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Part II—Section 2

Notifications or Orders of interest to a Section of the public issued by Secretariat Departments.

NOTIFICATIONS BY GOVERNMENT

HIGHER EDUCATION DEPARTMENT

[Collegiate Education - Recruitment Of Assistant Professors In Collegiate Education Department By Way Of Direct Recruitment Through Teachers Recruitment Board By Conducting Competitive Written Examination - Prescription Of Syllabi - Notification Issued.]

[G.O.Ms.No. 50, Higher Education (F2), 28th February 2024,
மாசி 16, சோபகிருது, திருவள்ளுவர் ஆண்டு–2055.]

No. II(2)/HE/137(b)/2024.

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CODE NO.	SUBJECTS
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46.	URDU
47.	VISUAL COMMUNICATION
48.	WILDLIFE BIOLOGY
49.	ZOOLOGY

Code No:01

SUBJECT : BIOTECHNOLOGY

SYLLABUS

UNIT 1: BIOCHEMISTRY

Classification, structure, chemistry and properties of carbohydrate, lipid, amino acids proteins and nucleic acids. Carbohydrate biosynthesis-Lipid biosynthesis- Biosynthesis of amino acids, Nucleotide and related molecules.

Principles of Bioenergetics, Glycolysis. Catabolism of hexoses- The citric acid Cycle. Oxidation of fatty acids-Oxidation of amino acids-Oxidative phosphorylation – Photo phosphorylation, Biological membranes and transport. Cytoskeletal organization. Prostaglandins, leukotrienes, thrombaxanes – Inteferons and interleukins. Antibodies, alkaloids. Plant and Animal pigments.

Principle techniques and applications of chromatography, centrifugation and electrophoresis.

UNIT 2: MOLECULAR GENETICS

Identification of DNA as the genetic material, Gene as the unit of mutation and recombination. Mutations: Molecular nature; mutagenesis by nitrous acid, hydroxylamine, alkylating agents, intercalators and UV. Origin of spontaneous mutations and control. Reversion and suppression – suppression of nonsense, missense and frameshift mutations. DNA damage by UV, alkylating agent, cross linkers, Mechanism of repair – photo reactivation, excision repair, recombinational repair, SOS, Adaptive responses and their regulation Heat shock response. DNA damage and repair.

Para sexual process in bacteria: Transformation, transduction and conjugal gene transfer: The phenomena mechanisms and applications. Recombination: model, mechanism and control. Gene as the unit of expression. Colinearity of gene and poly – peptide. Elucidation of the genetic code, Wobble hypothesis. Regulation of gene expression. Extra chromosomal heredity: Biology of plasmids discovery, types and structure of F, RTF, Col-Factor and Ti plasmid, replication and partitioning. Incompatibility and copy number control, Natural and artificial plasmid transfer and their applications. Transposable genetic elements – Identification of transposition – IS elements, composite transposons, Tn3, Tn5, Tn9, Tn10 and Mu phage. Mechanism of transposition. Transposable elements in eukaryotes: Maize – Ac & Ds, Spm & dspm, Drosophila – p elements. Retro transposons. Genetics of Eukaryotes: Gene linkage and chromosome mapping. Crossing over–there point cross, tetrad analysis. Organisation of chromosomes, specialized chromosomes, chromosome abnormalities, quantitative inheritance, population genetics. Development of genetics using Drosophila as model system.Somatic cell genetics.

Genome sequencing projects – Microbes, plants and animals, Accessing and retrieving genome project information from web, Comparative genomics, Identification and classification using molecular markers-16S rRNA typing/ sequencing, EST's and SNP's.

UNIT 3: MOLECULAR AND DEVELOPMENTAL BIOLOGY

Cell theory, prokaryotic and eukaryotic cell structure and ultra structure and functions of intra cellular organelles. Organisation of cytoskeleton – organization of intermediate filaments, microtubules and actin filaments. Molecular aspects of cell division and cell cycle, mitosis, cytokines – Cell cycle – Cell fusion – Nuclear cytoplasmic interaction. Structure of DNA and RNA. DNA melting and unwinding. kinetics – cot curve replication of DNA: enzymology, models of replication, kinetics and control. Transcriptions – Enzymology, prokaryotic and eukaryotic transcription, mechanism of transcription, post transcriptional modifications, export of mRNA. Transcription and process of rRNA and tRNA. Translation – Mechanism and regulation, post translational modifications, protein secretion. Regulation of gene expression: Regulation in prokaryotes – Operon concepts, Lac, Trp and Ara. Regulation in eukaryotes – Transcriptional regulation, transcription factors, hormonal regulation, loss, amplification and rearrangement. RNA mediated regulation. Mechanism of signal transduction – G protein, cAMP and calcium ion channel. Cancer – Introduction, types and oncogenesis, mitogens. Oncogenes, suppression of Oncogenes.

Functional genomics and proteomics – Analysis of microarray data, Protein and peptide microarray-based technology, PCR-directed protein in situ arrays, Structural proteomics

UNIT 4: IMMUNOLOGY AND IMMUNOTECHNOLOGY

History and scope of immunology.Types of immunity – innate, acquired, passive and active, Physiology of immune response-H1 and CMI specificity and memory. Antigen-Antibody reactions, types of antigens, hapten,

immuno-globulins, types, structure, distribution and functions. Molecular biology of Ig synthesis. Lymphoid organs, ontogeny and physiology of immune system, origin and development, differentiation of lymphocytes. Lymphocytes sub-population of mouse and man. Structure and functions of Class I and Class II molecules. HLA in human health and diseases. Transplantation immunity – Organ transplantation and HLA tissue typing, effector mechanism in immunity – Macrophage activation, cellular interaction in immune response, cell mediated cytotoxicity, hypersensitivity reactions, antigen lymphocyte activation, clonal proliferation, differentiation, interleukins and compliment systems. Immunological tolerance, immuno suppression, history and status of tumour immunology, auto immune disorders and immunology of infectious disease.

