and Evaluation of Formal, Non – formal and Extension Education.
Theories and Principles of Guidance and Counselling in Formal / Non – formal / Extension.
Problems and Challenges encountered in Formal / Non – formal / Extension.
Enterprenureship Management.

Unit– IX : Developmental and Educational Communication

Concept and Classification of Communication
Traditional Methods and Materials of Communication – Selection / Preparation / Use.
Modern Methods and Materials of Communication – Selection / Preparation / Use.
Strategies for Developmental Communication.
Classroom Communications in Home Science trends.
Communication for Publicity and Public Relations.
Change and Challenges in Communication in Contemporary Society.
Media Production and Management.

Unit– X : Methods of Research

Trends in Research in Home Science.
Research Designs.
Types of Research.
Sampling Techniques.
Selection and Preparation of Tools for data collection.
Type of variables and their selection.
Data collection and classification / coding.
Analysis of data through parametric and non – parametric statistics
Report Writing – presentation of data, interpretation and discussion
Statistical tests- Mean, Medium Mode, S.D., Chi-Square

7. Journalism and Mass Communication

Unit - 1

Introduction to Journalism and Mass Communication

a. Concept of Journalism and mass communication, mass communication in India.

b. History, growth and development of print and electronic media. Major landmarks in print and electronic media in Indian languages. Media's role in formulation of states of India.

c. Media criticism and media literacy, Press Council and Press Commissions of India, status of journalism and media education in India. Media policies of the Government of India since Independence.

d. Models and theories of mass communication, normative theories, administrative and critical traditions in communication, media and journalism studies, communication and theories of socio-cultural, educational and agricultural change. Technological determinism, critique of Marshall McLuhan's views on media and communication and Marxist approaches. Information and knowledge societies.

e. Indian traditions and approaches to communication from the Vedic era to the 21st century. Western and Eastern philosophical, ethical and aesthetic perceptions of communication - Aristotle and Plato, Hindu, Buddhist, and Islamic traditions.

f. Media and culture - framework for understanding culture in a globalised world. Globalisation with respect to politico-economic & socio-cultural developments in India.

Unit - 2

Communication for Development and Social Change

a. Concept and definition of development communication, role of media and journalism in society, characteristics of Indian society – demographic and sociological impact of communication, media and journalism. Media and specific audiences.

b. Development and social change. Issues and post-colonial conceptions.

c. Deconstruction of dominant paradigm of communication and development. Responses and critique of dominant models.

d. Corporatisation of development - Corporate Social Responsibility, non-state actors in development, mass campaigns by NGOs, Government of India, international agencies and corporates. Paradigms and discourse of development communication.

e. Emergence of global civil societies, public sphere, global communication system - nation state-universal, national communication policies.

f. Leading influencers of social reform in India - Raja Rammohan Roy, Pandit Madanmohan Malviya, Bal Gangadhar Tilak, Mahatma Jyotiba Phule, Mahatma Gandhi, Acharya Vinoba Bhave, Dr B. R. Ambedkar, Deendayal Upadhyay, Dr Ram Manohar Lohia etc.

Unit - 3

Reporting and Editing

a. News-concepts, determinants (values), structure and perspectives. Reporting for print, radio, television and digital media. Types of reporting. National and international news agencies and feature syndicates, functions and role.

b. Writing for print, electronic and digital news media. Translation and transcreation.

c. Editing and presentation techniques for print, television and digital media.

d. Journalism as profession, reportage of contemporary issues, ethics of reporting.

e. Critique of western news values, effect of new technology on global communication flows.

f. Niche Reporting.

Unit - 4

Advertising and Marketing Communication

a. Definition, concept, functions, types, evolution of advertising, standards and ethics in advertising. Theories and models of communication in advertising.

b. Brand management.

c. Advertising management - agency-role, structure and function, client-agency relationship, media planning and budgeting.

d. Advertising and creativity, language and translation.

e. Advertising campaign and marketing.

f. Advertising and marketing research.

Unit - 5

Public Relations and Corporate Communication

a. Public Relations and Corporate Communication - definition, concept and scope.

b. Structure of PR in State, Public, Private and non-government sectors.

c. Tools and techniques of PR and Corporate Communication.

d. Crisis communication and crisis communication management.

e. Ethics of Public Relations.

f. International Public Relations, communication audit.

Unit - 6

Media Laws and Ethics

a. Concept of law and ethics in India and rest of the world.

b. The Constitution of India, historical evolution, relevance.

c. Concept of freedom of speech and expression in Indian Constitution.

d. Defamation, Libel, Slander-IPC 499-502, Sedition IPC 124(A), Contempt of Courts Act 1971, Official Secrets Act 1923, Press and Registration of Books Act 1867, Working Journalists and other Newspaper Employees (Conditions of Service) and Miscellaneous Provisions Act 1955, Wage Boards, Law of Obscenity (Section 292-294 of IPC); the Miller test, the Hicklin test, Indecent Representation of Women (Prohibition) Act 1986, Scheduled Castes and Tribes (Prevention of Atrocities) Act, 1989, Parliamentary Privileges. Famous cases involving journalists and news media organisations.

e. Right to Information Act 2005, Copyright Act 1957, Intellectual Property Rights, Cable Television Network (Regulation) Act 1995, Information Technology Act (relevant) 2000 and cyber laws, Cinematograph Act 1952, Film Censorship, Press Council Act as amended from time to time, IPR, ASCI, Drugs and Magic Remedies (Objectionable Advertisements) Act, 1954, Various regulatory bodies for print, TV, Advertising, PR, and Internet.

f. Rules, regulations and guidelines for the media as recommended by Press Council of India, Information and Broadcasting ministry and other professional organisations, adversarial role of the media, human rights and media.

Unit – 7

Media Management and Production

a. Definition, concept of media management. Grammar of electronic media.

b. Communication design theories and practice.

c. Media production techniques – print and electronic.

d. Digital media production techniques.

e. Economics and commerce of mass media in India.

f. Principles and management in media industry post liberalisation.

Unit – 8

ICT and Media

a. ICT and media - definition, characteristics and role. Effect of computer mediated communication. Impact of ICT on mass media. Digitisation.

b. Social networking.

c. Economics and commerce of web enabled media.

d. Mobile adaption and new generation telephony by media, ethics and new media.

e. ICT in education and development in India, online media and e-governance.

f. Animation - concepts and techniques.

Unit - 9

Film and Visual Communication

a. Film and television theory.

b. Film and identity in Indian film studies, leading film directors of India before and after Independence. Indian cinema in the 21st century.

c. Approaches to analysis of Indian television.

d. Visual Communication. Visual analysis.

e. Basics of film language and aesthetics, the dominant film paradigm, evolution of Indian cinema-commercial and 'non-commercial' genres, the Hindi film song, Indian aesthetics and poetics (the theory of Rasa and Dhvani).

f. National cinema movements: Soviet Montage cinema, German Expressionistic cinema, Italian Neo-Realistic cinema, French New Wave cinema, British New Wave cinema, Indian New Wave cinema, Period cinema. Cinema in the new millennium.

Unit - 10

Communication Research

a. Definition, concept, constructs and approaches to communication research process.

b. Research Designs - types, structure, components, classical, experimental and quasi experimental, variables and hypotheses; types and methods of research; basic, applied, descriptive, analytical, historical, case study, longitudinal studies.

c. Research in journalism, Public Relations, advertising, cinema, animation and graphics, television, Internet, social media practices, magazines, children's media. Communication, journalism and media research in India.

d. Levels of measurement: sampling-probability and non-probability, tests of validity and reliability, scaling techniques. Methods and tools of data collection-interviews, surveys, case studies, obtrusive and non-obtrusive techniques, ethnography, schedule, questionnaire, dairy, and internet based tools, media specific methods such as exit polls, opinion polls, telephone, SMS surveys and voting with regard to GEC (general entertainment content).

e. Data analysis, testing, interpretation, application of statistical tests-parametric and non-parametric, tests of variance-univariate, bivariate and multivariate, tests of significance, computer mediated research.

f. Ethical considerations in communication, media and journalism research, writing research reports, plagiarism.

8. **Management** and Business Administration

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.

9. GEOGRAPHY

1. **Geomorphology :** Fundamental concepts; Endogenetic and Exogenetic forces; Denudation and weathering; Geosynclines, Isostasy, Continental Drift and Plate Tectonics Theories; Mountain Building, Concept of geomorphic cycle; Landforms associated with fluvial, glacial, arid, coastal and karst cycles, Modern Geomorphologists, Applied Geomorphology.

2. **Climatology** : Composition and structure of the atmosphere; Heat budget of the earth, Horizontal and Vertical Distribution of Temperature; Atmospheric pressure and general circulation of winds; Monsoon, jet stream and local winds; Tropical and temperate cyclones; Classification of world climates; Koppen's and Thornthwaite's schemes and features of World Climatic Regions.

3. **A- Oceanography** : Ocean Bottom Topography, Ocean deposits; Coral reefs; Temperature and salinity of the oceans; Density of sea water; Tides and ocean currents.

   B- Bio and Environmental Geography : World distribution of plants and animals; Forms and functions, Conservation and management of ecosystems;. Principle of ecology; Human ecological adaptations; Influence of man on ecology and environment; Global and regional ecological changes and imbalances; Environmental degradation, hazards Problems of pollution, ozone depletion and climate change, and their remedial measures, management and conservation; Biodiversity and sustainable development; Environmental policies; Environmental education and legislation

4. **Geographic Thought :** General character of Geographic knowledge in India and world during the ancient and medieval period; Geographical Knowledge in Vedas, Epic Periods, Puranas and Samritis. Foundations of Modern Geography and contributions of different scholars; Dichotomy and dualism; Determinism, possibilism; Man and Environment, Areal differentiation and spatial organization, Quantitative revolution. Locational analysis; radical, behavioural, human and welfare approaches.

5. **A- Population Geography :** Factors and Patterns of world population distribution; Growth and density of population; Patterns and processes of migration; Demographic transition, Population –resources region.

   B- Settlement Geography : Site, situation, types, size, spacing and internal morphology of rural and urban settlements; Process and pattern of urbanization; City–region; Primate city; Rank–size rule; Settlement hierarchy; Christaller's Central Place theory; August Losch's theory of market Centres; Concept of Smart City and Development of Urban Centres.

6. **Economic Geography :** Sectors of Economy : primary, secondary, tertiary and quaternary; Natural resources: renewable and non-renewable, conservation of resources.
   Measurement of agricultural productivity and efficiency, agricultural revolution, agricultural types and typology; Crop combination and diversification; Theories of Agricultural Location; Von Thunen's Model. Agricultural systems and regions of the world. Classification of industries: Weber's and Losch's approaches; Resource based and footloose industries. Models of transportation and transport cost : Accessibility and connectivity.

7. **A- Political Geography :** Heartland and Rimland theories; Boundaries and frontiers; Nature of administrative areas and Geography of public policy and finance.

B- Social Geography : Ethnicity; tribe; dialect; language, caste and religion; Concept of social well-being. Social Groups and Organisation.

C- Cultural Geography : Culture – Realms, Areas and Cultural Regions of the World; Human races; Habitat; Economy and Society of tribal groups; Diffusion of Cultural innovations; Human Development and their Index; Impact of Globalization on Indian Society and Culture.

8. **Regional Planning :** Regional concept in Geography; Concept of planning regions; Types of regions; Methods of regional delineation; Regional planning in India; Indicators of development; Regional imbalances; Evolution, nature and scope of town planning with special reference to India, and Fundamentals of Town and Country planning.

9. **Geography of India :** Physiography and Physiographic divisions; Climate : Its regional variations; Mechanism of Indian monsoons and rainfall patterns, Tropical cyclones and western disturbances; Floods and droughts; Vegetation types and vegetation regions, Forest and wild life resources, deforestation and their conservation, Major soil types; Irrigation and multipurpose projects. Agriculture and its regionalisation; agro-climatic zones; agro-ecological regions.; Population distribution and growth, Demographic attributes: sex-ratio, age structure, literacy rate, work-force Urbanization; Indian Society- Racial, linguistic and ethnic diversities; religious minorities; major tribes, tribal areas and their problems; Land, surface and ground water, energy, minerals, biotic and marine resources and their conservation, Energy crisis; major industries and industrial regions, New industrial policies; Special Economic Zones; Tourism including eco -tourism. Transport and Communication; national and foreign trade; Trade balance; Trade Policy; Export processing zones; Five Year Plans; Integrated rural development programmes; Panchayati Raj and decentralised planning;

10. **A- Cartography :** Types of maps : Techniques for the study of spatial patterns of distribution; Choropleth; Isopleth and Chorochromatic maps and pie diagrams; Mapping of location – specific data; Accessibility and flow maps. Topographical Maps-types and features; Map Projection- graticules, types, construction and salient features of map projections,

    B- Statistical Methods : Data sources and types of data; Frequency distribution and cumulative frequency ; Measures of central, tendency; Selection of class intervals for mapping; Measures of dispersion and concentration; Standard deviation; Lorenz Curve; Methods of measuring association among different attributes; Simple and Multiple correlation; Regression. Nearest– neighbour analysis; Scaling techniques; Rank score; Weighted score; Sampling.

    C- Remote sensing and GIS- Its principles, development and application; Development of Remote Sensing of India; Features of Indian Satellite; Computer application in mapping; Digital mapping; Geographic Information System (GIS).

10. PSYCHOLOGY

UNIT- 1. Foundations of Psychology

Historical roots of psychology; Schools of psychology

Approaches to Psychology: Behaviouristic, Psychodynamic, Gestalt, Cognitive, & Humanistic

Methods of psychology: Experimental, Correlational, Survey, Longitudinal & Cross-sectional, and Case study.

Biological bases of Behaviour: 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. Neurophysiological methods: EEG, PET, MRI, & fMRI.

Neuropsychological assessment: Approaches and popular neuropsychological assessment batteries: Luria-Nebraska, AIIMS neuropsychological assessment battery.

Endocrine system and human behaviour.

UNIT- 2. Research Methodology and Statistics

Research: Meaning, Purpose, and Dimensions.

Research problems, Variables and Operational Definitions, Hypothesis, Sampling.

Ethics in conducting and reporting research

Paradigms of research: Quantitative, Qualitative, Mixed methods approach

Methods of research: Observation, Interview, Narrative, Questionnaires, Field studies, Experimental & Quasi-experimental and

Statistics in Psychology: Measures of Central Tendency and Dispersion. Normal Probability Curve. Parametric [t-test] and Non-parametric tests [Sign Test, Wilcoxon Signed rank test, Mann-Whitney test, Kruskal-Wallis test, Friedman]. Power analysis. Effect size.

Correlation and Regression:Correlation [Product Moment, Rank Order], Partial correlation, multiple correlation. Special Correlation Methods: Biserial, Point biserial, tetrachoric, phi coefficient. Simple linear regression,

Multivariate Statistics: Multiple & Logistic regression: Assumptions, strategies, tabulation and interpretation of results. Factor analysis: Assumptions, Methods, Steps, Rotation, and Interpretation.

Basic understanding of Cluster analysis and Multiple Discriminant Analysis

Experimental Designs: Randomized group design: ANOVA [One-way, Factorial], Randomized Block Designs, Repeated Measures Design, ,MANOVA, ANCOVA. Single-subject designs.

UNIT- 3. Psychometrics & Psychological testing

Classical Test Theory and Item Response Theory; Approaches of test construction: Rationale, empirical and factor analytic.

Types of psychological tests

Test construction: Item writing, item analysis

Test standardization: Reliability, validity and Norms

Areas of testing: Intelligence & Aptitude, Creativity, Personality, interest, Attitude.

Applications of psychological testing in various settings: Clinical, Organizational and business, Education, Counseling, Military. Career guidance.

UNIT- 4. Attention and Perception

Attention: **C**oncept, types- selective, divided, and sustained. Attentional automaticity, Theories of selective and sustained attention

Perception: Approaches to the Study of Perception: Gestalt approach – Figure and Ground, Law of perceptual Organization; information processing approach to perception- Pattern recognition and its models.

Perceptual Constancy: Size, Shape, and Colour; Illusions

Perception of Form, Depth and Movement

Role of motivation and learning in perception

Signal detection theory: Assumptions and applications

Subliminal perception, culture and perception.

UNIT- 5. Learning, Memory and Forgetting

Fundamental theories of learning: Thorndike, Guthrie, Hull, Tolman

Classical Conditioning: Procedure, phenomena, and related issues

Instrumental learning: Procedure, phenomena, and theoretical issues; Reinforcement and reinforcement schedules.