Hybridoma techniques and monoclonal antibody production. Myeloma cell lines. Fusion of myeloma cells with antibody producing B cells and selection of hybrids. Cloning, production and characterization of monoclonal antibody. T-cell cloning and mechanism of antigen, recognition by T & B lymphocytes. Structure, function and synthesis of lymphokines. Antigen presentation and MHC Class-II molecules in T-cell cloning and application of T-cell cloning in vaccine development. Immunity to viruses, bacteria and parasites. Genetic control of Immune response. MHC associated pre-disposition, diseases. Infectious diseases– Leprosy, tuberculosis, malaria, filariasis, amoebiasis, rabies, typhoid, hepatitis and AIDS. Principles and strategy for developing vaccines, immuno diagnosis of infectious diseases.

UNIT 5: MICROBIOLOGY AND MICROBIAL TECHNOLOGY

Ultrastructure and functions of bacteria, fungi, algae, protozoa and viruses. Principles and structure and applications of microscopes. Classification of bacteria, fungi, algae, protozoa and viruses. Molecular taxonomy and current methods of microbial identification for systematic studies. Biology of Echerichia coli, Bacillus substilis, Bacillus thuringiensis, Stretomyces sp., Rhizobium sp., Agrobacterium tumefaciens, Saccharomyces cervisiae, Aspergillusnidulans, archaeobacteria and bacteriophages. Food and diary microbes, Classification of foods, Contamination, preservation and spoilage of foods, Food borne diseases, Plant microbes interactions–Rhizobium and Mycorrhizae. Human pathogens, nosocomial infections, disinfectants and antibiotics. Biofermentor-upstream and downstream processing. Products of industrial microbiology.

UNIT 6: ENZYMOLOGY AND ENZYME TECHNOLOGY

Enzyme classification and nomenclature, General properties of enzymes like effect of pH, temp, ions etc. Extraction, assay and purification of enzymes. Steady state kinetics. Michaelis–Menten, Lineweaver-Burke, Eadie-hofstee and Hanes-Woolf equations and Km value. Enzyme inhibitors, Pre-steady state kinetics. Fast kinetics to elucidate the intermediates and rate limiting steps (Flow and Relaxation methods). Enzyme specificity. Evidences for enzyme substrate complex. Nucleophilic and electrophilic attack. Role of metal ions in enzyme catalysis. Mechanism of enzyme action eg. Lysozyme, chymotrypsin, DNA polymerases, RNase, Zymogens and enzyme activation. Allosteric interactions and product inhibition; complex kinetics and analyses, Membrane bound enzymes – Extraction, assay lipid protein interaction and effect of fluidity on enzyme activity. Coenzyme; Clinical and Industrial applications of enzymes. Immobilization of enzymes and their application. Ribozymes and their applications. Enzyme engineering.

UNIT 7: PLANT MOLECULAR BIOLOGY AND INTELLECTUAL PROPERTY RIGHTS

Plant genome organization, structural features of a representative plant gene, gene families in plants. Organization of chloroplast genome, nucleus – encoded and chloroplast encoded genes for chloroplast proteins, targeting of proteins to chloroplast. Organization of mitochondrial genome, nuclear and mitochondria – encoded genes for mitochondrial proteins. RNA editing in plant mitochondria, mitochondrial genome and cytoplasmic male sterility. Seed storage proteins. Regulation of gene expression in plant development. Plant hormones and phytochrome. Symbiotic nitrogen fixation in legumes by rhizobia – biochemistry and molecular biology. Agrobacterium and crown gall tumours. Mechanism of T-DNA transfer to plants. Ti plasmid vectors for plant transformation. Agroinfection. Classification and molecular biology of plant viruses. Molecular biology of plant stress response. Genetic engineering in plants, selectable markers, reporter genes and promoters used in plant vectors. Direct transformation of plants by physical methods. Genetic engineering of plants for virus resistance, pest resistance, herbicide tolerance, delay of fruit ripening. Golden rice. Antibody production in plants. Plant genetic engineering for resistance to fungi and bacteria. Production of antibodies, viral antigens and peptide hormones in plants. Gene silencing in transgenic plants, DNA markers in marker-assisted selection and plant breeding. Management aspects of plant genetic engineering. Tagging, mapping and cloning of plant genes. Molecular biology of plant pathogen interactions. Plant tissue culture techniques. Introduction, Principles and importance Intellectual property rights: Patenting.

UNIT 8: ANIMAL CELL BIOTECHNOLOGY

Basic principles of biotechnology applicable to animal science. Artificial insemination.

Development and use of transgenic animals – Retroviral vector method, DNA micro injection method and engineered embryonic stem cell method. Transgenic animals sheeps, goats, pigs, birds, fish, Transformation of animal cells – in vitro fertilization and embryo transfer. Cloning vectors – Plasmid vectors, lambda vectors, cosmid vectors, phagemid vectors, BAC, PAC vectors, Plant and animal viruses as vectors. YAC vectors, MAC vectors. Expression vectors - Expression cassettes, baculovirus and expression vectors system for insect cells, virus expression vectors for mammalian cells. Baculovirus as biocontrol agents, Baculo virus for expression of foreign genes. Molecular diagnosis immunological diagnosis – ELISA, use of antibodies as immune therapeutic agents. DNA finger printing and characterization of animal cell. DNA Diagnosis – use of nucleic acid probes in Diagnosis. Gene therapy. Signal transduction and production of recombinant proteins: Acetylcholine, G-protein, visual pigments, growth factor receptors, steroid receptors, AIDS, Oncogenes and anti oncogenes, production of recombinant proteins – vaccines, blood products, hormones, regulatory proteins, phage display technology. Human genome mapping, Restriction fragment length polymorphism (RFLP) and its application, Ethical issues in Animal Biotechnology – CPCSEA and IAEC guidelines, management aspects of biotechnology and genetic engineering. Gene therapy. Application of engineered cell lines -recombinant glycoprotein heterogeneity.

UNIT 9: RECOMBINANT DNA TECHNOLOGY AND BIO-INFORMATICS

Introduction to rDNA technology: DNA modifying enzymes and their uses, Restriction enzymes – Discovery, types, use of type II restriction enzymes. Elucidation of restriction site, Restriction mapping. DNA polymerases – Klenow, DNA polymerase I, Thermostable DNA Polymerase δ used in PCR. T4/T7 DNA polynucleotide kinases and alkaline phosphatases. RNA polymerases, ligases, nucleases – DNAse I, SI Nuclease. Cloning vectors and their applications: vectors for gram positive and gram negative bacteria, Bacteriophage vectors – Lambda and M13 virus based vectors, cosmids, phagmids, yeast vectors, Expression vectors, vector facilitating protein purification, Shuttle vectors. Artificial chromosomes – BAC, YAC, HAC. Inteins (Protein introns) Exteins. DNA cloning – sticky ends, blunt ends, homopolymeric tailing use of adaptors and linkers. PCR based cloning. Preparation of radio labeled/ fluorescent labeled DNA & RNA probes. Chemical synthesis of oligo nucleotides. Blotting & hybridization techniques. Screening of recombinants, alpha complementation and Blue White selection. DNA sequencing – Maxam and Gilbert, Sanger methods, short gun sequencing Automated DNA sequencing. PCR technology – concept, types primer design, analysis of products and applications. DNA finger printing. Chromosome jumping, chromosome walking. Site – directed mutagenesis. Strategies for the production of recombinant proteins – insulin, human growth hormone, industrially important proteins. Construction of genomic DNA library and cDNA library.

Bioinformatics Introduction to bioinformatics – Definitions and basic concepts – Genome projects. Biological data complexity – The role of bioinformatics. Biological database – Sequence databases - Sequence assembly – Submission of sequences – Sequence formats – Conversion between formats – Database browsers and Search engines. Sequence Alignment – Pair wise comparison – Sequence comparison scoring systems – Sequence similarity searching algorithms (BLAST & FASTA family of programs) – Similarity searching scores and their statistical interpretation. Sequence Analysis – Nucleic acid sequence analysis – Reading frames; Codon Usage analysis; Translational and transcriptional signals – Protein sequence analysis – Compositional analysis; Hydrophobicity profiles; Amphiphilicity detection; Introduction to secondary structure prediction methods. Multiple Sequence alignment – Methods available – Iterative alignment, Progressive alignment – Clustal W, T-Coffee – Profile Methods – Clustering and Phylogeny–Methods for Phylogeny analysis: Distance and Character based methods.

UNIT 10: ENVIRONMENTAL BIOTECHNOLOGY

Biotools for environmental monitoring. Role of biotechnology in environmental protection. Waste water treatment. microbial system in waste water stabilization. biofilms. immobilization technology. oil degradation. Biodecolourization. reed bed technology. Rhizosphere engineering-biofiltration and bioindicators. Biodegradation of agrochemicals and other organic compounds. Biotransformation of xenobiotic compound - Role of GEMS in degradation of xenobiotics, bioscrubbers-Biomining of metals- Biopulping. Biodegradable plastics-biotechnology of microbial composting. Biofertilizers, Biopesticides. Bioindicators-biomarkers, biosensors biofilms, biofouling, biomonitoring–polluted environment–short term and long term monitoring remediated sites.

Code No:02

SUBJECT: BIO CHEMISTRY

SYLLABUS

UNIT: 1

CELL–COMPONENTS,GENETICS AND BIOMOLECULES

Molecular organization of prokaryotic and eukaryotic cells. Structure and functions of sub cellular organelles including cytoskeleton. Types of Tissue, Types of adhesion molecules, extracellular matrix, Types of junctions. Cell cycle and regulations- check points.

Genetics–phenotype, genotype, heterozygous, homozygous, allele (dominant, recessive, wild-type, mutant), character, gene, gene locus, pure line, hybrid. Mendel's laws. Monohybrid cross, multiple alleles, dihybrid cross, test cross, back cross, epistasis. Chromosome structure. Polytene and lamp brush chromosomes. Types of chromosomes, Karyotyping. Variation in chromosome number (euploidy, aneuploidy), arrangement (translocation, inversion), number of segments (deletion, duplication). Population genetics - The Hardy-Weinberg law

Carbohydrates: Sources, Structure, Classification, Properties and Biological roles of Simple sugars, Disaccharides, Homo and Hetero polysaccharides.

Amino Acids and Proteins: Structure, Classification, Properties and Biological roles of amino acids and proteins. Different structural organization of proteins.

Nucleic Acids: Structure, Classification, Properties and Biological roles of DNA and RNA. Chargaff's rule, Watson – crick model, bonds involved in nucleic acid.

Fatty acids and Lipids: Structure, Classification, Properties and Biological roles of Fatty acid and Lipids.

Bioenergetics: Bioenergetics Thermodynamics and biochemical equilibria – laws of thermodynamics, free energy, ΔG–Endergonic and exergonic reactions High energy phosphates. Components of Electron Transport chain, Mechanism of ATP synthesis; Oxidative phosphorylation – the chemiosmotic theory. Uncoupling of oxidative phosphorylation. Inhibitors of respiratory chain and oxidative phosphorylation. Mitochondrial transport systems, ATP/ADP exchange, malate/glycerol phosphate shuttle.

UNIT : 2

BIOANALYTICAL TECHNIQUES

Concentration Expression: Normality, Molarity, Molality and milliosmol. pH, pOH, Henderson – Hesselbalch equation, buffers, pH of body fluids, Viscosity, surface tension and Donnan membrane equilibrium.