Applications of classical and instrumental conditioning in behaviour modification.

Cognitive approaches in learning: Latent learning, observational learning.

Verbal learning and Discrimination learning

Biological bases of learning

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

Biological bases of Memory

UNIT- 6. 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

Intelligence: Concept; Theories: Spearman; Thurstone; Guilford; Jensen; Cattell; Gardner; Stenberg; Mayer & Salovey; Goleman; Das, Kar &Parrila

Creativity: Concept; Theories: Torrance, Getzels & Jackson, Guilford, Wallach & Kogan

Relationship between Intelligence and Creativity

UNIT- 7. Personality, Motivation and Emotion,

Personality: Concept; Approaches: Trait and Type; Determinants: - Biological and socio-cultural

Theories of personality: Psychoanalytical, Neo-Freudian, Social learning, Cognitive, Humanistic, Existential.

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

Approaches to the study of motivation: Psychoanalytical, Ethological, S-R Cognitive, Humanistic

Social motives: Achievement, Affiliation and Power

Motivational Competence and Self-regulation

Biological bases of motivation
Emotions: Concept and components; Physiological correlates
Theories of emotions: James-Lange, Canon-Bard, Schachter and Singer, Lazarus, Lindsley, Facial-feedback hypothesis of emotion. Emotion regulation
Biological basses of emotions.

UNIT- 8. Social Psychology

Nature, scope and history of social psychology
Traditional theoretical perspectives: Field theory, Cognitive Dissonance, Sociobiological, Psychodynamic Approaches.
Social cognition and person perception: Impression formation and its theories; attribution and its theories.
Social attitude: Nature and determinants; Theories of attitude formation and change
Group and Social influence [Social Facilitation; Social loafing; prosocial behaviour]; 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]

UNIT- 9. Life-span Human Development

Developmental processes: Nature, Principles, Factors in development, Stages of Development.
Theories of development: Psychoanalytical, Behaviouristic, and Cognitive
Various aspects of development: Sensory-motor, cognitive, language, emotional, social and moral.
Piaget's cognitive development theory; Information processing and social learning theories; Kohlberg's theory of Moral development.

UNIT- 10. Applications of Psychology

Stress, health, and well-being:
Conflicts: Sources and types; Stress and Coping: Concept, Models, Type A, B, C, D behaviours, Stress management strategies [Biofeedback, Music therapy, Breathing exercises, Progressive Muscular Relaxation, Guided Imagery, Mindfulness, Meditation, Yogasana, Stress Inoculation Training].
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]
Clinical Psychology: Psychopathology: Concept, Classification (DSM-5 & ICD-11) and Causes; Mental Status Examination
Psychotherapies: Psychoanalytic; Person-cantered; Gestalt; Existential, Acceptance Commitment Therapy; Behaviour therapy; Cognitive therapy: REBT, CBT, MBCT; Play therapy; Transactional Analysis, Group and Family therapy.
Guidance and counselling: Needs, organizational set up, and techniques of guidance and counselling; Counselling process and skills.
Organizational Psychology:
Historical developments in OB, the organizational system; structural characteristics of organizations; organizational designs; challenges and opportunities for organizational behaviour
Organizational culture: Nature and types; developing and maintaining organizational culture and customer responsive culture; promoting ethics in organizational culture

Introduction to Organizational Development: Nature and scope of organizational development, Management of change.

Meaning and process of organizational communication, perspectives; direction of communication flow, communication barriers, Communication for organizational effectiveness.

11. POLITICAL SCIENCE

Unit- 1. Political Theory

Concepts and Issue – Democracy, Liberty, Equality, Justice, Nationalism, Behaviouralism and Post- Behaviouralism

Multiculturalism, Cosmopolitanism, Neo – Liberalism, Post- Modernism, Feminism

Unit- 2. Political Thinkers (Indian and Western)

Ancient Indian Political Thought : Manu, Kautilya and Shanti Parva (Mahabharata), The Indian Renaissance

Greek Political Thought : Plato and Aristotle.

Western Political Thought–I : Machiavelli, Hobbes, Locke, Rousseau.

Western Political Thought – II : Bentham, J. S. Mill, Hegel, Marx, Green and Mao

Contemporary Political Thought – I : Gramsci, Althusser, Hannah Arendt

Contemporary Political Thought – II : Rawls and Nozic.

Modern Indian Thought : Tilak, Jay Prakash Narayan, Gandhi and Ambedkar.

Unit- 3. Comparative Politics and Political Analysis

Evolution of Comparative Politics as a discipline; Nature and Scope.

Approaches to the study of Comparative Politics : Traditional, Structural – Functional, Systems, Neo – Institutionalism, Political economy approach.

Constitutionalism : Concepts & forms.

Forms of Government : Unitary – Federal, Parliamentary – Presidential.

Organs of Government : Executive, Legislature, Executive – Legislative relationship in Comparative perspective, models of State : Capitalist, Socialist, Developmental & Welfare State.

Party Systems and Pressure Groups; Electoral Systems.

Political Development and Political Modernization.

Political Culture and Political Socialization.

Revolution : Theories and Types.

Dependency : Development and Under Development.

Unit- 4. Political Institutions in India

Ideological Bases of the Indian Constitution, Preamble, Fundamental Rights and Duties and Directive Principles, Constituent Assembly Debates.

Constitutional Amendments and Review.

Structure and Process – I : President, Prime Minister, Council of Ministers, Working of the Parliamentary System.

Structure and Process –II : Governor, Chief Minister, Council of Ministers, State Legislature.

Judiciary : Supreme Court, High Courts, Judicial Review, Judicial Activism including Public Interest Litigation cases, Judicial Reforms.

Unit- 5. Political Processes in India

Panchayati Raj Institutions : Urban, Local self governments- their organization and functions.

Federalism : Theory and Practice in India; Demands of Autonomy and Separatist Movements; Emerging trends in Centre – State Relations.

Political Parties, Pressure Groups, Public Opinion, Media

Elections, Electoral Behaviour, Election Commission and Electoral Reforms.
Politics of Identity and Democratic upsurge : caste, gender & ethnicity.
Demand of New States, Emerging Trends in Indian Politics

Unit- 6. Theories of Public Administration

Nature, Scope and significance of Public Administration
Evolution of Public Administration as a Discipline with a special focus on New Public Administration and New Public Management
Classical Theory – Fayol, Luther Gullick, Marry Parker Follet
Scientific Management Theory- F.W. Taylor
Theory of Bureaucracy - MaxWeber and its critics
Ecological Theory- F.W. Riggs

Unit- 7. Public Administration In India

Development and Welfare Administration.
Planning, Impact of liberalization on planning, Niti Ayog.
Personnel Administration : Recruitment, Training & Promotion, Role of UPSC and State PSC.
Bureaucracy – Its Characteristics, Civil servant – Minister relationship. Committed Bureaucracy.
Financial Administration : Budget, Audit, Control over Finance with special reference to India.

Unit- 8. International Relations

Theories and approaches to international relations
Realism, Neo-Realism
Liberalism, Neo-Liberalism
Idealism, Social Constructivism, Critical Theory
Concept of Nation-State, empire
National Interest
Power in International Relations
Peace and conflict analysis, approaches to peace,
Perspectives on Conflict analysis and resolution
History of International relations
First and second world wars, Cold war, League of nations, United Nations
Contemporary issues in International Relations
Globalization, Environmental issues, Climate Change negotiations, Civil Wars, Global Terrorism
Political economy in international relations
GATT, World Trade Organization, Regional Trade Organizations (ASEAN, NAFTA, SAARC)- structures and functioning

Unit- 9. Indian Foreign Policy

History, geography and economy factors as determinants of Indian Foreign Policy
History of India's relations with neighbours during Mauryan empire, Mughal Empire and British Empire
India's foreign policy since independence, Non-alignment, Wars in South Asia
India’s Relations with Neighbouring countries (with special reference to Pakistan, China, Afghanistan, Bangladesh, Nepal, Srilanka, Bhutan, South East Asia)
Rise of European Union, Global Governance
Globalization and Indian Foreign policy
Rise of China, Brazil, Russia and India in International Relation
BRICS, RIC, Shanghai, Cooperation Organization.

India's Security Concerns amidst Chinese Assertion, Pakistan support to cross border terrorism.

Unit- 10. Public Policy in India

Good Governance; Governance, Good Governance and Democratic Governance

Problems of Administrative Corruption; Transparency and Accountability; Right to Information.

Grievance Redressal Institutions : Ombudsman, Lokpal and Lokayukta.

Institutional mechanisms for good governance: Right to Information, Consumer Protection Act, Citizen Charter; Grievance redressal system: Ombudsman, Lokpal, Lokayukta

Grassroots Governance: Panchayati Raj Institutions and their functioning

Monitoring and evaluation of public policy; mechanisms of making governance process accountable: jansunwai, social audit.

Major flagship programmes of the Government : MANREGA, NRHM, Ayushman Bharat, Ujjawala Yojana

E-governance in India : National e-governance programme, Digital India Programme, Kisan Call Centres.

12. COMMERCE

Unit 1: Business Environment and International Business

Concepts and elements of Business Environment: Economic environment- Economic systems, Economic policies(Monetary and fiscal policies); Political environment- Role of government in business; Legal environment- Consumer Protection Act, FEMA; Socio-cultural factors and their influence on business; Corporate Social Responsibility (CSR), Policy Environment : Liberalization Privatisation and globalisation, Second generation reforms, Industrial policy and simplementation. Industrial growth and structural changes.
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, Foreign direct investment (FDI) and Foreign portfolio investment (FPI); Types of FDI, Trends in FDI; India's FDI policy, Balance of payments (BOP): Importance and components of BOP, Regional Economic Integration: Levels of Regional Economic Integration; Trade creation and diversion effects; Regional Trade Agreements: European Union (EU), ASEAN, SAARC, NAFTA, International Economic institutions: IMF, World Bank, UNCTAD, World Trade Organisation (WTO): Functions and objectives of WTO.

Unit 2: Accounting

Basic accounting principles; concepts and postulates, Partnership Accounts: Admission, Retirement, Death, Dissolution and Insolvency of partnership firms, Corporate Accounting: Issue, forfeiture and reissue of shares; Liquidation of companies; Acquisition, merger, amalgamation and reconstruction of companies, Holding company accounts, Cost and Management Accounting: Marginal costing and Break-even analysis; 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, Responsibility Accounting.

Unit 3: Business Economics

Meaning and scope of business economics, Objectives of business firms, Demand analysis: Law of demand; Elasticity of demand and its measurement; Relationship between 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, Price determination under different market forms: Perfect competition; Monopolistic competition; Oligopoly- Price leadership model; Monopoly; Price discrimination, Pricing strategies: Price skimming; Price penetration; Peak load pricing

Unit 4: Business Finance

Scope and sources of finance; Cost of capital and time value of money, Capital structure, Leverages- Operating, Financial & Combined Leverages, EBIT- EPS Analysis, 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, Foreign exchange market; Exchange rate risk and hedging techniques, International financial markets and instruments: Euro currency; GDRs; ADRs, International arbitrage; Multinational capital budgeting, Portfolio management- CAPM, APT; Derivatives.

Unit 5: Business Statistics and Research Methods

Measures of central tendency, Measures of dispersion, Measures of skewness, Correlation and regression of two variables, Association of attributes, 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; Rank correlation test.

Unit 6: Business Management and Human Resource Management

Principles and functions of management, Planning – Objectives, Strategies, Planning process and decision making, Organization structure: Formal and informal organizations; Span of control, Responsibility and authority: Delegation of authority and decentralization, Directing, Motivation and leadership: Concept and theories, Controlling, 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

Unit 7: 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: Basel norms; 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, Digitisation of banking and other financial services: Internet banking; mobile banking; Digital payments systems

Unit 8: 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 life cycle; 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 Behaviour; Consumer buying process; factors influencing consumer buying decisions, Service marketing, Trends in marketing: Social marketing; Online marketing; Green marketing; Direct marketing; Rural marketing; CRM.

Unit 9: 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; Quasi contracts; 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; Dishonour 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, The Information Technology Act, 2000: Objectives and main provisions; Cyber crimes 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

Unit 10 : 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, 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, Deduction and collection of tax at source; Advance payment of tax; E-filing of income-tax returns

13. LAW

Unit – I : Constitutional Law :

Essential Features of Indian Constitution.
Distribution of Legislative Powers between Union and States.
Fundamental Rights, Fundamental Duties and Directive Principles of State Policy.
Judiciary
Parliament and State Legislatures
Amending Process of the Constitution.

Unit – II : Administrative Law :

Nature, Scope and Importance of Administrative Law.
Principles of Natural Justice.
Administrative Discretion and its control.
Judicial Review of Administrative Action-Writ Jurisdiction.
Lokpal and Lokayukta.

Unit – III : Jurisprudence :

The Nature and Definition of Jurisprudence
School of Jurisprudence : Analytical School (Austin)
Pure Theory law (Kelsen)
Historical School (Savigny and Maine)
Socogical School (Roscoe Pound)
Nature and Sources of Law.
Legal Concepts : Right, Duty, Ownership, Possession and Person
Judicial. Process : Application of Doctrine of Precedent in India.
Law and Morality.

Unit – IV : General Principles of Criminal Law :

General Principles of Criminal Law-meaning, nature, essentials and stages of offence.
Joint Liability; Abetment and Criminal Conspiracy.
Offences against Human Body.
Offences against Property.
Defamation
Definition and Nature of Cyber Crime under Information Technology Act, 2000
Different kinds of Cyber Crimes under Information Technology Act, 2000

Unit – V : International Law :

Nature of International Law and its sources.
Concept of sovereignty and its relevance today.
Recognition of State and Governments.
Extradition, Asylum, Nationality and Status of Refugees.
International Court of Justice.
Human Rights-Concept and Development
Global Trade Regime under International Law.

Unit – VI : Personal (Family Law) Hindu Law & Muslim Law :

Marriage
Divorce
Adoption and Guardianship
Maintenance
Matrimonial Remedies
Uniform Civil Code

Unit – VII : Law of Torts :

Nature and definition of Tort.
General Principles of Tortious Liability.
Specific Torts- Negligence, Nuisance and Defamation.
Absolute Liability- Emerging trends in India.

Unit – VIII : Contract Law :

Essentials of a valid contract.
Offer, acceptance and consideration.
Elements vitiating contract- Mistake, fraud, misrepresentation, public policy, coercion, undue influence,
Frustration of contract.
Remedies for breach of contract.

Unit – IX : Lok Adalat :

Lok Adalat under Legal Services Authority Act, 1987
Organization and Jurisdiction of Lok Adalat
Power of Lok Adalat
Functions of Lok Adalat

Unit – X : Environmental Law:

Salient Features of the Environment (Protection) Act, 1986
Wild life (Protection) Act, 1972 and Forest Conservation Act, 1980.