Chromatographic Techniques: Principles and Applications of Paper, Column, TLC, Adsorption, Ion exchanges, Gel filtration, Affinity, Analytical Ultracentrifugation, GLC, HPLC and FPLC.

Electrophoretic Techniques: Principles and Applications of Polyacrylamide gel electrophoresis, SDS-PAGE, 2D–PAGE, Isoelectric focusing, Agarose gel Electrophoresis, pulse field electrophoresis, high voltage electrophoresis, Capillary Electrophoresis, Isotachophoresis, RFLP, FISH. Blotting techniques and its applications.

Spectroscopic and Radio isotope techniques: Colorimetry, spectrophotometry – UV & visible, Principle – Beer & Lambert's law. Principle and applications of AAS and Fluorimetry. Basic principle and application of mass spectra, NMR, ESR, CD, MRI and CT scans and Biochips. Geiger Muller counters, scintillation counting, auto radiography and RIA, Application of isotopes in biological studies. Circular dichroism and XRD.

Microscopy: Principles and application of light, phase contrast, Fluorescence, scanning and Transmission electron microscopy.

Immuno-Molecular techniques: Antibody generation, detection of molecules using ELISA, RIA, Western blot, immuno precipitations. Isolation and purifications of RNA, DNA (Genomic and plasmid) and proteins. Isolation and separation and analysis of carbohydrates and lipid molecules RLFP, RAPD, AFLP techniques.

UNIT : 3

ENZYMES AND METABOLIC REGULATION

Nomenclature and properties: Nomenclature and IUB system of enzyme classification. Active site–Fischer and Koshland models. Formation of enzyme substrate complex evidence.

Enzyme kinetics: Kinetics of single substrate enzyme catalysed reaction–Michaelis- Menten (Briggs - Haldane) equation, Double-Reciprocal Plot, Lineweaver Burk plot, Eadie- Hofstee and Hanes-Wolf plots. Determination of Vmax, Km, Kcat, Specificity constant (Kcat/Km) and their significance. Factors influencing enzymatic activity, Arrhenius plot.

Enzyme inhibition: Reversible and Irreversible inhibition–Competitive, Non-competitive and mixed inhibition. Substrate inhibition and Feedback inhibition. Applications of enzyme inhibitors. Mechanism of enzyme action-Lysozyme, Carboxypeptidase, Chymotrypsin and Ribonuclease.

Co-enzymes: Structure and functions – Pyridine and flavin nucleotides, coenzyme A, Pyridoxal phosphate and thiamine pyrophosphate, tetrahydrofolate and B12 coenzymes. Allosteric Interactions: Enzyme regulation, allosteric enzymes. Enzyme repression and covalent modification of enzymes. Zymogen activation and Isozymes.

Multi enzyme system: Multi functional enzymes. Multi-enzyme complexes (Pyruvate dehydrogenase complex, fatty acid synthase and Na–K ATPase) and Metalloenzymes, abzymes, Immobilised enzymes and their industrial applications. Enzymes–food and pharmaceutical enzymes and Biosensors.

Carbohydrate Metabolism: Pathway, regulation and energetic. Blood glucose homeostasis – role of tissues and hormones.

Amino acid metabolism: Biosynthesis and degradation of amino acids and their regulation. Transamination and Deamination, ammonia formation, Urea cycle and regulation of ureogenesis.

Lipids metabolism: Lipogenesis and regulations. Cholesterol–biosynthesis and regulations. Free Fatty acid and derivatives metabolism and regulations (All types of Oxidations). Ketogenesis and its control. Lipoprotein metabolism–exogenous and endogenous pathways.

Nucleic acid metabolism: Biosynthesis and catabolism of purines and pyrimidines and their regulation.

UNIT : 4

CLINICAL BIO-CHEMISTRY AND ENDOCRINOLOGY

Biological fluid: Blood, Urine, CSF and Amniotic fluid. Composition and Clinical Diagnostic significance.

Disorders of carbohydrate metabolism: Hyper and Hypoglycemia, Types of Diabetes Millites, Carbohydrate intolerance. Glycogen storage disorders, Pentosuria and galactosemia.

Disorder of protein metabolism: Agammaglobulinemia, Alpha – fetoprotein, Amyloidosis. Cryoglobulinemia. Hypo and hyper gamma – globulinemia. Abnormalities in Nitrogen Metabolism, porphyrias and porphyrinuria.

Disorders of lipids: Plasma lipoproteins, cholesterol, triglycerides & phospholipids in health and disease. Fatty liver, Hyperlipidemia, hyperlipoproteinemia, Major Cardiovascular diseases – Atherosclerosis and pathogenesis.

Inborn error of metabolic inheritance: Phenylketonuria, alkaptonuria, albinism, tyrosinosis, maple syrup urine disease, Leish – Nyhan syndrome, Histidinemia, Gaucher's disease, Tay – sachs and Niemann – Pick disease. Sickle cell anemia and Thalassemia.

Disorders of liver and kidney: Hepatobiliary system–Liver function tests–jaundice–cirrhosis, Drug toxicity, hepatic coma, hepatitis, gallstones, cholecystitis and tumours. Renal function tests–acute and chronic renal failure–clearance tests–urinary calculi, renal hypertension–principles of peritoneal and hemodialysis. Nephritic syndrome.

Disorders of Endocrine system: Endocrine system: Laboratory diagnosis and investigations related to disorders of thyroid, pituitary, adrenal cortex, adrenal medulla, testes, ovaries–assay of hormones related to clinical diagnosis.

UNIT: 5

MICROBIAL AND PLANT BIOCHEMISTRY

Growth and Staining: Structure of bacteria, fungi and algae. Microbial growth: physical and chemical requirements for growth, culture media, mixed and pure cultures, phases of growth, measurements of microbial growth. Sterilization and Staining techniques.

Soil Microbiology: Different soil microbes. Biogeocycle – carbon, Nitrogen and sulphur cycles.

Aquatic Microbiology: Freshwater microbial flora, effects of pollution, chemical pollution - test for water purity, salinity, BOD, COD, Microbial load. Water treatment–Sewage treatment- primary, secondary treatment – sludge digestion.

Food Microbiology: Microbial spoilage – Fresh food, milk and canned food. Food preservation – temperature, canning, pasteurization and sterilization methods in food industry.

Mycotoxicosis: Mycotoxins of food contaminants like A.flavus, P.rubrum, P.citrinum and A.canidus and stachybotrayacitra.

Photosynthesis: Chloroplast structure and function – CO_2 fixation by C3, C4 and CAM plants. Hill's reaction, Photorespiration, Photophospharylation. Nitrogen metabolism. Trace elements in plant nutrition. Translocation of Organic and Inorganic substances. Plant pigments–isoprenoids, anthocyanina and secondary metabolites.

Seed Germination and Phytohormones: Germination changes in composition and enzyme activities in seed, factors affecting germination and vernalisation. Structure and functions of plant hormones–Auxins, gibberellins and absicic acid.

Plant pathogens: common plant pathogens of interest of India, portals of entry, transmission of plant pathogen by vector. Plant diseases caused by bacteria, fungi and viruses, Defensive mechanism including resistance to infections.

UNIT : 6

HUMAN PHYSIOLOGY AND NEUROCHEMISTRY

Homoestasis: water, temperature regulations.

Gastro Intestinal Physiology: Digestive secretions and composition, assimilation of carbohydrate, protein, lipid and nucleic acid.

Circulatory system: Elementary principles of circulation, vasomotor circulation, blood pressure and structure of heart. Cardiac cycle, rhythum, tachycardia. ECG and EEG.

Renal Physiology: Structure of kidney and Nephron. Urine formation and regulations. Renal role in acid base balance, mechanism and regulation of miturition. Normal and abnormal constituents in urine.

Special Senses: vision and hearing.

Structure of Brain, Neuron and spinal cord. Central and peripheral nervous system, neural control of muscle tone and posture. Reflex arc. Sleeping and awakening.

Action potential: Neurotransmitters–examples, release and cycling of neurotransmitters. The neuromuscular junction. The acetylcholine receptor.

Structure of skeletal muscle: Muscle proteins–myosin, actin, troponin and tropomyosin and other proteins. Sequence of events in contraction and relaxation of skeletal muscle. Cardiac and smooth muscle (Brief account only).

UNIT: 7

IMMUNO MOLECULAR CHEMISTRY

Immunoglobulins: Types of immunity-Innate and Adaptive. Humoral and cell mediated immunity. Central and peripheral lymphoid organs. Antigens, Immunoglobulin classifications. Haptens, adjuvants and abzymes. T and B Lymphocytes and their characterization; mono-clonal antibodies. Type of Immune cells.

Complement pathways: Complement system: components of complement activation and its biological consequences – classical, alternative and lectin pathways. Clonal selection theory. Organization and expression of immunoglobulin genes, generation of antibody diversity. Class switching.

Overview of B cell & T cell, types of immune response, T–cell, B-cell receptors, Antigen recognition – processing and presentation to T- cells. Interaction of T and B cells. Effector mechanisms – macrophage activation. Cell mediated cytotoxicity, Cytokines types, regulation of immune response: immune tolerance and immune suppression.

Major Histocompatibility complex (MHC): MHC genes and products. Polymorphism of MHC genes, role of MHC antigen in immune response, Transplantation types, allograft rejection mechanism. Immune response to Viral, bacterial and protozoal. AIDS, Immuno suppressive therapy, Tumorantigens, Proto-Oncogene and other immuno deficiency disorders. Autoimmunity: Mechanism of induction of organ specific and systemic autoimmune diseases. Hyper sensitivity reactions. Vaccines-Immunisation practices – active and passive immunization, types of vaccines-toxoids, DNA, recombinant, synthetic peptides.

UNIT: 8

MOLECULAR BIOLOGY AND CELL SIGNALLING

Central dogma of life: DNA as the genetic material, super coiling, hybridization. Hierarchy of Chromatin Organisation, Central Dogma, Unique sequence DNA, Repetitive DNA – SINEs, LINEs, Satellite, Minisatellite and Microsatellite DNAs, C Value Paradox. E.Coli Chromosome and plasmids, Mitochondrial and Chloroplast Genomes. Concept of genes. Structure of Protein-coding genes in prokaryotes and eukaryotes.

DNA Replication: Mode of replication in prokaryotes and eukaryotes. Enzymes involved in replication and regulations of replication.

Repair and Mutation: Type of damages and mutation.

Transcription: prokaryotes and eukaryotes. RNA polymerases – structure and functions. Promoters, transcription factors, initiation, elongation and termination of transcription. Post transcriptional modification of RNA. Genetic code–specificity, redundancy and wobble hypothesis. Mitochondrial and chloroplast genetic codons.

Translation: Components of protein synthesis – mRNA, rRNA and tRNA. Mechanism of protein synthesis. Regulation and Post translational modifications.

Gene expression and regulation: Gene regulations. Lac, Arb and Trp Operon model. Levels of gene expression. Principles of gene regulation. Genetic and epigenetic gene regulation by DNA methylation. Methylation and gene regulation in mammals and plants.

Cell signaling: Fundamental concepts and general features of cell signalling. Endocrine, paracrine, autocrine and juxtacrine signaling. Types of receptors. Transmembrane, nuclear and cytosolic receptors. G-protein coupled receptors. Second messengers: c-AMP, cGMP, diacylglycerol, inositol triphosphate and Ca2+. Receptor tyrosine kinases–insulin signalling, ras-raf-MAP kinase and JAK-STAT pathways. ATM signalling pathway.

UNIT : 9

BIOSTATISTICS, ENVIRONMENTAL AND NUTRITIONAL BIOCHEMISTRY

Statistical analysis: Measure of central tendency and dispersal; sampling distribution, probability distribution, level of significance, t-test, analysis of variance; regression and correlation.