14. संस्कृत

इकाइ-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 : पुरूरवा-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 :

- ऋग्वेदः - 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)
- शुक्लयजुर्वेदः - शिवसंकल्प, अध्याय - 34 (1-6),
  प्रजापति, अध्याय - 23 (1-5)
- अथर्ववेदः - 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 |

इकाई-IV

(ख) दर्शन-साहित्य का विशिष्ट अध्ययन :

- ईश्वरकृष्ण; सांख्यकारिका - सत्कार्यवाद, पुरुषस्वरूप, प्रकृतिस्वरूप, सृष्टिक्रम, प्रत्ययसर्ग, कैवल्य।
- सदानन्द; वेदान्तसार : अनुबन्ध-चतुष्ट्य, अज्ञान, अध्यारोप-अपवाद, लिंगशरीरोत्पाति, 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 भाषा विज्ञान

(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; णमुल।
- स्त्रीप्रत्यय - लघुसिद्धान्तकौमुदी 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 प्रेरणास्रोत, साहित्यिक महत्त्व, रामायण में आख्यान ।
- महाभारत - विषयवस्तु, काल महाभारतकालीन समाज, परवर्ती ग्रन्थों के लिए प्रेरणास्रोत, 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)
- मनुस्मृति : (प्रथम, द्वितीय तथा सप्तम अध्याय)
- याज्ञवल्क्यस्मृति : (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 ।

15. SOCIOLOGY

Unit-1 : Basic Sociological Concepts and Institutions :

Sociology- Definition, Nature and Scope
Sociological Concepts, Sociological Perspective
Basic Concepts-Community, Institution, Association, Culture, Custom, Norms and Values
Social Structure: Meaning of Social Structure; Status and role
Social Group: Primary & Secondary, Formal - Informal, Ingroup – Outgroup, Reference group
Social Institutions : Marriage, Family, Kinship, Economy Polity, Religion, Education
Social Stratification : Social differentiation, Hierarchy and Inequality, Exclusion
Forms of stratification : Caste, Class, Gender and Ethnicity
Theories of social stratification
Social mobility : Meaning and types
Socialization-Meaning, agencies and theories
Social change and its types
Evolution, Diffusion, Progress, Revolution, Transformation
Theories of Social change
Social reform and Social movement

Unit-2 : Sociological Theories and Perspectives :

Structural functional : Radcliffe Brown; Levi – Strauss; S.F. Nadel.; Malinowski, Durkheim, Parsons, Merton; J. Alexander
Interactionist : Social action : Max Weber, Pareto
Symbolic Interactionism : G. H. Mead, Blumer
Conflict - Karl Marx, Dahrendorf, Coser, Collins, Althusser.
Phenomenology and Ethnomethodology : Alfred Shultz, Peter Berger and Luckmann; Garfinkel and Goffman
Structuration, Post – Modernism; Post Structuralism & Post-Colonialism; Bourdieu, Haberamas, Giddens, Derrida, Foucault

Unit-3: Research Methodology, Methods and techniques :

Meaning and Nature of Social Research
The scientific method
Objectivity and subjectivity, Theory, fact and value
Critique of positivism
Ethical values in research
Qualitative and Quantitative Methods
Historical method, Comparative method, Hermenautic method, Survey, Research Design, Hypothesis
Sampling and its types
Techniques of data collection : Observation, Questionnaire, Schedule, Interview
Qualitative Methods : Observation; Case study; Content analysis
Statistics in Social Research - Mean, Median and Mode

Unit- 4: Sociology of Development :

Theories of Development : Human development, Social development
Sustainable development : Ecological and Social
Modernization

Science, Technology and Society
Globalization
Issues related to Development
Regional disparity
Displacement
Ecological degradation and environmental pollution
ICT and Network Society

Unit-5: Urban and Industrial Society :

Urban- Industrial Society in the Classical Sociological Tradition
Urbanization & urban problems
Division of labour
Bureaucracy
Alienation
Industrialization and Social Change in India
Impact of industrialization on society
Class and class conflict in industrial society
Limitations of industrialization and urbanization

Unit-6: Tribal and Rural Society :

Meaning of Tribe, Tribe and Development, Tribal Studies
Approaches to the study of Rural Society
Rural – Urban differences
Peasant and village studies
Agrarian Institutions
Caste and Jajmani system
Agrarian class structure
Land ownership and its types
Panchayati Raj System
Agrarian unrest, Peasant movements and formers movement

Unit-7: Crime, Population and Gender Issues :

Meaning and Theories of Crime and Punishment
Crime and delinquency
Deviance and its forms
White collar crime, Corruption, Nepotism, Terrorism, Cyber crime, Probation, Parole and Justice
Concepts of Fertility, Mortality, Morbidity and Migration
Theories of Population Growth
Gender as a Social Construct, Patriarchy and Matriarchy, Theories of Gender; Gender and Development; Women and Development

Unit-8: Environment and Society :

Social ecology, Indigenous knowledge, gender and environment, development induced displacement & rehabilitation; ecological degradation and environmental pollution
Environmental movements

Unit-9: Indian Sociological Perspectives :

Conceptualizing Indian Society
Cultural diversity : Regional, linguistic, religious and tribal
Indological / Textual Perspective : G. S. Ghurye, Louis Dumont
Structural – Functional Perspective : M.N. Srinivas, S. C. Dube
Marxian Perspective : D. P. Mukherjee, A. R. Desai
Subaltern : B.R. Ambedkar; D. Hardiman
Sociology in India and Sociology for India and Indigenization of Sociology

Unit-10: Contemporary debates in Sociology :

Debates on Tradition and Modernity in India
Issues of Nation Building : Fundamentalism, Secularism
Pluralism and Nation building; Democracy, Citizenship and Civil Society
Ethnicity and Identity
Challenges of LPG
Contemporary movements in India

16. Integrative Science

Unit 1: Concepts in Computing

Fundamentals of Computing, Introduction to Operating Systems, WINDOWS, UNIX/Linux operating systems, Batch Processing, Multi-programmed Batch System, Time Sharing System, Distributed System, Real Time System, Dead lock, CPU scheduling, Computer Security, Visualization techniques, Viewing in three dimension, Image Processing with emphasis on biological systems, Computer Networking, Security of the network, Network topology and architecture, Hierarchical networks, TCP/IP family of protocols, Parallel & High performance computing, Cloud computing

Unit 2: Programming Languages

Programming in C, Variables and operators, Control Flow statements and loops, Arrays and Pointers, string, Functions, File handling in C, Overview of Object Oriented Programming using Python: class and objects, functions and operator overloading, inheritance, Introduction to PERL, BioPerl modules, Web technology using PHP and Python.

Unit 3: Database Management System and Biological Databases

Definition, purpose, advantage, components of Database System; Data Models; Three level Architecture for Database System –internal, conceptual and external levels; Role of Schemas, Client/Server architecture; Relational Databases: Relational data models (binary, ternary, quaternary & n-ary relations), Primary and secondary keys, Data Definition Language; Data Manipulation Language; Structured Query Language; Classification of biological databases; Nucleic acid, protein, genome and structural databases; tools and databases for sequence submission and retrieval; Concepts of Bigdata and NoSQL.

Unit 4: Mathematics and Statistics

Coordinate geometry: Basic concepts of 2D and 3D geometry; Vector algebra– Addition and subtraction of vectors, Dot and cross product; Matrix algebra: basic definitions, matrix operations, transpose of a matrix, inverse of matrix, Eigen values, Eigen vectors; Introductionto Probability and Statistics, Conditional probability, Bayes' theorem; Random variable, mathematical expectation; Frequency distributions, Descriptive Statistics; Probability Distributions: Binomial, Multinomial, Poisson and Normal Distribution; Introduction and properties of 't', Chi-square and F distributions; Hypothesis testing; Basic concepts of Simple Random sampling and Stratified random sampling; Correlation and regression; Cluster Analysis-Hierarchical and Non-Hierarchical methods, Principal Component Analysis;Hidden Markov Models.

Unit 5: Biochemistry, Molecular Biology and Biotechnology

Biochemistry: Hydrophobic, electrostatic and van der Waals forces, General introduction to physical techniques for determination of structure of biopolymers, Structure, properties and functions of amino acids, proteins, and nucleic acids, Anatomy of Proteins - Secondary structures, Motifs, Domains, Tertiary and quaternary structures, Classification of Protein topologies, Helices and sheets, Helix-coil theory, Conformation of polypeptides and side chains, molten globules, enzymes and folding pathways; Molecular Biology and Biotechnology: Nucleic acids as genetic material, Genetic code, Genome organization and regulation in prokaryotes and eukaryotes, DNA replication, transcription and translation, recombinant DNA technology, Site directed mutagenesis, Mutation, RNA editing, RNAprocessing;

Unit 6: Genomics and Proteomics

Genomics: Classical ways of genome analysis, Evolution of sequencing technologies, Genomic libraries, Physical mapping of genomes; Genome sequencing strategies: Sequencingby synthesis, ligation, single molecular sequencing; Microarrays analysis and applications; Next generation sequencing technologies, Sequence assembly and annotation, exome sequencing; Genome structural and functional annotation; Functional genomics; Candidate gene identification, Linkage analysis, genotyping analysis; Whole genome analysis and comparative genomics; ncRNAs; Genome Editing; Proteomics: Mass spectrometry and analysis, peptide identification and protein interface; Metabolomics for elucidating metabolic pathways; Applications of genomics and proteomics in agriculture;

Unit 7: Analytical Bioinformatics

Introduction, origin, history of Bioinformatics; Bioinformatics applications in agriculture; Basic concepts of sequence similarity, Sequences alignments: local and global alignment, pairwise and multiple sequence alignment, Dynamic programming-Needleman and Wunsch, Smith-Waterman algorithms; Scoring matrices: PAM & BLOSUM, Motifs and Patterns;Analysis of nucleotide and protein sequences: Pre-processing of NGS data, Bowtie, BWA, HISAT, FM Index, Assembly assessment measures, Quantification of gene expression: RPKM, FPKM, TPM; ncRNA analysis; Phylogenetic analyses: Types of phylogenetic trees, Tree-Building Methods: Character-based and Distance-based methods; Tree Evaluation: Bootstrapping; Introduction to systems and network biology; Tools and models for GWAS and Genomic Selection; Data mining & Knowledge discovery, Machine learning techniques: Supervised and unsupervised learning, Artificial Neural Network, Support Vector Machine, Random Forest; Deep Learning;

Unit 8: Molecular Modelling and drug designing

Concepts of Protein Modelling, Molecular mechanics, Force Fields, Local and global energy minima, Energy minimization techniques; Algorithms in predicting secondary structure of proteins- Chau-Fasman algorithm, Protein folding energy landscape; Protein structure prediction: *ab initio*, homology modeling and fold recognition methods, Ramachandran plot; Visualization tools: Rasmol, SwissPDB, PyMol, QMol; Techniques of MD Simulation, Simulated annealing; RNA Secondary Structure prediction techniques, Algorithmic perspective of RNA folding; Drug designing: Receptor-based and ligand-based drug design, Design of ligands, docking, Classical SAR/QSAR, Molecular descriptors, Pharmacophore mapping and applications.

Unit 9: Data structures and Algorithms

Linear and non-linear data structure: Linked list, Stack, Queues, Trees-Terminologies, Binarytrees, Tree traversal (Pre-order, In-order, post-order), AVL trees, Graph theory, Depth-first search and Breadth-first search algorithms; Algorithms and complexity, Iterative and recursive algorithms, Big-O Notation, Algorithm design and analysis techniques, Greedy Algorithms, Randomized Algorithms, Divide-and-Conquer approach, Searching and Sorting algorithms;

17. हिन्दी

1. **हिंदी भाषा का इतिहास** :
   - **हिंदी की ऐतिहासिक पृष्ठभूमि :-**
     प्राचीन भारतीय आर्य भाषाएँ, मध्यकालीन भारतीय आर्य भाषाएँ और उनके अंतरसंबंध, अपभ्रंश, अवहट्ट (पुरानी हिंदी) का संबंध, आधुनिक भारतीय आर्य भाषाएँ और उनका वर्गीकरण, हिंदी का भौगोलिक विस्तार, आरंभिक हिंदी का व्याकरणिक तथा अनुप्रयुक्त रूप, हिंदी की उपभाषाएँ और बोलियाँ - वर्गीकरण तथा क्षेत्र, प्रारंभिक हिंदी के विविध रूप- हिंदी, उर्दू, हिंदुस्तानी, दखिनी हिंदी; काव्यभाषा के रूप में अवधी का उदय और विकास, काव्यभाषा के रूप में ब्रजभाषा का उदय और विकास, साहित्यिक हिंदी के रूप में खड़ी बोली हिंदी का उदय और विकास
   - मानक हिंदी का भाषावैज्ञानिक विवरण(रूपगत) : हिंदी की स्वनिम व्यवस्था, हिंदी ध्वनियों के वर्गीकरण का आधार, हिंदी शब्द रचना- उपसर्ग, प्रत्यय, हिंदी की रूप रचना- लिंग, वचन, कारक व्यवस्था के संदर्भ में संज्ञा, सर्वनाम, विशेषण, क्रिया रूप, हिंदी वाक्य रचना
   - हिंदी भाषा प्रयोग के विविध रूप : बोली, मानकभाषा, राजभाषा, राष्ट्रभाषा, संपर्क भाषा, संचार भाषा
   - प्रयोजनमूलक हिन्दी की संवैधानिक स्थिति और भारतीय संघ की राजभाषा के रूप में हिंदी का विकास

2. नागरी लिपि का इतिहास विकास :

- नागरी लिपि का उद्‌भव और विकास,
- नागरी लिपि की विशेषताएं एवं मानकीकरण,
- कंप्यूटर और देवनागरी लिपि से संबंधित सुविधाएँ एवं सॉफ्टवेयर
- यूनिकोड

3· हिन्दी विस्तारीकरण के वैयक्तिक एवं संस्थागत प्रयास :

- स्वतंत्रता आंदोलन के दौरान राष्ट्रभाषा के रूप में हिंदी का विकास,
- हिंदी प्रसार के आंदोलन, प्रमुख व्यक्तियों एवं संस्थाओं का योगदान,
- हिंदी से संबंधित सरकारी संस्थाएँ एवं विभाग,
- सम्मान,
- पुरस्कार
- पत्र पत्रिकाएँ
- हिंदी के जनमाध्यम
- हिंदी पोर्टल एवं वेबपटल

4. हिंदी साहित्य का इतिहास :

- साहित्य का इतिहास दर्शन, हिंदी साहित्य के इतिहास लेखन की पद्धतियाँ, हिंदी साहित्य के प्रमुख इतिहास ग्रंथ एवं उनकी विशेषताएँ, हिंदी साहित्य इतिहास का काल विभाजन और नामकरण,
- **आदिकाल :-**
  आदिकालीन साहित्य की सामाजिक-सांस्कृतिक-धार्मिक पृष्ठभूमि, धार्मिक साहित्य- सिद्ध, जैन, नाथ साहित्य, लौकिक साहित्य- रासो काव्यधारा, श्रृंगारिक काव्यधारा, अमीर खुसरो की कविता

- **भक्ति काल :-**

  भक्ति आंदोलन की पृष्ठभूमि और उसके उदय के सामाजिक-सांस्कृतिक कारण- विविध दृष्टि, भक्ति आंदोलन का अखिल भारतीय स्वरूप और उसका अंतःप्रादेशिक वैशिष्ट्य, भक्तिकाव्य के प्रमुख दार्शनिक सिद्धांत- विशिष्टाद्वैत, शुद्धाद्वैत, द्वैताद्वैत, द्वैत मत, भक्ति काव्य के भेद, हिंदी संत काव्य परंपरा और उसका वैचारिक आधार, संत काव्य में सामाजिक समरसता, हिंदी की सूफी काव्य परंपरा, हिन्दी के असूफी प्रेमाख्यान
- **रीतिकाल :-**

  रीतिकाल की सामाजिक सांस्कृतिक पृष्ठभूमि, रीतिकालीन साहित्य की प्रमुख प्रवृत्तियाँ, रीतिबद्ध, रीतिसिद्ध, रीतिमुक्त काव्य, रीति काव्य के प्रमुख स्रोत, रीतिकालीन कवियों का आचार्यत्व, रीतिकाल के प्रमुख कवि और उनका काव्य, रीति काव्य में लोकजीवन, रीतिकाव्य का अस्मितामूलक विमर्श
- **आधुनिक काल :-**
  - हिंदी गद्य का उद्भव और विकास, भारतेंदु पूर्व हिंदी गद्य, भारतेंदुकालीन हिंदी गद्य, भारतेंदु और उनका मंडल, भारतेंदु मंडल के बाहर के लेखक, पारसी थियेटर और हिंदी रंगमंच, हिंदी पत्रकारिता का आरंभ और 19वीं शताब्दी की हिंदी पत्रकारिता
  - द्विवेदी युग:- महावीर प्रसाद द्विवेदी और उनका युग, हिंदी नवजागरण और सरस्वती, राष्ट्रीय काव्यधारा के प्रमुख कवि, स्वच्छंदतावाद और उसके प्रमुख कवि, द्विवेदीयुगीन हिंदी पत्रकारिता, द्विवेदीयुगीन हिंदी गद्य का वैशिष्ट्य
  - छायावाद:- छायावाद की सांस्कृतिक-सामाजिक-दार्शनिक पृष्ठभूमि, छायावाद का आरंभ, छायावाद के विषय में विभिन्न मत, छायावाद की प्रमुख विशेषताएँ, छायावाद के प्रमुख कवि,
  - प्रगतिवाद की अवधारणा, प्रगतिवादी काव्य और उसके प्रमुख कवि
  - प्रयोगवाद और नई कविता: प्रमुख कवि
  - समकालीन कविता

5. हिंदी साहित्य की गद्य विधाएँ :