Environmental pollution: types, methods for measurement, biosensors to detect environmental pollutants, hazards from wastes and pollutants. Air pollution and its control through biotechnology. Water pollution and control.

Waste water treatment: physical, chemical and biological. Activated sludge–oxidation ditches and ponds, trickling filter, towers, rotating discs and drums. Anaerobic processes: anaerobic digestion and filters. Effluent treatment, B.O.D and C.O.D

Effluent treatment: Bioremediation, oil spill cleanup. Microbial mining. Biofertilizers bacteria, and blue green algae. Biopesticides in integrated pest management- Bacillus and Pseudomonas as biocontrol agents.

Single cell protein: microorganisms and steps in SCP production, biomass recovery, nutritional and safety evaluation, advantages.

Nutritional Biochemistry: Definition of BMR, SDA, Factors affecting BMR. Regulation of body temperature. Total energy requirement, estimation of energy requirement, energy value of food. Requirements of Carbohydrates and Lipids. Special aspects of Nutrition during pregnancy and lactation.

Protein energy malnutrition: clinical features, metabolic disorders and management of marasmus and kwashiorkor diseases: Basic food groups-Energy yielding, Body building, protective foods. Food production, Food storage, Functional foods, New protein and Fat foods, Changing food habits, Food adulteration and hygiene. Improvement of protein quality by supplementation and fortification. Nitrogen balance–positive and negative.

Micro and macro mineral nutrients: Distribution sources, metabolic functions and deficiency manifestations – Calcium, Phosphorus, Sodium, Potassium, Iron, Copper, Selenium and Zinc. Role of Vitamin as Antioxidant. Special needs of Infants, children, adolescents, pregnant and lactating women, convalescents and old persons.

UNIT :10

BIOTECHNOLOGY AND GENETIC ENGINEERING

Bioprocess engineering: Isolation and screening of industrially important microbes. Maintenance and improvement of strains. Bioreactors–types, design, parts and their function. Media for industrial fermentation, air and media sterilization. Antifoaming devices.

Types of fermentation processes: Analysis of batch, fed-batch and continuous bioreactions, analysis of mixed microbial population, specialized bioreactors (pulsed, fluidized, photobioreactors).

Downstream processing: solid-liquid separation, release of intracellular compartments, concentration of biological products, purification, preservation and stabilization, product formulation. Monitoring.

Bioreactors: DNA fingerprinting and foot printing with its applications. Bacterial leaching and biomining. Bioreactors–Design and types of fermentors, batch and continuous bioreactors. Downstream processing. Bioethics–Ethical issues in production of genetically engineered foods and transgenic plants and animals. Immuno supressive therapy. Tumor antigens. Proto - Oncogene.

Vectors: Restriction enzymes and their types, DNA ligases, Alkaline phosphatase. Plasmids–pBR322 and pUC, Phage vectors–λ and M13, Cosmids and High capacity cloning vectors–YAC, PAC and BAC. Shuttle vectors. Genomic DNA library, cDNA synthesis and cloning, Chromosome walking.

Gene transfer methods (All methods): in plants and animals. Anti-sense RNA technology and applications. PCR technology. Animal cell culture – Methods and Applications. Gene therapy. Principles and applications of stem-cell technology. Production of Insulin, Vaccines, Antibodies, Interferons and Somatostatin.

Industrial biotechnology: Industrial production of ethanol, lactic acid, butanol, penicillin and phenylalanine. Commercial production of fructose. Solvents, organic acids, amino acids and vitamins. Introduction to synthetic biology.

Code No: 03

SUBJECT: BIOLOGICAL SCIENCE EDUCATION

SYLLABUS

UNIT 1: Zoology–ANIMAL PHYLOGENY – EMBRYOLOGY & IMMUNOLOGY

- Concepts of species and hierarchical taxa, biological nomenclature.
- Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs and systems. Organization of Coelom, Symmetry and Metamerism.
- Protozoa: Human Parasitic Protozoanas – Entamoeba histolytica and Plasmodium vivax, Canal systems in Porifera, Polymorphism and Metagenesis in Coelentrates, Types of Corals and Coral reefs, Human Parasitic Helmith worms – Liverfluke and Ascatis, Adaptive Radiation in Polychaetes.
- Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals, embryo sac development and zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers and embryogenesis.
- Human Reproduction: Reproductive organs, Menstrual cycle, Human Fertilisation process, infertility and assisted reproductive technology, Birth control methods. Twins, Human Syndromes

UNIT 2: CELLULAR AND MOLECULAR INTERACTIONS

- Cellular communication: General principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix and integrins.
- Cell signaling Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways.
- Cancer: Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, therapeutic interventions of uncontrolled cell growth.
- Structure of atoms, molecules and chemical bonds. Structure of water molecule.
- Composition, structure and function of biomolecules: carbohydrates, lipids, proteins, nucleic acids and vitamins.
- Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

UNIT 3: ANIMAL PHYSIOLOGY – ECOLOGY – GENETICS

- Digestive system: Nutrients – Vitamins and Minerals. Balance Diet, BMR, Digestion and absorption.
- Blood and circulation: Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity and haemostasis.
- Cardiovascular System: Structure of Human Heart, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation. Blood vessels – Arteries, Veins and Lymphatic vessels.
- Respiratory system: Respiratory Structure – Insects, Fish and Human beings, respiratory pigments, Comparison of respiration in different species, transport of gases, exchange of gases, neural and chemical regulation of respiration.
- Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.
- Pollution: definition, types, sources, effects. Global warming, climate change, glacial melting and rising sea levels, floods, droughts and desertification, Creating buffer zones, sustainable development, carbon sequestration, carbon sink, carbon foot print, carbon credit, carbon trading and carbon budget.
- Biodegradation and Bioremediation.
- Electrophysiological methods: Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI and CAT.

UNIT 4: BOTANY–GENERAL BOTANY

• Biodiversity: Introduction Algae, Bryophytes, Pteridophytes, Gymnosperms: Bacteria, Viruses, Fungi. Food Microbiology: Beneficial role of microbes – Fermented food. Spoilage of fruits, vegetables, meats, poultry, eggs, bakery products, dairy products and canned foods. Microbial toxins. Food Preservation.

• Soil Microbiology: Importance of Microbial flora of soil and factors affecting the microbial community in soil. Microorganisms in organic matter decomposition.

• Environmental Microbiology: Microbiology of water and air. Water borne diseases -. Air borne diseases–Microbial degradation of chemical pesticides and hydrocarbon.

• ETHNOBOTANY: History of ethnobotany, Distribution of tribes in India. Role of plants in naturopathy-Indian Systems of Medicine (Ayurveda, Siddha, Allopathy, Homeopathy, Unani, Tibetan, Yoga and Naturopathy). Disease diagnosis, treatment, and cure using natural Bioprospecting of drug molecules derived from Indian traditional plants; Methods for bioprospecting of natural resources.

• Economic Botany. Source and processing of Economically useful products of the following: 1) Cereals-Rice, maize 2) Pulses–Black gram, soybean 3) Sugarcane 4) Coffee 5) Spices – turmeric, cloves 6) Medicinal plants–Ocimum, Aloe 7) Fibre–Cotton, Jute 8) Essential oils – Eucalyptus.

UNIT 5: Biochemistry and secondary metabolites, Instrumentation and Biostatistics, Molecular Biology, Intellectual Property Rights, Environmental Biology

• Biochemistry: Structure of atoms, molecules, and chemical bonds. Composition, structure, and function of biomolecules–carbohydrates, lipids, proteins, nucleic acids, and vitamins. Principles of biophysical chemistry–pH, buffer, reaction kinetics, thermodynamics, colligative properties. Metabolism of carbohydrates, proteins, lipids, amino acids nucleotides, and vitamins.

• Secondary metabolites: Types and their roles, alkaloids, flavonoids, saponins, terpenes, phenols, tannins, coumarins, glycosides, nitrogenous compounds. Microscopy–simple, compound, binocular, phase contrast, interference, polarizing, dark field, ultraviolet, fluorescent microscopes. Electron microscope – SEM, TEM. Micrometry, haemocytometer. Buffer (phosphate, acetate buffer), pH, Principles and applications of–pH meter – electrode, digital, oxygen electrode, cell fractionation, homogenizers, sonication. Chromatography – principle, paper, thin layer, column chromatography, HPLC, Ion exchange chromatography, gas chromatography. Electrophoresis – poly acrylamide–PAGE, SDS–agarose. Spectrophotometer, fluorimeter, luminometer – principle, working mechanism and its application.

Biostatistics: 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; X2 test; Basic introduction to Multivariate statistics, etc.

DNA–genetic material – Experiments that proved that DNA is the genetic material, Chargaff's rule. Genetic code.

Intellectual Property Rights: Intellectual Property Rights–Introduction, Kinds of Intellectual Property Rights–Patents, Trademarks, Copyrights, Trade Secrets.IPR in India genesis and development. Geographical Indication – introduction, types. Patent filing procedure for ordinary application. Ecosystem structure and function; energy flow and mineral cycling (C, N, P): terrestrial and aquatic.Energy resources; renewable and non-renewable. Environment Deterioration: Pollution – types and control-Climate change-Green house effect and global warming, ozone depletion and acid rain.

Unit 6 : Foundations of Education

Philosophical Perspectives: Idealism, Naturalism, Pragmatism, Progressivism, Existentialism, Humanism, Realism, Eclecticism – Philosophers and their contributions: Western Philosophers: Rousseau, Froebel, Maria Montessori, Pestalozzi, Bertrand Russell, John Dewey – Indian Philosophers: Mahatma Gandhi, Rabindranath Tagore, Swami Vivekananda, J.Krishnamurti, Aurobindo – Development of Indian Education during Pre-Independence, Post-Independence, Modern era–Important Education Committees – Recommendations of National Education Policies, National Curriculum Frameworks. Sociological Perspectives: Concepts of Special and Inclusive Education, Women Education, Population Education, Vocational Education, Environmental Education for sustainable development-UN SDG goals, Human Rights: UN Declaration of Human Rights, Peace and Value Education – Indian Constitution: Articles and Amendments related to Education–Culture and Communication in Education – Social issues: Measures and Reforms – Social Structure, Socialization process – Social stratification – Indigenous Value systems – History and Culture of Tamil Nadu: Social Equality, Language, Culture and Politics.

Unit 7 : Educational Psychology

Educational Psychology – Cognitive, Humanistic, Behavioural and Transpersonal school of thoughts – Role of heredity and environment – Dimensions of Development: Physical, Cognitive, Psycho-Social, Moral, Behavioural, Language – Theories of Development: Piaget, Bruner, Kohlberg, Erickson, Vygotsky, Noam Chomsky, Watson–Developmental tasks – Sensation and Perception–Factors of learning: Attention, Interest, Aspiration, Motivation and its types, Motivational Theories: Maslow, McDougall's, McClelland – Learning, Factors of Learning, Theories: Trial & Error, Operant and Classical Conditioning, Insight and Gestalt – Intelligence: Theories – Single-Factor, Two-Factor, Triarchic, Group and Multi-factor theory, Guilford's Structure of Intellect, Gardner's Multiple Intelligence theory, Factor Personality: Type and Trait theories – Personality Assessment methods and techniques – Educational Implications of Learning, Intelligence and Personality theories – Mental Health, Adjustment and Defence mechanisms – Concepts of Guidance and Counselling.