- **हिंदी उपन्यास :** उपन्यास की अवधारणा, प्रेमचंद पूर्व उपन्यास, प्रेमचंद और उनका युग, प्रेमचंद के परवर्ती उपन्यासकार, स्वातंत्र्योत्तर हिन्दी उपन्यास
- **हिंदी कहानी :** हिंदी कहानी का उद्भव और विकास, हिंदी कहानी के प्रमुख आंदोलन, कहानी और नई कहानी, हिंदी कहानी की प्रमुख प्रवृतियां,
- **हिंदी नाटक :** हिंदी नाटक और रंगमंच, भारतीय नाट्य परंपरा और नाट्यशास्त्र का संक्षिप्त परिचय, हिंदी नाटक के विकास के चरण, भारतेंदु युग पूर्व के नाटक, भारतेंदु युग के नाटक, प्रसाद युग और प्रसादोत्तर युग के नाटक, स्वातंत्र्योत्तर युग के नाटक, हिंदी एकांकी, हिंदी के प्रमुख एकांकीकार
- **हिंदी निबंध :** हिन्दी निबंध का विकास, हिंदी निबंध की मूलभूत विशेषताएँ, हिन्दी निबंध के प्रमुख भेद, हिन्दी के प्रमुख निबंधकार,
- **हिंदी आलोचना :** हिंदी आलोचना का उद्भव और विकास, हिंदी के प्रमुख आलोचक और आलोचनात्मक स्थापनाएँ
- **हिंदी की कथेतर गद्य विधाएँ :** संस्मरण, रेखाचित्र, जीवनी, आत्मकथा, रेडियो एकांकी, डायरी, रिपोर्ताज, साक्षात्कार, यात्रा साहित्य, पत्र साहित्य, ब्लॉग लेखन (चिट्ठाकारिता)

6. साहित्यशास्त्र और आलोचना :

काव्यशास्त्र :-

- काव्य के लक्षण, काव्य प्रयोजन, काव्यहेतु, काव्य दोष, काव्य गुण, काव्य के रूप,
- काव्य के प्रमुख संप्रदाय एवं सिद्धांत- रस, अलंकार, रीति , ध्वनि, वक्रोक्ति, औचित्य

- रस निष्पत्ति, साधारणीकरण, भरतमुनि का रस सूत्र और उसके प्रमुख व्याख्याकार, रस के अवयव, भेद
- शब्द शक्तियाँ
- अलंकार- अनुप्रास, यमक, वक्रोक्ति, श्लेष, उपमा, रूपक, उत्प्रेक्षा, संदेह, भ्रांतिमान, अतिशयोक्ति, अन्योक्ति, समासोक्ति, अत्युक्ति, विशेषोक्ति, विभावना, प्रतीप, व्यतिरेक, अर्थांतरन्यास, असंगति, विरोधाभास, तद्गुण, अतद्गुण, मीलित, उन्मीलित, अपन्हुति
- प्लेटो के काव्य सिद्धांत
- अरस्तु की काव्य विषयक मान्यताएँ, त्रासदी के तत्व, अनुकरण सिद्धांत, विरेचन का सिद्धांत, त्रासदी और महाकाव्य में अंतर,
- होरेस: काव्य विषयक मान्यताएं
- लोंजाइनस: काव्य में उदात्त तत्व
- शास्त्रीयतावाद और स्वच्छंदतावाद
- क्रोचे का अभिव्यंजनावाद
- आई. ए. रिचर्ड्स और टी. एस. इलियट के काव्य सिद्धांत
- नई समीक्षा

7. हिंदी आलोचना के पारिभाषिक शब्द और कतिपय अवधारणाएँ :

- काव्यभाषा, बिंब, मिथक, कल्पना, फैंतेसी, निजंधरी कथा, कविसमय, काव्यरूढ़ि
- प्रतिभा, व्युत्पत्ति, अभ्यास, अनुभूति अप्रस्तुत योजना, संकेतग्रह, बिम्बग्रहण, आनंद की साधनावस्था और सिद्धावस्था, शीलदशा, भावदशा, लोकमंगल, प्रत्यक्ष रूपविधान, स्मृत रूपविधान, कल्पित रूपविधान, भाव एवं मनोविकार, ज्ञानात्मक संवेदना और संवेदनात्मक ज्ञान, लाक्षणिक मूर्तिमत्ता, उपचार वक्रता, आदर्शोन्मुख यथार्थ, विरुद्धों का सामंजस्य, लघु मानव, मानोमयकोश, आलंबनत्व धर्म, अनुभूति, कल्पना, चेतना प्रवाह, रूप, कथ्य, सहृदय,
- विडंबना(आयरोनी), अजनबीपन(एलियनेशन), विसंगति (एब्सर्ड), अंतर्विरोध(पैराडॉक्स), संत्रास, विरोधाभास, विपथन
- उत्तरआधुनिकता, मार्क्सवाद, मनोविश्लेषणवाद, अस्तित्ववाद, यथार्थवाद, आदर्शवाद, अतियथार्थवाद, मानववाद, प्रभाववाद, आधुनिकतावाद, संरचनावाद, रूपवाद, अस्मितामूलक विमर्श (दलित, स्त्री, आदिवासी, थर्ड जेंडर)
- पुनर्जागरण, गांधीवाद, अंबेडकर दर्शन, लोहिया दर्शन, एकात्म मानववाद, सांस्कृतिक आलोचना
- हिंदी के प्रमुख आलोचक और उनकी आलोचनात्मक स्थापनाएँ

प्रमुख रचनाकार और रचनाएँ

8. हिंदी काव्य :

गोरखवाणी, संपादक - पीतांबर दत्त बड़थ्वाल, पद संख्या - 1, 6, 7, 9, 11, 12, 14, 15, 17, 28, 30, 32, 33, 36, 46, 51, 52, 54, 55, 57, 68, 69, 119, 123, 153

विद्यापति : विद्यापति पदावली, संपादक - रामफेर त्रिपाठी, पद संख्या -1, 2, 4, 6, 9, 10, 15, 20, 23, 33, 34, 36, 231, 239, 241, 251, 252, 254, 271, 274

कबीर : कबीर वाणी पीयूष, संपादक - जयदेव सिंह, वासुदेव सिंह, सुमिरन को अंग, विरह को अंग, परचा को अंग, सहज को अंग, पद- 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14

जायसी : जायसी ग्रंथावली, संपादक - रामचंद्र शुक्ल, नख-शिख खंड और नागमती वियोग खंड

सूरदास : भ्रमरगीत सार, संपादक - रामचंद्र शुक्ल, पद संख्या 21 से 70 तक

तुलसीदास : रामचरितमानस - उत्तरकांड, गीता प्रेस, गोरखपुर

मीराबाई : संपादक विश्वनाथ त्रिपाठी- आरंभ के 20 पद

रहीम : रहीम रचनावली, संपादक - सत्यप्रकाश मिश्र, दोहावली- 4, 13, 14, 16, 22, 23, 25, 27, 30, 31, 32, 35, 37, 40, 43, 44, 51, 63, 67, 72, 74, 75, 77, 89, 119, 124, 158, 168, 175, 209, 214, 219, 224, 225, 232, 239, 242, 243, 289, 290 (40 दोहे)

केशव : केशवदास - केशव कौमुदी, भाग 1, टीकाकार - लाला भगवान दीन,

पांचवाँ प्रकाश - छंद संख्या 10, 13, 14, 16, 17, 19, 22, 24, 31, 36, 38, 42, ग्यारहवाँ प्रकाश - 17, 18, 26, तेरहवाँ प्रकाश - 22, 53, 85, सोलहवाँ प्रकाश - 4, 6, 7, 11, 12, 13, 24

बिहारी : बिहारी, संपादक - विश्वनाथ प्रसाद मिश्र, दोहा संख्या- 5, 8, 11, 21, 29, 33, 34, 37, 41, 43, 55, 84, 96, 111, 134, 163, 182, 185, 199, 213, 215, 224, 235, 347, 263, 265, 326, 358, 367, 390, 403, 409, 436, 437, 440, 467, 525, 534, 539, 558 (40 दोहे)

भूषण : भूषण ग्रंथावली, संपादक - विश्वनाथ प्रसाद मिश्र , पद संख्या - 50, 53, 55, 61, 62, 76, 78, 83, 92, 100, 274, 182, 195, 213, 231, 233, 323, 415, 420, 421 (20 छंद)

रसखान: रसखान रचनावली (सं० विद्यानिवास मिश्र, सत्यदेव मिश्र) - सुजान रसखान - सवैया - 1, 2, 3, 5, 8, 12, 13, 18, 21, 27, 31, 32, 37, 41, 51, 53, 55, 56, 61, 63

घनानंद : घनानंद कवित्त (सं० विश्वनाथ प्र० मिश्र), कवित्त सं० 1 से 30 तक

मैथिलीशरण गुप्त : साकेत, नवम् सर्ग

जयशंकर प्रसाद : कामायनी - आशा, श्रद्धा, लज्जा सर्ग

सूर्यकांत त्रिपाठी निराला : राम की शक्ति पूजा, जागो फिर एक बार(भाग 2), भारती जय विजय करे, वर दे वीणा वादिनी वर दे

सुमित्रानंदन पंत : प्रथम रश्मि, नौका विहार, संध्या, एक तारा, भारत माता, द्रुत झरो जगत के जीर्ण पत्र

महादेवी वर्मा : दीपशिखा (दीप मेरे जल अकम्पित, पंथ रहने दो अपरिचित, मैं न यह पथ जानती थी, सब आँखों के आँसू उजले, सब के सपनों में सत्य पला), सांध्य गीत (मैं नीर भरी दुख की बदली, दीप तेरा दामिनी, देव अब वरदान कैसा)

सच्चिदानंद वात्स्यायन 'अज्ञेय' : असाध्य वीणा, नदी के द्वीप

गजानन माधव 'मुक्तिबोध' : अंधेरे में

रामधारी सिंह 'दिनकर' : रेणुका (हिमालय), सामधेनी (आग की भीख, दिल्ली और मास्को, जयप्रकाश, राही और बाँसुरी, सिंहासन ख़ाली करो कि जनता आती है, क़लम आज उनकी जय बोल)

नागार्जुन : हज़ार हज़ार बाँहों वाली, अकाल और उसके बाद, गुलाबी चूड़ियाँ, बादल को घिरते देखा है, कालिदास

शमशेर बहादुर सिंह : भारत की आरती, एक पीली शाम, शाम होने को हुई, निराला के प्रति, एक नीला आइना बेठोस, दूब

केदारनाथ अग्रवाल : मेरी धरती और मैं, प्यासी धरती की पुकार, सुनता है बादल, जागरण की कामना, निराला के प्रति, माँझी न बजाओ बंशी, किसान से

भवानी प्रसाद मिश्र : गीत फरोश, सतपुड़ा के जंगल

सुदामा पाण्डे 'धूमिल': मोचीराम, जनतंत्र के सूर्योदय में सच्ची बात

9. कथा साहित्य :

हिंदी उपन्यास :

प्रेमचंद - गोदान
चतुरसेन शास्त्री - वयम रक्षाम:
वृंदावनलाल वर्मा - विराटा की पद्मिनी
हज़ारी प्रसाद द्विवेदी - पुनर्नवा
सच्चिदानंद हीरानंद वात्स्यायन अज्ञेय: नदी के द्वीप
फणीश्वरनाथ 'रेणु, - मैला आंचल

भगवती चरण वर्मा - भूले बिसरे चित्र
शिव प्रसाद सिंह - नीला चाँद
अमृतलाल नागर - मानस का हंस
यशपाल - झूठा सच
श्रीलाल शुक्ल - राग दरबारी
भीष्म साहनी: वसंती
मन्नू भंडारी - आपका बंटी

कहानी :

प्रेमचंद - दुनिया का अनमोल रतन, कफन
राजा राधिकारमण प्रसाद सिंह - कानों में कंगना
विश्वम्भरनाथ शर्मा 'कौशिक' - ताई
चन्द्रधर शर्मा गुलेरी - उसने कहा था
जयशंकर प्रसाद - आकाशदीप
जैनेन्द्र - पत्नी
फणीश्वर नाथ 'रेणु' - लाल पान की बेगम, रसप्रिया
सच्चिदानन्द वात्स्यायन अज्ञेय - रोज, शरणदाता
भीष्म साहनी - चीफ की दावत
उषा प्रियंवदा - वापसी
निर्मल वर्मा - परिंदे
कमलेश्वर - दिल्ली में एक मौत
राजेन्द्र यादव - जहाँ लक्ष्मी कैद है
मोहन राकेश - मलबे का मालिक

हिंदी नाटक :

भारतेंदु हरिश्चंद्र - अंधेरी नगरी
जयशंकर प्रसाद - चंद्रगुप्त
धर्मवीर भारती - अंधा युग
लक्ष्मीनारायण लाल - सिंदूर की होली
मोहन राकेश - आषाढ़ का एक दिन
उपेंद्रनाथ 'अश्क' - अंजो दीदी

10. कथेतर गद्य विधाएँ :

हिंदी निबंध :

भारतेंदु हरिश्चंद्र - भारतवर्षोन्नति कैसे हो सकती है, वैष्णवता और भारतवर्ष
प्रताप नारायण मिश्र- आप, धोखा
बालकृष्ण भट्ट- साहित्य जन समूह के हृदय का विकास है
बालमुकुंद गुप्त - शिव शंभू के चिट्ठे
चंद्रधर शर्मा गुलेरी - धर्म और समाज
महावीर प्रसाद द्विवेदी - कवि कर्तव्य
सरदार पूर्ण सिंह - आचरण की सभ्यता
रामचन्द्र शुक्ल - श्रद्धा और भक्ति

हजारी प्रसाद द्विवेदी - नाखून क्यों बढ़ते हैं

कुबेरनाथ राय - महाकवि की तर्जनी

विद्यानिवास मिश्र - अस्ति की पुकार हिमालय

हरिशंकर परसाई - विकलांग श्रद्धा का दौर

आलोचना : प्रमुख आलोचक

रामचंद्र शुक्ल, नंददुलारे वाजपेयी, डॉ० नगेंद्र, हजारी प्रसाद द्विवेदी, रामविलास शर्मा, विजयदेव नारायण साही, रामस्वरूप चतुर्वेदी, नामवर सिंह की प्रमुख स्थापनाएँ

आत्मकथा :

पांडेय बेचन शर्मा 'उग्र' - अपनी ख़बर

जीवनी :

विष्णु प्रभाकर - आवारा मसीहा

संस्मरण :

विष्णुकान्त शास्त्री - सुधियाँ उस चन्दन के वन की

यात्रा साहित्य :

निर्मल वर्मा - चीड़ों पर चांदनी

रेखाचित्र :

महादेवी वर्मा - मेरा परिवार

रिपोतार्ज :

फणीश्वर नाथ 'रेणु' - ऋणजल धनजल

डायरी :

रमेशचन्द्र शाह - अकेला मेला

साक्षात्कार :

बनारसीदास चतुर्वेदी - प्रेमचंद के साथ दो दिन

पत्र साहित्य :

जानकी वल्लभ शास्त्री - निराला के पत्र

अमृत राय - चिट्ठी पत्री

18. ZOOLOGY

UNIT-1: Molecules and their interaction relevant to Biology :

A. Structure of atoms, molecules and chemical bonds.
B. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).
C. Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties).
D. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.
E. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes
F. Conformation of proteins (Ramachandran plot, secondary, tertiary and quaternary structure; domains; motif and folds).
G. Conformation of nucleic acids (A-,B-,Z-, DNA), t-RNA, micro-RNA).
H. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

UNIT-2: Cellular Organization :

A. **Membrane structure and function :** Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, ion pumps, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes.
B. **Structural organization and function of intracellular organelles :** Nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, vacuoles, structure & function of cytoskeleton and its role in motility.
C. **Organization of genes and chromosomes :** Operon, interrupted genes, gene families, structure of chromatin and chromosomes, unique and repetitive DNA, heterochromatin, euchromatin, transposons.
D. **Cell division and cell cycle :** Mitosis and meiosis, their regulation, steps in cell cycle, and control of cell cycle.
E. **Microscopic techniques :** Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze- fracture methods for EM, image processing methods in microscopy.

UNIT-3: Fundamental Processes and techniques :

A. **DNA replication, repair and recombination :** Unit of replication, enzymes involved, replication origin and replication fork, fidelity of replication, extrachromosomal replicons, DNA damage and repair mechanisms.
B. **RNA synthesis and processing :** Transcription factors and machinery, formation of initiation complex, transcription activator and repressor, RNA polymerases, capping, elongation, and termination, RNA processing, RNA editing, splicing, polyadenylation, structure and function of different types of RNA, RNA transport.
C. **Protein synthesis and processing :** Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, and translational proof-reading, translational inhibitors, Post-translational modification of proteins.

D. **Molecular Biology and Recombinant DNA methods :** Isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods; Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis.
Generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors; In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms; Protein sequencing methods, detection of post-translation modification of proteins; DNA sequencing methods.

E. **Histochemical and Immunotechniques :** Antibody generation, Detection of molecules using ELISA, RIA, western blot, immunoprecipitation, fluocytometry and immunofluorescence microscopy.

F. **Biophysical Method :** analysis of biomolecules using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy, structure determination using x-ray diffraction and NMR; analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.

UNIT-4: Cell Communication and cell signaling :

A. **Host parasite interaction :** Recognition and entry processes of different pathogens like bacteria, viruses into animal alteration of host cell behavior by pathogens.

B. **Cell Signaling :** Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers.

C. **Cellular Communication :** Regulation of hematopoiesis, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation.

D. **Cancer :** Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, senescence.

E. **Innate and adaptive immune system :** Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules. generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, humoral and cell-mediated immune responses, primary and secondary immune modulation, the complement system.

UNIT-5: Developmental Biology :

A. **Basic concepts of development :** Potency, commitment, specification, induction, competence, determination and differentiation.

B. **Gametogenesis, fertilization and early development:** Production of gametes, cell surface molecules in sperm-egg recognition in animals; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis.

C. **Morphogenesis and organogenesis in animals :** Cell aggregation and differentiation in *Dictyostelium*; axes and pattern formation in *Drosophila*, amphibia and chick; organogenesis -vulva formation in *Caenorhabditis elegans*, eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development- larval formation, metamorphosis; environmental regulation of normal development; sex determination.

UNIT-6: Animal Physiology :

A. **Blood and circulation :** Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.
B. **Cardiovascular System :** Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.
C. **Respiratory system :** Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.
D. **Nervous system :** Neurons, action potential, neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and movements.
E. **Sense organs :** Vision, hearing and tactile response.
F. **Excretory system :** Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.
G. **Thermoregulation :** Comfort zone, body temperature-physical, chemical, neural regulation, acclimatization.
H. **Digestive system :** Digestion, absorption, energy balance, BMR.
I. **Endocrinology and reproduction :** Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, neuroendocrine regulation, stress and strain.

UNIT-7: Inheritance Biology

A. **Mendelian principles :** Dominance, segregation, independent assortment, deviation from Mendelian inheritance.
B. **Concept of gene :** Allele, multiple alleles, pseudoallele, complementation tests.
C. **Extensions of Mendelian principles :** Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.
D. **Gene mapping methods :** Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids.
E. **Mutation :** Types, causes and detection, mutant types-lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.
F. **Structural and numerical alterations of chromosomes :** Deletion, duplication, inversion, translocation, ploidy and their genetic implications.
G. **Recombination :** Homologous and non-homologous recombination, including transposition, site-specific.

UNIT-8: Animal Systematic, Invertebrates and Vertebrates :

A. **Principles & methods of taxonomy :** Concepts of species and hierarchical taxa, biological nomenclature, classical & quantitative methods of taxonomy, animals.
B. **Levels of structural organization:** Unicellular, colonial and multicellular forms; levels of organization of tissues, organs & systems.
C. **Classification of animals :** Important criteria used for classification in each taxon; classification of animals; evolutionary relationships among taxa.
D. **Invertebrate :** Type study of all important animals belong to different plylum of invertebrate.
E. **Vertebrate :** Specific topics : Evolution of chordates, origin and evolution of lungfishes, tetrapodes, poisonous and non-poisonous snakes and biting mechanism, flight adaptation in birds, aquatic and terrestrial mammals.

Unit-9: Ecology:

A. **The Environment :** Physical environment; biotic environment; biotic and abiotic interactions.

B. **Habitat and Niche :** Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

C. **Population Ecology :** Characteristics of a population; population growth curves; population regulation; life history strategies (*r* and *K* selection); concept of metapopulation- demes and dispersal, interdemic extinctions, age structured populations.

D. **Species Interactions :** Types of interactions, interspecific competition, herbivory, carnivory, symbiosis.

E. **Community Ecology :** Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

F. **Ecological Succession :** Types; mechanisms; changes involved in succession; concept of climax.

G. **Ecosystems :** Structure and functions; energy flow and mineral cycling (C,N,P); primary production and decomposition; structure and function of some Indian ecosystems: terrestrial (forest, grassland) and aquatic (fresh water, marine, eustarine).

H. **Zoogeography :** Major terrestrial biomes; theory of island biogeography; zoogeographical zones of the world.

I. **Applied Ecology :** Environmental pollution; global environmental change; biodiversity- status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches.

J. **Conservation Biology :** Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).

K. **Statistical Methods :** Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); Sampling distribution; Difference between parametric and non-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; X^2 test; Basic introduction to Muetrovariate statistics, etc.

UNIT-10:Evolution and behaviour :

A. **Emergence of evolutionary thoughts :** Concepts of variation, adaptation, struggle and natural selection; Synthetic theory of evolution.

B. **Origin of cells and unicellular evolution :** Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes.

C. **Evolutionary History :** The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale. Stages in primate evolution including Homo.

D. **The Mechanisms :** Population genetics-Populations, Gene pool, Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; Adaptive radiation and modifications; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.

E. **Animal Behavior :** Approaches and methods in study of behavior; Proximate and ultimate causation; Altruism and evolution-Group selection, Kin selection, Reciprocal altruism; Neural basis of learning, memory, cognition, sleep and arousal; Biological clocks; Development of behavior; Social communication; Social dominance; Use of space and territoriality; Mating systems, Parental care; Aggressive behavior; Habitat selection and optimality in foraging; Migration, orientation and navigation; Domestication and behavioral changes.

19. PHYSICS

I. Mathematical Methods of Physics

Dimensional analysis. Vector algebra and vector calculus. Linear algebra, matrices, Cayley-Hamilton Theorem. eigenvalue problems; Linear differential equations; special functions (Hermite, Bessel, Laguerre and Legendre); Recurrence relations. Fourier series, Fourier and Laplace transforms; Elements of complex analysis: Laurent series-poles, residues and evaluation of integrals; Elementary ideas about thesors; Introductory group theory, SU(2), O(3); Elements of computational techniques: roots of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, solution of first order differential equations using Runge-Kutta method; Finite difference methods; Elementary probability theory, random variables, binomial, Poisson and normal distributions.

II. Classical Mechanics

Newton's laws; Phase space dynamics, stability analysis; Central-force motion; Two-body collisions, scattering in laboratory and center-of-mass frames; Rigid body dynamics, moment of inertia tensor, Non-inertial frames and pseudoforces; Variational principle, Lagrangian and Hamiltonian formalism and equations of motion; Poisson brackets and canonical transformations; Symmetry, invariance and conservation laws, cyclic coordinates; Periodic motion, small oscillations and normal modes; Special theory of relativity, Lorentz transformations, relativistic kinematics and mass–energy equivalence. Twin Paradox, Hamilton – Jacobi Theory.

III. Electromagnetic Theory

Electrostatics: Gauss's law and its applications; Laplace and Poisson equations, boundary value problems; Magnetostatics: Biot-Savart law, Ampere's theorem, electromagnetic induction; Maxwell's equations in free space and linear isotropic media; boundary conditions on fields at interfaces; Scalar and vector potentials; Gauge invariance; Electromagnetic waves in free space, dielectrics, and conductors; Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction; Dispersion relations in plasma; Lorentz invariance of Maxwell's equations; Transmission lines and wave guides; Cavity Resonator, Dynamics of charged particles in static and uniform electromagnetic fields; Radiation from moving charges, dipoles and retarded potentials Plasma.

IV. Quantum Mechanics

Wave-particle duality; Wave function in coordinate and momentum representations; Commutators and Heisenberg's uncertainty principle; Matrix representation; Dirac's bra and ket notation; Schroedinger equation (time-dependent and time-independent); Eigenvalue problems such as particle-in-a-box, harmonic oscillator, etc.; Tunneling through a barrier; Motion in a central potential; Orbital angular momentum, Angular momentum algebra, spin; Addition of angular momenta; Hydrogen atom, spin-orbit coupling, fine structure; Time-independent perturbation theory and Time dependent perturbation theory and Fermi's Golden Rule; Selection rules; Semi-classical theory of radiation; Elementary theory of scattering, phase shifts, partial waves, Born approximation; Identical particles, Pauli's exclusion principle, spin-statistics connection; Relativistic quantum mechanics: Klein Gordon and Dirac equations.

V. Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences; Thermodynamic potentials, Maxwell relations; Chemical potential, phase equilibria; Phase space, micro- and macrostates; Microcanonical, canonical and grand-canonical ensembles and partition functions; Free Energy and connection with thermodynamic quantities; First- and second-order phase transition; Classical and quantum statistics, ideal Fermi and Bose gases; Principle of detailed balance; Blackbody radiation and Planck's distribution law; Bose-Einstein condensation; Random walk and Brownian motion; Introduction to non equilibrium processes; Diffusion equation.

VI. Electronics

Semiconductor device physics, including diodes, junctions, transistors, field effect devices, homo and heterojunction devices, device structure, device characteristics, frequency dependence and applications; Optoelectronic devices, including solar cells, photodetectors and LEDs; High-frequency devices, including generators and detectors; Operational amplifiers and their applications; Digital techniques and applications (registers, counters, comparators and similar circuits); A/D and D/A converters; Microprocessor and microcontroller basics. Oscillator, Amplifier, Modulation & demodulation, Switching time, High frequency devices.

VII. Experimental Techniques and data analysis

Data interpretation and analysis; Precision and accuracy, error analysis, propagation of errors, least squares fitting, linear and nonlinear curve fitting, chi-square test; Transducers (temperature, pressure/vacuum, magnetic field, vibration, optical, and particle detectors), measurement and control; Signal conditioning and recovery, impedance matching, amplification (Op-amp based, instrumentation amp, feedback), filtering and noise reduction, shielding and grounding; Fourier transforms; lock-in detector, box-car integrator, modulation techniques.

Application of experimental and analytical techniques.

VIII. Atomic & Molecular Physics

Quantum states of an electron in an atom; Electron spin; Stern-Gerlach experiment; Spectrum of Hydrogen, helium and alkali atoms; Relativistic corrections for energy levels of hydrogen; Hyperfine structure and isotopic shift; width of spectral lines; LS & JJ couplings; Zeeman, Paschen Bach & Stark effect; X-ray spectroscopy; Electron spin resonance, Nuclear magnetic resonance, chemical shift; Rotational, vibrational, electronic, and Raman spectra of diatomic molecules; Frank - Condon principle and selection rules; Spontaneous and stimulated emission, Einstein A & B coefficients; Lasers, optical pumping, population inversion, rate equation; Modes of resonators and coherence length, U-V and infrared spectrometry.

IX. Condensed Matter Physics

Bravais lattices; Reciprocal lattice, diffraction and the structure factor; Bonding of solids; Elastic properties, phonons, lattice specific heat; Free electron theory and electronic specific heat; Response and relaxation phenomena; Drude model of electrical and thermal conductivity; Hall effect and thermoelectric power; Diamagnetism, paramagnetism, and ferromagnetism; Electron motion in a periodic potential, band theory of solids, Superconductivity: type-I and type-II superconductors. Josephson junctions; Defects and dislocations; Ordered phases of matter, translational and orientational order, kinds of liquid crystalline order; Conducting polymers; Quasicrystals, Quantum Hall effect.

X. Nuclear and Particle Physics

Basic nuclear properties: size, shape and charge distribution, spin and parity; Binding energy, semi-empirical mass formula; Liquid drop model; Fission and fusion; Nature of the nuclear force, form of nucleon-nucleon potential; Charge-independence and charge-symmetry of nuclear forces; Isospin; Deuteron problem; Evidence of shell structure, single-particle shell model, its validity and limitations; Rotational spectra; Elementary ideas of alpha, beta and gamma decays and their selection rules; Nuclear reactions, reaction mechanisms, compound nuclei and direct reactions; Classification of fundamental forces; Elementary particles (quarks, baryons, mesons, leptons); Spin and parity assignments, isospin, strangeness; Gell-Mann- Nishijima formula; C,P, and T invariance and application of symmetry arguments to particle reactions, parity non-conservation in weak interaction; Relativistic kinematics.

20. BOTANY

1. Cell Biology : Cell as structural and functional unit of life, Prokaryotic and eukaryotic cells- structural and ultra structural details; Structure and function of extracellular matrix (cell wall), membranes-cell adhesion, membrane transport and vesicular transport; Structure and function of cell organelles (chloroplasts, mitochondria, FR, dictyosomes ribosomes, endosomes, lysosomes, peroxisomes); Cytoskelaton and microtubules; Nucleus, nucleus, nuclear pore complex; Chromatin and nucleosome; Cell signaling and cell receptors; Signal transduction; Mitosis and meiosis; Molecular basis of cell cycle; Numerical and structural variations in chromosomes and their significance; Chromatin organization and packaging of genome; Polytene chromosomes; B-chromosomes –structural, behaviour and significance.

2. Microbiology and Plant Pathology : Structure and reproduction/multiplication of viruses, viroids, bacteria, fungi and mycoplasma; Applications of microbiology in agriculture, industry, medicine and in control of soil and water pollution; Prion and Prion hypothesis. Important crop diseases caused by viruses, bacteria, mycoplasma, fungi and nematodes; Modes of infection and disease resistance/defence mechanisms. PR proteins, Control measures; Mycotoxins.

3. Cryptogams : Algae, fungi, lichens, bryophytes, pteridophytes- structure and reproduction from evolutionary viewpoint; Distribution of Cryptogams in India and their ecological and economic importance.

4. Phanerogams : Gymnosperms; Concept of Progymnosperms; Classification and distribution of gymnosperms; Salient features of Cycadales, Ginkgoales, Coniferales and Gnetales, their structure and reproduction; General account of Cycadofilicales, Bennettitales and Cordaitales; Geological time scale; Type of fossils and their study techniques.

Angiosperms : Systematics, anatomy, embryology, palynology and phylogeny.

International Code of Botanical Nomenclature; Numerical taxonomy and chemotaxonomy; Evidence from, embryology and palynology.

Comparative account of various systems of classification of angiosperms; Study of angiopermic families – Mangnoliaceae, Ranunculaceae, Cappparidaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Acanthaceae, Lamiaceae, Verbenaceae, Arecaceae, Liliaceae, Musaceae, Orchidaceae, Poaceae.

Unusual secondary growth; Development of male and female gametophytes, fertilization; Endosperm- its development and function; patterns of embryo development; Polyembroyony and apomixis; Applications of palynology; Experimental embryology including anther culture, embryo culture and test-tube fertilization.

5. Plant Resource Development : Domestication and introduction of plants; Plants as sources for food, fodder, fibre, spices, beverages, edible oils, drugs, narcotics, insecticides, timber, gums, resins and dyes, latex, cellulose, starch and its products; Perfumery; Importance of Ethnobotany in Indian context; Energy plantations; Botanical Gardens and Herbaria.

6. Morphogenesis : Totipotency, polarity, symmetry and differentiation; Cell, tissue, organ and protoplast culture; Somatic hybrids and Cybrids; Micropropagation; Somaclonal variation and its applications.

7. Genetics & Evaluation : Gene versus allele concepts (Pseudoalleles); Quantitative genetics and multiple factors; incomplete dominance, polygenic inheritance, multiples; Linkage and crossing over; Methods of gene mapping, including molecular maps (idea of mapping function); Sex chromosomes and sex-linked inheritance, sex determination and molecular basis of sex

differentiation; Mutations (biochemical and molecular basis); Cytoplasmic inheritance and cytoplasmic genes (including genetics of male sterility Back cross).

Structure and synthesis of nucleic acids and proteins; Genetic code and regulation of gene expression; Gene silencing; Multigene families; Organic evolution- evidences, mechanism and theories. Role of RNA in origin and evolution.

8. **Biotechnology, Molecular Biology and Biostatistics :** Use of apomixis in plant breeding; DNA sequencing; Genetic engineering – methods of transfer of genes; Transgenic crops and biosafety aspects; Development and use of molecular markers in plant breeding; Tools and techniques – probe, southern blotting, DNA fingerprinting, PCR and FISH.

   DNA/gene manipulating enzymes : Endonuclease, exogenase, Ligase, Polymerase, Phosphatase, Transcriptases, transfarases

   DNA damage and repair, Gene cloning

   Standard deviation and coefficient of variation (CV); Tests of significance (Z-test, t-test and chi-square test); Probability and distributions (normal, binomial and Poisson); Correlation and regression.

9. **Physiology and Biochemistry :** Water relations, mineral nutrition and ion transport, mineral deficiencies; Photosynthesis – photochemical relations; photophosphorylation and carbon fixation pathways; C3, C4 and CAM pathways; Mechanism of phloem transport; respiration (anerobic and aerobic, including fermentation) – electron transport chain and oxidative phosphorylation; Photorespiration; Chemiosmotic theory and ATP synthesis; Lipid metabolism; Nitrogen fixation and nitrogen metabolism; Enzymes, coenzymes; Energy transfer and energy conservation; Importance of secondary metabolites; pigments as photoreceptors (plastidial pigments and phytochrome); Plant movements; Photoperiodism and flowering, vernalization, senescence; Growth substances – their chemical nature, role and applications in agri-horticulturel; Growth indices, growth movements; Stress physiology (heat, water, salinity, metal); Fruit and seed physiology; Dormancy, storage and germination of seed; Fruit ripening – its molecular basis and manipulation.

10. **Ecology and Plant Geography :** Concept of ecosystem; Ecological factors; Concept and dynamics of community; Plant succession; Concept of biosphere; Ecosystems; Conservation; Pollution and its control (including phytoremediation); Plant indicators; Environment (Protection) Act.

    Forest types of India – Ecological and economic importance of forests, afforestation, deforestation and social forestry; Endangered plants, endemism, Hot spots, IUCN categories, Red Data Books; Biodiversity and its conservation; Protected Area Network; Convention on Biological Diversity; Farmers' Rights and Intellectual property Rights; Concept of Sustainable Development; Biogeochemical cycles; Global warming and climatic change; Invasive species; Environmental Impact Assessment; Phytogeographical regions of India.

21. CHEMISTRY

UNIT-1

- **Structure and Bonding :** Atomic orbitals, electronic configuration of atoms (L-S coupling), periodic properties of elements; ionic radii, ionisation potential, electron affinity, electronegativity, concept of hybridization. Molecular orbitals and electronic configuration of homonuclear and heteronuclear diatomic molecules. Shapes of polyatomic molecules and ions; VSEPR Theory.
- Symmetry elements and point groups for simple molecules, character tables and its application; Symmetry consideration in coordination compounds and symmetry aspects of molecular orbital and ligand field theories.

UNIT-2

- **Chemistry of Non-transition Elements :** General discussion on the properties of the non-transitional elements; special features of individual elements; preparation, properties and structure of their halides, oxides etc. Polymorphism of carbon, phosphorus and sulphur. Synthesis, properties and structure of boranes, carboranes, borazines, silicates, carbides, silicones, phosphazenes, sulphur -nitrogen compounds, peroxo compounds of boron, carbon and sulphur, oxy acids of nitrogen, phosphorus, sulphur and halogens, interhalogens, pseudohalides and noble gas compounds.
- **Bio inorganic chemistry :** Metal ions in biology, molecular mechanism of ion-transport across membranes, oxygen uptake proteins, cytochromes and ferridoxins.

UNIT-3

- **Chemistry of Transition Elements :** Co-ordination chemistry of transition metal ions; structural aspects, isomerism, octahedral, tetrahedral and square planner crystal field splitting of d-orbitals, CFSE, magnetism and colour of transition metal ions, John-Teller effect, interpretation of electronic spectra including charge transfer spectra, Orgel diagrams, spectrochemical series, nephelauxetic series, quenching of orbital angular moment, spin orbit coupling. Stereochemistry of coordination compounds, stability constants of complexes and their determination, stabilization of unusual oxidation states.
- **Mechanism of Inorganic Reactions :** Substitution reactions, trans effect, electron transfer reactions. Fluxional molecules, palladium catalysed reactions.
- **Organometallic Chemistry :** Synthesis, structure and bonding, organometallic reagents in organic synthesis and in homogeneous catalytic reactions (hydrogenation, hydroformulation, isomerisation and polymerisation) π- metal complexes.
- **Ligand Field and Molecular Orbital Theories :** M.O. energy level diagrams of octahedral, tetrahedral and square planner complexes, Effect of π bonding on the energy of t_{2g} orbitals and on Dq. experimental evidences for metal-ligand orbital overlap.

UNIT-4

- **Stereochemistry:** Element of symmetry, chiral and aehiral molecules, R, S nomenclature, diastereomerism in acyclic compounds. Methods of asymmetric synthesis. Stereospecific and stereo-selective reactions. Interconversion of Fischer, Newman and Sawhorse projections. E, Z isomerism, conformational analysis of mono and disubstituted cyclohexanes. Effect of confirmation on reactivity in acyclic compounds and cyclohexanes.

- **Reaction Mechanism :**
  - **(a) General methods (non-kinetic) of study of mechanism of organic reactions :** Use of isotopes, crossover experiments, intermediate trapping, stereochemistry. Thermodynamic control and kinetic control of reactions.
  - **(b) Reaction Intermediates :** generation, geometry, stability and reactions of carbocations, carbanions, free radicals, carbenes & NHC, benzynes and non classical carbocations.
  - **(c) Substitution reaction :** SN1, SN2, SNi, SN1' and SN2' mechanisms, Neighbouring group participation in aliphatic nucleophilic substitutions. Electrophilic and nucleophilic aromatic subtitution reactions.
  - **(d) Elimination reactions :** E1, E2 and E1 cb mechanisms. orientation in E2 reaction (Saytezeff and Hofmann), Pyrrolytic syn-elimination. Stereochemistry of elimination reaction.
  - **(e) Addition Reactions:** Electrophilic addition to carbon-carbon multiple bond and its stereochemistry. Nucleophilic addition to carbon-oxygen double bond and activated Carbon-carbon double bond.
  - **(f) Common Organic Reaction and Mechanism :**
    - (i) Aldol, Perkin, Dieckmann condensation, Reformatsky, Benzoin, Wittig, Reimer-Tiemann, Diels-Alder, Robinson annulation, Ene Barton reaction, Hofmann-Loffor-Freytage reactions, Shapiro reaction, Sharpless epoxidation reaction, Mannich reaction, Michael reaction, Stroke enamine reaction, Stetter reaction and Baylis-Hillman reaction.
    - (ii) Rearrangements : Pinacol-Pinacolone, Wagner-Meerwein, Demjanove, Beckmann, Hofmann, Curtius, Schmidt, Lossen, Sommelet-Hauser, Favoroskii and Baeyer-Villiger rearrangement.

UNIT-5

- **Reagents in Organic Synthesis :**
  Use of following reagents in organic synthesis and functional group transformation:
  - (i) **Complex metal hybrids :** $LiAlH_4$, $NaBH_4$, Sia_2BH, mono and dialkyl boranes, disobutylaluminium hydride and tri-n-butyltin hydride.
  - (ii) **Organometallic Compounds :** Grignard reagents, Lithium dialkylcuperate, dialkylcadmium, alkyllitrhium and Trimethyl silyl iodide
  - (iii) 1, 3-Dithiane, lithium diisopropylamide, DDQ, SeO_2, Bayker's yeast, crown ether and phase transfer catalysts.

- **Pericyclic Reactions :** Classification and examples, Woodward-Hofmann's Rule, Elcetrocyclic reaction, Cycloaddition reaction ([2+2] and [4+2] only) and sigmatropic shifts {[1,3] -shift, [1,5]-shift and [3,3]-shift (Cope rearrangement and Claisen Rearrangement)}, FMO approach only.
- **Photochemistry :**
  - **(a)** Photochemistry processes, Jablonski diagram, exciplexes, photosensitisations.
  - **(b)** Photochemistry of alkenes (cis-trans isomerisation), Photochemical addition reactions of 1,3: 1,4 and 1,5-dienes, dimerisations.
  - **(c)** Photochemistry of Carbonyl compounds : Norrish Type-I and Norrish Type-II of cyclic and acyclic ketones, Paterno-Buchi reaction, Photoreduction.
  - **(d)** Rearrangement given by β, γ- unsaturated ketones, cyclohexenons and 2,5-cyclohexadienones.
  - **(e)** Photochemistry of aromatic compounds, skeletal isomerisation.
- **Aromaticity :** Huckel's rule and concept of aromaticity. Nonbenzenoid aromatic compounds (Monocyclic aromatic ions, annulene and bicyclic nonbenzenoid aromatic compounds).
- **Heterocyclic Chemistry :** Synthesis, aromaticity and reactivity of furan, thiophene, pyrole, pyridine, quinoline and isoquinoline.

UNIT-6

- **Electro -chemistry :** Redox potential, electrochemical series, redox indicators. Kohlrausch's law of independent migration of ions. Transport number and its determination, Hydrolysis of salts, pH and buffer solutions, type of single electrodes and elctrode potentials, concentration cell with and without transference, liquid junction potential, fuel cell.

- **Nuclear Chemistry :** Radioactive decay and equilibrium. Nuclear reactions; fission and fusion, mass defect, fission products and yields. Radioactive techniques; tracer technique, neutron activation analysis, counting techniques such as G.M. ionisation and proportional counter.
- **Solids :** Cubic Crystal Systems, Dislocations in solids, Schottky and Frenkel Defects, electrical properties, insulators and semiconductors, superconductors, band theory of solids, solid –state reactions.

UNIT-7

- **Spectroscopy :** Basic principles and applications of IR, Ramam, ESR, NMR, Massbauer and Photoelectron spectroscopy in structural elucidation of simple inorganic and coordination compounds including F & P containing inorganic compounds. Elementary principles and application of electronic (UV), vibrational (IR), PMR, C-13 NMR and Mass spectral techniques for structural elucidation of organic compounds and Compounds Containing F.
- **Topics in Analytical Chemistry:** Adsorption partition, exclusion electrochromatography, solvent extraction and ion exchange methods, electroanalytical techniques, voltammetry, cyclic voltammetry, polarography, amperometry, coulometry and conductometry, ion selective electrodes, annodic stripping voltammetry, TGA, DTA etc.

UNIT-8

- **Thermodynamics :** Variation of internal energy with temperature and volume, Enthalpy as a function of temperature and pressure, relation between C_p and C_v, Kirchoff's equation, Joule-Thompson coefficient, Inversion temperature, Important thermodynamic quantities (w, q, ΔE, ΔH) in an isothermal expansion of an ideal gas and adiabatic expansion of an ideal gas, Spontaneous processes, Carnot cycle, Statement of second law, concept of entropy, Thermodynamic equation of state (Energy as a function of T and V, enthalpy as a function of T and P), Variation of entropy with Temperature and Volume, Helmholtz and Gibbs free energy, Gibbs-Helmholtz equation, Thermodynamic criteria of equilibrium, Clapeyron and Claucious equation, Hoff equation, Thermodynamic derivation of Phase Rule and distribution law, Partial molar Quantities, Chemical potential and other thermodynamic functions, Effect of Temperature and Pressure on chemical potential; chemical potential of real gas and fugacity of real gas. Nernst heat theorem and its application to non-condensed system, statements of third law, The relationship between entropy constant and Nernst Chemical constant, Determination of entropy from the third law.
- **Chemical Kinetics and Catalysis :** Differential and integral rate equations for zero, first, second and third order reactions, Half-life period, Kinetics of first order opposing, consecutive and parallel reactions, Effects of temperature on reaction rate, energy of activation and collision theory of bimolecular gaseous reactions. Steady-State approximation, Lindemann's theory of reaction rates. Thermodynamic formulation of rate constant, comparision of collision and absolute reaction rate theory, calculation of transmission co-efficient, Primary and Secondary salt effects, kinetics of homogenious, acid -base and enzyme catalysis, heterogenious catalysis.

UNIT-9

- **Chain reactions and Photochemistry :** Chain reaction, free radical chains (Rice-Herzfeld mechanism for the decomposition of ethane), Einstein's law of Photochemical equivalence, Quantum efficiency, Kinetics of some photochemical reactions (Decompositions of acetaldehyde, dimerization of anthracene).
- **Statistical Thermodynamics :** Quantum states and complex ions, The combinatory rule, System with definite total energy. Degeneracy of energy levels. Probability and most probable distribution, translational, rorational, vibrational and electronic partition function. Internal energy and heat capacity in terms of partition function. Thermodynamic function for gaseous system, Molar heat capacity of gases, Heat capacity of monoatomic crystal. The Einstein model, Debye's theory of solid heat capacities of Crystal at very low temperatures, Calorimetric entropy, spectroscopic entropies, expression for equilibrium constant in terms of partition functions, Base-Einstein statistics, Fermi-Dirac statistics, Comparision of M-B, B-E and F-D statistics.

UNIT-10

- **Fast Reaction:** Luminescence and energy transfer processes. Study of Kinetic by stopped flow technique, relaxation method, flash photolysis and magnetic resonance method.
- **Non-equilibrium Thermodynamics :** Postulates and methodologies, linear laws, Gibbs equation, Onsager reciprocal theory.
- **Macromolecules :** Number- average and weight average molecular weights; determination of molecular weights. Kinetics of polymerization. Stereochemistry and mechanism of polymerisation.

Unit 1: Introductory Food Technology

Introduction to food technology. Food processing industries/ institutions/food scientists of importance in India. Food attributes *viz.* colour, texture, flavour, nutritive value and consumer preferences; Causes of food spoilage, sources of microbial contamination of foods, food borne illnesses, water activity and its relation to spoilage of foods; Spoilage of processed products and their detection; Principles and methods of food preservation; Food fortification, Composition and related quality factors for processing; Methods of food preservation such as heat processing, pasteurization, canning, dehydration, freezing, freeze drying, fermentation, microwave, irradiation and chemical additives; Refrigerated and modified atmosphere storage; Aseptic preservation, hurdle technology, hydrostatic pressure technology and microwave processing; Use of non-thermal technologies (microfiltration, bacteriofugation, ultra high voltage electric fields, pulse electric fields, high pressure processing, irradiation, thermosonication), alternate-thermal technologies (ohmic heating, dielectric heating, infrared and induction heating) and biological technologies (antibacterial enzymes, bacteriocins, proteins and peptides) in food processing. Super critical fluid extraction; Cold plasma technology.

Unit 2: Technology of Foods of Plant Origin

Post harvest handling and storage of fresh fruits and vegetables; Preparation of fruits and vegetables for processing. Minimally processed products. Cold chain logistics; ZECC (Zero Energy CoolChambers), CCSR (Charcoal cool storage Rooms) Thermal processing and process time evaluation for canned products, process optimization, aseptic canning, methods for canning of different fruits, and vegetables; Dehydration and associated quality changes during drying and storage of dehydrated products. Solar drying. Intermediate moisture foods. Preparation and utilization of fruits and vegetables juices in non-fermented/ fermented/ aerated beverages, health drinks. Membrane technology; Chemistry and manufacture of pectin, role in gel formation and products like jellies and marmalades; Technology of preservatives, pickles, chutneys and sauces; Nature and control of spoilage in these products; Re-structured fruits and vegetables. By products utilization of fruits and vegetable processing industry; Processing methods of frozen fruits and vegetables, IQF products, packaging, storage and thawing. Role of pectinases; Tomato products such as juice, puree, paste, soup, sauce and ketchup. Other convenience foods from fruits and vegetables; Beverages, tea, cocoa and coffee processing; Medicinal and aromatic plants: their therapeutic values; Spice Processing viz. cleaning, grading, drying, grinding, packaging and storage; Oleoresins and essential oils and extraction.

Structure, composition of different grains like wheat, rice, barley, oat, maize and millets; Anti-nutritional factors in food grains and oilseeds; Milling of grains; Wheat flour/semolina and its use in traditional/non-traditional foods like breads, biscuits, cakes, doughnuts, buns, pasta goods, extruded, confectionary products, breakfast and snack foods; Rheology of wheat and rice flour. Preparation of vital wheat gluten and its utilization. Instant ready mixtures; Enzymes (amylases and proteases) in milling and baking; Milling and parboiling of rice; by-products of rice milling and their utilization. Processed products from rice; Pearling, malting, brewing and preparation of malted milk feeds from barley; Significance of 13-glucans. Milling of oats and its processing into flakes, porridge and oatmeal. Wet and dry milling of corn, manufacture of corn flakes, corn syrup, corn starch, corn steep liquor and germ oil. Structure and composition of pulses and theirimportance in Indian diet; Milling and processing of pulses viz. germination, cooking, roasting, frying, canning and fermentation. Use in traditional products, protein concentrates and isolates; Modified starches and proteins; Oilseeds: edible oilseeds, composition and importance in India. Oilseed processing. Oil extraction and its processing, by-products of oil refining. Production, packaging and storage of vanaspati, peanut butter, protein concentrates, isolates and their use in high protein foods. Export of oilseed cakes; International market and consumer preferences for quality in cakes for use in textured vegetable proteins. Millets: composition, nutritional significance, structure and processing. Dairy analogues based on plant milk.

Unit 3: Technology of Foods of Animal Origin

Milk and Milk production in India. Importance of milk processing plants in the country. Handling and maintenance of dairy plant equipment. Dairy plant operations viz. receiving, separation, clarification, pasteurization, standardization, homogenization,sterilization, storage, transport and distribution of milk. Problems of milk supply in India. UHT, toned, humanized, fortified, reconstituted and flavoured milks. Technology of fermented milks. Milk products processing viz. cream, butter, *ghee,* cheese, condensed milk, evaporated milk, whole and skimmed milk powder, ice-cream, butter oil, *khoa, channa, paneer* and similar products. Judging and grading of milk products. Cheese spreads by spray and roller drying techniques. EMC (Enzyme modified cheese), Enzymes in dairy processing. Insanitization *viz.* selection and use of dairy cleaner and sanitizer. In plant cleaning system. Scope and functioning of milk supply schemes and various national and international organizations. Specifications and standards in milk processing industry. Dairy plant sanitation and waste disposal.

Scope of meat, fish and poultry processing industry in India. Chemistry and microscopic structure of meat tissue; Ante mortem inspection. Slaughter and dressing of various animals and poultry birds. Post mortem examination; Rigor mortis; Retails and wholesale cuts. Factors affecting meat quality. Curing, smoking, freezing, canning and dehydration of meat, poultry and their products; Sausage making; Microbial factors influencing keeping quality of meat. Processing and preservation of fish and its products; Handling, canning, smoking and freezing of fresh water fish and its products; Meat tenderization and role of enzymes in meat processing; Utilization of by-products; Zoonotic diseases. Structure and composition of egg and factors effecting quality; Quality measurement; Preservation of eggs using oil coating, refrigeration, thermostabilization and antibiotics; Packing, storage and transportation of eggs; Technology of egg products viz. egg powder, albumen, flakes and calcium tablets; Industrial and food user physiological conditions and quality of fish products.

Unit 4: Food Quality Management

Objectives, importance and functions of quality control. Quality systems and tools used for quality assurance including control charts, acceptance and auditing inspections, critical control points, reliability, safety, recall and liability; The principles and practices of food plant sanitation. Food and hygiene regulations. Environment and waste management; Total quality management, good management practices, HACCP and codex in food. International and National food laws; US-FDA/ISO-9000 and FSSAI; Food adulteration, food safety; Sensory evaluation, panel screening, selection methods; Sensory and instrumental analysis quality control. Quality control of food at all stages and for packaging materials; Non-destructive food quality evaluation methods.

Unit 5: Food Engineering/Packaging and Labelling

Unit operations of food processing viz. grading, sorting, peeling and size reduction machineries for various unit operations, energy balance in food processing; Automation in different unit operations of food processing: Raw food material sorting, grading, size reduction, mixing and agitation, thermal processing, dehydration,packaging, CIP, quality control; Packaging materials *viz.* properties and testing procedures, packaging of fresh and processed foods; Shelf-life studies; Recent trends in packaging, aseptic, modified atmosphere, vacuum and gas packaging; Nutritional labelling requirements of foods; Requirements and functions of containers; Principles of package design. Time Temperature labels and indicators.

Unit 6: Food Microbiology & Biotechnology

Fermentation technology, fermented food products (animal and plant based), microbial spoilage of foods, bacterial growth curve, hurdle technology; Fermenter and bioreactors: Transport phenomenon in microbial systems, types of reactors, working principles, aeration and agitation, sterilization and sanitation, advances in continuous fermentation, developments in solid-state fermentation for food applications; Role of biotechnology in productivity of plants, livestock and microbes for improved nutrition and quality; Use of biotechnology in production of food additives viz.preservatives, colorants, flavours. Use of biotechnologically improved enzymes in food processing industry, biomass production using industrial wastes; Single cell proteins, Food contaminants viz. aflatoxins, botulism; Food intoxication and infection; Consumer concerns about risks and values, Biotechnology and food safety.

Unit 7: Flavour Chemistry Technology

Flavour composition of foods/beverages (identification and quantitative analysis of the flavour precursors and their products, characterization of the staling reaction using stable isotopes). Flavour composition of foods/beverages in relation with maturation and microbial activity/ or the processing conditions (e.g. fermented dairy products, beer, wine, honey, fruits). Analysis of odour-active compounds of food/beverages (Charm analysis; Synthesis of flavour by microorganisms and plant cells. Lipid derived flavours. Investigation of equilibrium of key flavour compounds that govern the flavour stability of beverages. Natural antioxidant constraints in spices; Role of microorganisms in flavour development; Flavor emulsions, flavour composites, essential oils and oleoresins; Flavor encapsulation and stabilization.

Unit 8: **Consumer Sciences and Food Product Development**

Consumer Sciences, Food Product Development, Health Foods Socio-cultural, psychological and economical consideration for foodappearance, Domestic and export marketing; Consumer trends and their impact on new product development. Product development *viz.* to conceiveideas, evaluation of ideas, developing ideas into products, test marketing and commercialization; Role of food in human nutrition; Nutritional disorders, natural contaminants and health hazards associated with foods; Diet therapy. Functional properties of foods: Dextrinization, Gelatinisation, Crystallisation, gelation, foaming, coagulation, denaturation and syneresis, foaming, emulsification. Therapeutic / Engineered / Fabricated and Organic foods/ Nutraceutical and functional foods. Nutrigenomics: concept of personalized medicine. Use of nanotechnology in functional food industry.

23. Agricultural Economics and Agri-Business Managemnet

Unit 1: Economic Theory

Nature and tools of economic analysis; theory of consumer behavior; production theory; costs theory; theory of firm; price determination under different markets, price discrimination, effect of taxation under different market conditions; welfare economics; market failure; nature of macroeconomic analysis; national income; consumption; saving and investment, employment, theory of business cycle, functions and demand for money; inflation; income and interest determination; IS-LM functions; **general equilibrium analysis;** monetary and fiscal policies, economic reforms.

Unit 2: Agricultural Development and Policies

Role of agriculture in economic development; growth and development, characteristics of developing and developed economies; present development challenges; role of economic, technological, social, cultural, political and environmental factors; Green GNP, nature, sources and impact of technological challenge; rainbow (green, white, yellow, blue etc.) revolution; agriculture development in Asia; poverty inequality and development; interdependence between agricultural and industrial development. Growth models -Harrod-Domar, neo-classical, Rostow's growth stages, Lewis-fei-Ranis model, **induced innovation model,** five-year plans and agriculture, development strategies in India; land reforms; theory of share tenancy; institutions and development. **Policy options for sustainable agriculture development,** measurement of poverty and poverty alleviation programmes.

Unit 3: Agricultural Growth Analysis

Determinants of agricultural growth and their measurements; planning models, features of planning in capitalist, socialist, neosocialist and mixed economies; types of planning - micro level, regional, sectoral, agro-eco regional development; characterzing agricultural growth, changes in cropping pattern, decomposition analysis, and sources of output growth; analysis of instability; capital formation, crop livestock insurance, infrastructure; transfer of technology- constraints to technology adoption, yield gap analysis and research planning; agricultural information system.

Agricultural policy analysis and reforms – energy, water, fertilizer, land, seed, labour, technology, rural infrastructure, marketing, pricing, trade etc.

Unit 4: Natural Resource Management

Characteristics and classification of natural resources; sustainability issues in natural resources; role of economics in natural resource accounting, planning, management and policy formulation; social welfare function; allocation of renewable and non-renewable resources (forests, water, land, etc.) under various market structures: management strategies for major natural resources; Government programmes for conservation and development of natural resources. Climate changes, mitigation and policies.

Unit 5: Farm Management and Production Economics

Basic principles of farm management – law of variable proportions, law of equimarginal returns, opportunity cost principles, law of substitution, enterprises combination, time comparison and comparative advantage; cost concepts and analysis; farm efficiency measures; farm financial analysis; farm planning and budgeting; book keeping and accountancy; process of decision making under different knowledge situations; measurement and management of risk and uncertainty in agriculture (including livestock, horticulture, fisheries, forestry, etc.), diversification and insurance in agriculture and allied sectors. Types and systems of farming. Forms and applications of production functions- Linear, quadratic. square root, spillman, cubic, semi-log, Cobb-Douglas, constant elasticity of substitution

(CES), variable elasticity of substitution (VES), etc; dualities between production, cost and profit functions; derivation of supply and factor demand functions from production and profit functions; optimization of resource allocation; resource-use efficiency and returns to scale; frontier production function; total factor productivity; Decision making under risk and uncertainties.

Unit 6: Agricultural Finance, Cooperation and Project Management

Importance of agricultural finance, objective, functions and principles of agricultural finance, sources of capital acquisition; rural credit structure-demand, supply, credit gap; classification of agricultural credit – sources and forms; cost of credit/ capital; credit appraisal-3Rs, 3 Cs and 7Ps of credit, estimation of credit requirement; **supervisory credit system,** reforms in agricultural credit policy; financial system in India-commercial banks, cooperatives. RRBs, micro-finance institutions (MFIs) global financial institutions; innovations in agricultural financing-microfinance, Kisan credit cards; **e-banking, credit inclusion, principles of cooperations, role of cooperatives under emerging scenario,** definition and characteristics of projects; need for project approach for agricultural development; SWOT analysis and project identification, project life cycle, project feasibility-market technical, financial and economic feasibility, social cost-benefit analysis; project risk analysis; project scheduling and resource allocation; financial and economic appraisal/measures , **choice of discount rate**, - net present value (NPV), internal rate of return (IIR), benefit-cost ratio (BCR); network analysis – PERT & CPM; fundamental of accounting and book-keeping; analysis of financial statements-balance sheet, income statement cash flow statement.

Unit 7: Agricultural Marketing and Price Analysis

Concepts of agricultural marketing; marketing functions-processing, transportation, storage and ware housing; channels of marketing agricultural produce-price spread and efficiency, structure, conduct and performance analysis; Indian marketing environment; market integration; marketing institutions-role and functions; government interventions including administrated price policy; regulated markets, market segmentation, **supply chain and value chain analysis in agril. commodities,** buffer stock operations, price stabilization measures and policies etc. **price forecasting for crop area allocation,** marketing of agricultural inputs, role of private sector in input and output marketing; forward trading and futures market e-NAM, commodity boards and contract farming; marketed surplus models; competitive and comparative advantage in trade, trade policies, models and agreements; regulations and reforms for marketing and trade, WTO, SPS measures and competitiveness; ecological concerns and marketing ethics.

Unit 8: Operations Research and Research Methods

Objective, types and process of research; role and uses of quantitative technique in business decision making; sampling techniques and sample size determination; sampling and non-sampling errors; index numbers, hypothesis testing. ANOVA, factor analysis, cluster analysis; measures of central tendency, measures of variation,skewness and kurtosis; correlation and regression, discriminant and dummy variable analysis; OLS, **MLE** estimation-assumptions and their violations, properties, simultaneous equations systems: identification and estimation; Linear programming; objective, assumptions, formulation of linear programming problem, simplex method; primal and dual LP problems, role of business decision making models.

Unit 9: Organizational Behaviour and Human Resource Management

The agribusiness system; management processes, planning, controlling, organizing, motivating and leading; decision making; managerial skills; level of managers; organizational context of decisions; decision making models; management by objectives; organizational culture; management of organizational conflicts; managing change; leadership styles; group dynamics; motivation.

Human resource planning, job analysis and design; recruitment, selection, induction and placement; human resource training and development; management development; performance

appraisal and job evaluation; wage and salary administration; promotion, transfer, separation, absenteeism and turnover, employee welfare and safety; morale; personnel supervision; styles; participative management; labour management relations; negotiation and negotiating skills; conflict management.

Unit10: Strategic Management and Entrepreneurial Skills

Strategic management – meaning, concept and scope; framework for strategic management; industrial (external) and organizational (internal) environmental factors influencing strategy; scanning the external and internal environment; strategy formulation; SWOT analysis; strategy implementation; strategy and structure, strategic analysis, strategy and technology, strategy and leadership, total quality management, the customer resource, development of strategy, creating competitive advantage strategy, evaluation of strategy.

Entrepreneurship and small business concepts; process of business opportunity identification; project feasibility study; detailed business plan preparation; managing small enterprises; planning for growth; sickness in small enterprises; government policies for promotion of small and tiny enterprises; rehabilitation of sick enterprises; entrepreneurship.

24. Visual Arts and Animation

UNIT:-I

Fundamentals of visual art (line, shape, form, space, colour, texture, tonal values, perspective, design etc.). Understanding visual principles of composition (proportion, unity, harmony, rhythm, contrast, balance, foreshortening and emphasis etc.). Representation through two and three dimensions in visual art. Environmental, conceptual and perceptual aspects of art.

UNIT:-II

Various forms of visual arts and their inter-relationship with other modes of creative expression, e.g. performing art, cinema and literature.

UNIT:-III

Knowledge of traditional medium, materials and techniques, and their application in all disciplines of visual expression – e.g. carving and casting processes; handling of colour/pigment (impasto, glazing, etc.); intaglio/relief print; fresco; preparation of ground for murals, preparation of wasli for miniatures, etc.

UNIT:-IV

Developments in modern techniques, processes and procedures and their application in contemporary visual practices (installation; multi-colour print; computer-aided design – vector & rector; multimedia and digital technologies in art; trompe l'oeil illusory hyper realism etc.)

UNIT:-V

The study of Indian and Western aesthetics and art appreciation.

UNIT:-VI

Study of chronological periods from prehistory to post-modern art and artists of the West, with a focus on the various movements that transformed its history

UNIT:-VII

Study of chronological periods and developments in Indian art from prehistory to the 19th century.

UNIT:-VIII

Contemporary practices in Indian art during the 20th & 21st centuries with reference to art movements & major exponents; modern concept of advertising, designing and visual communication; experimental modes in contemporary visual expression; development of art education in India from colonial (British) art schools till the present.

UNIT:-IX

The study of art in the Far East, South East and Central Asia and the ancient Near-East

UNIT:-X

Understanding visual practices of traditional communities and their contemporary transformations – the 'folk', 'tribal' and craft practices in India.

UNIT:-XI Drawing and Painting

Aesthetics: Fundamental elements of drawing and painting. Imagery in visual arts. Origin and development of art (visual). Classification of Arts. Conceptual and Visual reality.

Relevance of study of aesthetics in painting: The early philosophical thoughts in Indian Culture. Nature and Function of Art in the society.

Indian aesthetics: Concept of Ras-Sutra and its commentaries: The Theory of Rasa, Sadharanikarana, Dhvani, Alankara, Auchitya,etc; shilpa texts like the Chitrasutra of the Vishnudharmottara Purana, Shadanga from Yashodhara's commentary on the Kamasutra, etc.; A.K. Coomaraswamy and Rabindranath Tagore's contributions towards Indian aesthetics

Western Aesthetics: Theory of imitation and representation, catharsis (Plato and Aristotle). Aesthetical views of Kant, Hegel, Croce, Tolstoy, Baumgarten, Schopenhauer, Clive Bell, Roger Fry, I. A. Richards, Susanne Langer, Sigmund Freud, and George Santayana.

Application of Materials, Support in Painting (Canvas, Paper, Wall surface, Panels), Mix media. Oil painting and its technique – Traditional and Non-traditional. Techniques of Wall paintings – Traditional (Fresco Secco and Buono) and Modern. Water color painting, wash technique, pastel and crayon, Acrylic color, color preparation and technical aspect of pigments. Color theory and color harmony.

UNIT:-XII Applied Art

The term 'Graphic Design' and William Addison Diggings; Basics of Graphic Design/Applied Art: Image and Text; Developing message to promote product. Terms and terminologies relevant to advertising Industry: Understanding of the 'Portmanteau' terms such as, Advertorials, Info graphics, Infomercials, Edutainment etc.

UNIT:-XIII Sculpture

Fundamentals and elements of sculpture; origin and development of imagery in sculpture; classification of sculpture; sculptural form vis-a-vis conceptual reality.

Relevance of the study of aesthetics for sculptural practice: the early philosophical ideas in India and the West; the role and function of sculpture in the society.

History of sculpture in Western and Oriental traditions; traditional sculptural program as integral part of architectural structures such as churches, temples and secular buildings

Study of form, material, methods, and techniques relevant to sculptural practice; clarity of understanding of terminologies related to the art of sculpture.

25. Hospitality and Tourism management

Unit – I:

Tourist/ visitor/ traveller/ excursionist – Definitions and Differences, Early and Medieval Period of Travel, Renaissance and its Effects on Tourism, Birth of Mass Tourism, Old and New Age Tourism, Forms of Tourism – Inbound, Outbound, National, International, Nature, Scope and Characteristics of Tourism. Need for Measurement of Tourism, Interdisciplinary Approaches, Different Tourism Systems- Leiper's Geo-spatial Model, Mill-Morrison, Mathieson & Wall, Butler's Tourism Area Life Cycle (TALC) - Doxey's Irridex Index – Demonstration Effect – Crompton's Push and Pull Theory, Stanley Plog's Model, Gunn's Model

Meaning and Nature of Tourism Industry, Input and Output of Tourism Industry, Tourism Industry Network- Direct, Indirect and Support Services, Basic Components of Tourism - Transport- Accommodation- Facilities & Amenities, , Horizontal and Vertical Integration in Tourism Business, Tourism Business during Liberalization & Globalizations, Tourism Impacts: Economic Social, Cultural, and Environmental**;** Positive & Negative Impacts of Tourism**,** Factors affecting the future of tourism business; Seasonality & tourism, Sociology of tourism, Travel motivators.

Role and functions of Important Tourism Organizations in development and promotion of Tourism - UNWTO, IATA, ICAO, UFTAA, ASTA, PATA, WTTC, IHA, TAAI, IATO, FHRAI, ITDC, ICPB, State Tourism Development Corporations, Airport Authority of India, Archeological Survey of India, Ministry of Tourism, Culture, Railways , Civil Aviation of Government of India.

Unit – II:

Earth's movement; Latitude, Longitude; Areas, Sub Areas and Sub Regions as per International Air Transport Organization (IATA), IATA Three Letter City Code, Two Letter Airlines and Airport

Code, International Date Line, Time Zones, Greenwich Mean Time, Calculation of Local Time, Flying Time, Grounding Time, Elapsed Time, Daylight Saving Time.

World Geography - Climate & Vegetation of North, South and Central America – Europe – Africa - Asia & Australasia, Elements of weather and climate, Impact of weather and climate on tourist destinations, Climate and Vegetation of India, Physical Geography of India - Distribution of Rivers, Mountains, Plateaus & Plain area, Coastal area, Deccan, major lakes, deserts.

Tourists Movement - Demand and origin factors; destinations and resource factors; Contemporary trends in international tourists movements, Environment Act – Environment rules – Environmental Impact Assessment (EIA), Environmental Information System (EIS), Environmental Management System (EMS) & Carrying capacity, Forest Act – Forest Conservation Act – Wild life Protection Act,

Unit – III

Nature and Characteristic of Tourism Products of India - Seasonality and Diversities, Tourist attraction – Concept & Classification, Heritage – Indigenous; Colonial, Handicrafts of India; Fairs and Festivals of Social & Religious importance, Forms & Types of Performing Art, Classical Dances, Folk Dances of different Regions & Folk Culture, Indian Music - Different Schools, Status of Indian Vocal & Instrumental Music, Indian Music abroad, Indian Museums, Art Galleries, Libraries & their Location, Indian cuisine - Regional variations, Historical monuments of India – Ancient temples, caves, stupas, monasteries, forts, palaces, Islamic and colonial art and architecture, Indian rituals, dresses. World heritage sites of India, Major religious centers of India – holy places connected with Hinduism, Buddhism, Jainism, Sikhism, Islamism, Christianity, Zoroastrianism and other religious sects, places associated with the work and life of legendry figures – Mahatma Gandhi, Pt. Jawaharlal Nehru, Dr. B.R. Ambedkar, Swami Vivekananda, Rabindranath Tagore, Subash Chandra Bose & Sardar Vallabhai Patel. Important paces related to India's freedom struggle.

Major National Parks, Wildlife Sanctuaries and Biosphere reserves of India and their Locations - Accessibility, Facilities, Amenities, Uniqueness of Dachigam, Corbett, Ranthambore, Hazaribag, Similipal, Bhitarkanika, Kanha, Bandhavagarh, Mudumalli, Periyar, Gir, Sunderbans, Manas, Valley of flowers, Hill Stations - Locations, Accessibility, Facilities, Amenities, Uniqueness of Gulmarg, Kullu & Manali, Shimla, Mussorie, Nainital, Panchmarahi, Mahabaleswar, Chikmangulaur, Coorg, Munnar, Ooty, Kodiakanal, Arakku, Darjeeling, Gangtok, Shillong, etc., Tourist potential of Himalayas.

Beach Resorts of India - Locations, Accessibility, Facilities, Amenities, Uniqueness of important Beaches of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Puducherry, Andhra Pradesh, Odisha, West Bengal, Lakshadweep, Andaman & Nicobar Islands. Emerging attractions for Medical Tourism, Ecotourism, Rural Tourism, Agri Tourism, Farm Tourism, Green Tourism, Wilderness Tourism, Film Tourism, MICE tourism, Countryside Tourism, Caravan Tourism, Adventure tourism, Golf tourism, Light house tourism, Fort tourism, Buddhist tourism, Sufi

tourism, Special interest tourism, Textile tourism, Aqua based tourism , wellness and spa tourism, culinary tourism, shopping tourism, indigenous tourism, industrial & Mining Tourism.

Unit – IV

Transportation - Evolution and importance of Transportation Systems; Role of Transportation in Tourism; Major transport systems – Rail, Road, Air and Water transport; Road Transport Network in North America, South America, Europe, South Africa, Asia and the Middle-East, Austria and New Zealand, Major Railway Transport Network in the World, Modes of transportations in India – Past & Present.

Licensing of air carriers; Limitations of weights and capacities; Scheduled and non-scheduled airlines services; No-frill airlines; Open sky policy; International conventions; Functions of IATA, ICAO, DGCA, AAI; GDS in air transportation. Types of air journey, MPM, TPM, Extra Mileage Allowance, One-way, Return Trip and Circle Tri Journey, Higher Intermediate Fare Check Point, Add-on and Open Jaw Fare, Excursion Fare , Components in International Air Tickets, Airline Business in the World, Major Air Carriers and Major Low-cost Airlines, Domestic Air Transport Business, Distribution of Sales of Airlines Tickets, Baggage and Travel Documents, Air Charter Services, Miscellaneous Charges order (MCO) - Multiple Purpose Document (MPD) - Billing and Settlement Plan.

Surface Transport System - Approved tourist transport, car hire companies including car rental scheme and tourist-coach companies, Documents connected with road transport viz. Regional Transport Authority, transport and insurance documents, road taxies, fitness certificate, contact carriage, state carriage, All India permits, maxi car, motor car etc. Railway System of world, British Rail, Euro Rail, Amtrak, Orient express, Trans-Siberian railway and luxury train of the world. Indian Railways - types of tours available in Indian Rail, Indrail pass, special schemes and packages available, palace on wheels, royal orient, fairy queen and toy trains. Planning itineraries on Indian Railways, reservation and cancellation procedures, Water Transport System - Historical past, cruise ships, ferries, hovercraft, river canal boats. Prospects and future growth of water transport in India. Major cruise lines of the world and their packages

Unit – V

Historical Background of Travel Trade, Significance of Travel Agency Business, Types of Travel Agent- Full Service Agency, Commercial Agency, Implant Agency, Group / Incentive Agency, Skills and Competencies for Running Travel Agency Business, Wholesale and Retail Agents, Future of Travel Wholesaling & Retailing. Types of Tour Operator- Inbound, Outbound , Domestic, Ground and Specialized, Types of Tour- Independent Tour, Escorted Tour, Hosted Tour, Incentivized Tour, Tour Wholesalers and Retailers, Diversified Role of Tour Operators, Distribution Networks of Tour Operation Business, Special Services for Charter Tour Operators, Meeting & Incentive Planners and Activities of Meeting Planners, Convention & Conference Tourism Business, Trade Fairs & Exhibitions, Essential Requirements for Starting Travel Agency & Tour Operation Business, Procedures for Obtaining Recognition, Travel Agency Organization Structure, Sources of Revenue, Use of Information Technology in Travel Agency Business.

Types of Itinerary - Resources and Steps for Itinerary Planning, Tour Costing: Tariffs, FIT & GIT, Confirmation of Tour, Creation of Docket/ File, Issue of Tour Vouchers, Reconfirmation with Airlines, Hotel & Ground Service Providers, Distributing Customized Itinerary to Tour Leader, Guide, Driver & Transporter, Standard Procedures for Pickup and Drop, Preparation of Feedback or Guest Comment Sheet, Analysis of Comments of Guest, Tour Guides & Escorts, WATA guidelines; Relation with service suppliers; Travel agency appointments; International regulations.

Familiarization with TIM (Travel Information Manual), Passport & VISA- Meaning, Types, Procedures, Validity, Necessary Information to fill the Passport and VISA Form for Issuance, Health Certificates, Currency, Travel Insurance, Credit & Debit Card, Customs, Currency, Baggage and Airport information, Citizenship – Passport - Visa - FEMA – Foreigners Registration Act – Customs – RBI guidelines - Criminal Law - Registration of cases, Cargo handling - Baggage allowance, free access baggage, Weigh and piece concept, Accountability of lost baggage, Dangerous goods, Cargo rates ad valuation charges Automation and airport procedures, Tour Brochures - element and importance of brochure.

Unit – VI

Distinctive characteristics of Hospitality Industry - Inflexibility, Intangibility, Perishability, fixed location, relatively large financial investment etc.; Concepts of Atithi Devo Bhavah; Hotel and the other lodging facilities; types of hotels and hotel departments; classification of hotels; chain operations; E- Hospitality. Types of accommodation; Activities in Accommodation Management – Front office – Housekeeping – Bar and Restaurant - Supporting services; Fiscal and non-fiscal incentives offered to hotel industry in India, ethical and regulatory aspects in a hotel, international hotel regulations.

Duties and responsibilities of front office staff; Reservation & registration- Types of Room, Types of Bedding, Meal plans, room assignments, check-in, methods of payment, type of hotel guests. Factors affecting the price of accommodation, important functions of Housekeeping Management, liaison with other departments, room supplies, Bed making and related types of service; Housekeeping department-Hierarchy, duties & responsibilities of housekeeping staff.

Food Production Organization, Kitchen, Buffets, Beverages Operation, Functions, Outlets of F & B, Types of Meal Plans, Types of Restaurant-Menu, Room Service, Catering Services-Food Service for the Airlines, Banquette, Corporate, MICE, Retail Food Market, Business/Industrial Food Service, Healthcare Food Service, club food services - Trends in lodging and food services. Food & Beverage Department of a hotel: Hierarchy, duties & responsibilities of staff.

Unit – VII

Concept of Goods & Services; Characteristics of Service; Salient features of Marketing Services: Services Marketing – Concept, Need & Significance, Types of Tourism Services, Tourism Marketing Environment, Strategic Planning and Marketing Process, Organizing and Implementing marketing in the Tourism Organization. Service Quality, Gap Model of Service

Quality. Marketing Research. Market Segmentation - Targeting and positioning for competitive advantage; Relationship Marketing; Familiarization Trip.

P's of Tourism Marketing- Product, Place, Price, Promotion, Physical Evidence, People, Process & Packaging, Designing Tourism Product – Branding and Packaging, Product Development – Product Life Cycle & Its Various Stages, Pricing Strategies and Approaches, Advertising – Sales Promotion – Publicity – Personal Selling, Tourism Distribution Channels, Cooperation and conflict Management. Global Marketing, Direct Marketing, Social Media & Digital Marketing, Green Marketing, Corporate Social Responsibility, Marketing Ethics & Consumerism.

Destination Image Development - Attributes of Destinations, Destination resource analysis, measurement of destination image - Destination branding perspectives and challenges- Creating the Unique Destination Proposition - Place branding and destination image - Destination image formation process; unstructured image -Product development and packaging - Institutional Support & Public Private Partnership in Destination Marketing.

Unit – VIII

Tourism planning - Role of Govt. public and private sectors in formulation of tourism policy; Roles of international, national, state and local tourism organizations in carrying out tourism policies. Tourism planning for thrust areas, special tourism areas & zones identified by Ministry of Tourism, Government of India. Sustainable tourism development, Pro-poor Tourism and Community Participation; Responsible tourism.

Tourism Policy - Factors influencing tourism policy; National Tourism Policy, Levels of Tourism planning - International, national, regional, state and local, the traditional, approach and PASLOP method of tourism planning; important feature of five year tourism plans in India; Elements Agents, Processes and typologies of tourism development; State tourism policies. National Planning Policies for Destination Development- WTO Guidelines for Planners - Role of urban civic bodies: Town planning -Characteristics of rural tourism planning.

Economic System and Its Impact on Tourism Development, Macro & Micro Economic System, Demand & Supply, Determinants , Measurement of Tourism Demand, Forecasting, Methods of Demand Forecasting, Inflation, Recession, Savings & Investment, Export & Import, Multiplier Effects &Its Types, Displacement Effect, Costs and Benefits of Tourism, Monetary Policy- Repo Rate, Reverse Repo Rate, Cash Reserve Ratio(CRR).

Unit – IX

Statistics: Measures of central tendency- mean, median, mode; measures of dispersion- range, standard deviation, variance, etc.; skewness and kurtosis; correlation and regression- scatter plots, lines of best fit, Pearson and Spearman correlation coefficients; Regression- bivariate and multivariate. Distributions- discrete and continuous; Normal distribution, sampling distribution. hypothesis testing – parametric vs. non-parametric tests, t-tests, ANOVA, Chi-square tests, run Test, sign tests, Wald- Walfowitz Test, Kursal Walis Test, Komogrov- Smirnov Test.

Research and theory, types and methods of research; review of literature; variables and measurement, concepts, constructs and formulation of hypothesis; Sampling, methods of data collection, development of schedules and questionnaires, scales and fieldwork. Qualitative research: quantitative vs. qualitative research; techniques- Grounded Theory, Ethnography, Case method of research, Content Analysis, Phenomenology, Narrative research, mixed methods.

Analysis, tools- Factor analysis, discriminant analysis, conjoint analysis, multiple regression, etc. Report writing, types of report.

Unit – X

Managerial processes, functions, skills, and roles in organization, Systems, contingency and operational approaches to management. External and internal environment affecting managerial decisions – social responsibilities of business – evolution of management thought; functions of planning, organizing, staffing, directing and controlling.

Understanding & Managing Individual & Group Behaviour – Personality, Perception, Learning, Values & attitudes, persuasion, Theories of Motivation, Factors affecting group behaviour, group & individual dimensions, understanding work team, Communication, Leadership & influence process, Organization structure, centralization vs decentralization, strategy & structure, flat & tall structures, work specialization, departmentalization, chain of command, span of control and formalization, Common organizational designs - Simple, bureaucratic, matrix, virtual, boundary less, feminine – Organization as an open system & influence of environment over organizational dynamics with reference to technological innovations.

Basic Accounting Records and Books of Accounts, Double Entry System, Journal, Ledger, Trial Balance, Cash Book, Depreciation Accounting, Final Accounts with Adjustments. Hotel Accounting, Financial management, Concept of raising funds, capital structure, capital budgeting, Internal financial control- meaning, problems unique to hospitality industry, Establishing cost standard, Types of budget, preparation of budget, and zero based budgeting, working capital Management, cash management, Opportunities and challenges for investments in hotel, aviation & Tourism related sectors, Role of TFCI and other financial organizations. Elements of Contract Act – Breach of Contact – Performance of Contract – Indemnity & Guarantee – Bailment - Consumer Protection Act.