Unit 8: Pedagogical approaches

Nature, Scope, Aims and Objectives, Values of Teaching the subject, Inter-disciplinary aspects, Taxonomy of Educational Objectives: Bloom's, Anderson's, RCEM, NCERT –Micro-teaching: Skills and Components, Micro Cycle, Link Lesson–Planning of the lesson: Curricular Plan, Unit Plan and Lesson Plan, General and Specific Instructional objectives, Action verbs – Methods of Teaching: Traditional and Modern Methods – Techniques of Teaching: Small and Large Group Techniques – Models of Teaching: Concept attainment, Advanced Organizers, Inquiry Training, Information Processing, Personalized Model – Resources for Teaching-Learning: Text Books, Laboratory, Library, E-resources and Field-trips – Flander's Classroom Interaction Analysis – Dale's Cone of Experience – Educational Technology and ICT Resources in Teaching-Learning: Blended Learning, Simulation, Augmented Reality, Virtual Learning – Digital Resources – Assessment and Evaluation: Types of Tests, Steps in construction of an achievement test – Continuous and Comprehensive Evaluation – Analysis and Interpretation of test scores.

Unit 9 : Curriculum Components and Teacher Education

Curriculum – Principles, Bases of Curriculum: Philosophical, Psychological and Sociological, Criteria of selection of content – Types: Subject, Learner, Community and Activity centred curriculum – Concepts of core and hidden curriculum – Curriculum Organization: Articulation, Balance and Continuity – Approaches: Concentric, Spiral, Topical, Logical, Vertical and Horizontal – Curricular

Materials – Role of NCERT and SCERT in curriculum planning – Stakeholders contribution and participation in the curricular, co-curricular and extra-curricular activities – Curriculum Evaluation and Theories: Tyler's model, Hilda Taba model, Beauchamp's model, D.K.Wheeler's model, Virgil V. Herrick model.

Teacher Education – National Council for Teacher Education: Functions–Teacher Education systems and Programmes: Pre-service and In-service – Integrated Teacher Education Programmes–Concept of Teaching Profession;–Changing roles and responsibilities – Continuous Professional development and Professional ethics–National Professional Standards for Teachers – Teacher Appraisal and accountability – Significance of Teachers In-service education and training–Research and innovations in Teacher education, NAAC's Assessment and Accreditation process – Autonomy in Education: Institutional, Administrative and Teacher autonomy –Teacher Eligibility Tests – Concepts of Andragogy – Life-long and continuing education.

Unit 10: Research Methodology and Statistics

Research – Types of Research: Basic, Applied and Action Research, Sources of Selecting Research Problem, Importance of Review of Literature, Hypothesis, Variables, Sampling Techniques: Probability and Non-Probability techniques, Steps in writing research proposal and research report – Academic and Research Writing – Experimental Research Designs: Pre-Experimental, True and Quasi Designs – Factors affecting internal and external validity of experimental research, Quantitative, Qualitative and Mixed Research Methods–Research Tools: Likert and Thurstone, Personality, Interest and Intelligence test, Item and Factor analysis – Characteristics of Research tools – Statistical Analysis: Descriptive and Inferential Analysis, Hypothesis testing: Type I and Type II errors, Level of Significance, Graphical Representation of Data – Issues related to plagiarism–Research Ethics and Integrity.

Code No : 04

SUBJECT: BOTANY/ PLANT BIOLOGY AND

PLANT BIOTECHNOLOGY

SYLLABUS

UNIT-1 Biodiversity

Algae: General characters and Classification of algae by F.E.Fritsch (1935-45) & Silva (1982). Salient features of major classes: Cyanophyceae, Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae. Range of thallus organization, reproduction and life cycles. Economic importance of algae.

Bryophytes: General characters and Classification of Bryophytes by Watson (1971). Distribution, Structural variations and evolution of gametophytes and sporophytes in Hepaticopsida, Anthoceropsida and Bryopsida. Economic importance of bryophytes.

Pteridophytes: General characteristics and classification of Pteridophytes (Reimer, 1954). Stellar evolution. Heterospory and seed habit, Telome theory, Economic importance of Pteridophytes. General characters and life cycle of Psilopsida, Lycopsida, Sphenopsida, Pteropsida.

Gymnosperms: General characters of Gymnosperms. classification (K.R.Sporne, 1965). Economic importance of Gymnosperms. General characters of major groups: Cycadophyta, Ginkgophyta, Gnetophyta, Coniferophyta. Fossil gymnosperms.

UNIT-2 Microbiology

Bacteria: General characters of bacteria – Outline classification–Bacterial growth – Reproduction–Genetic recombination- Transformation, Transduction and Conjugation. Isolation and cultivation of bacteria.

Viruses: General characters, Classification, Structure, Multiplication. Bacteriophages–replication of DNA and RNA phages - Lytic and Lysogenic cycle. Viroids and prions. Mycoplasma.

Fungi: General Characters, occurrence and distribution. Mode of nutrition in fungi. Classification of Fungi by Alexopoulos and Mims (1979). General characters of major classes: Myxomycetes, Oomycetes, Zygomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Heterothallism, sexuality, Para sexuality, sex hormones in fungi.

Lichens: Introduction and Classification (Hale, 1969). Occurrence and inter-relationship of phycobionts and mycobionts, structure and reproduction in Ascolichens, Basidiolichens and Deuterolichens. Economic importance.

Plant Pathology: History and significance of plant pathology. Classification of plant diseases, symptomology. Principles of plant infection – Host parasite interrelationship and interaction. Causal agents of plant diseases–biotic causes (fungi, bacteria, virus, mycoplasma, nematodes, parasitic algae, angiospermic parasites–Abiotic causes (Physiological, deficiency of nutrients & minerals and pollution). Mechanism of penetration- Disease development of pathogen (colonization) and dissemination of pathogens. Role of enzymes and toxins in disease development. Defense mechanism of host–structural and biochemical defenses. Important diseases of crop plants in India – Principles of disease management–Cultural practices, physical, chemical and biological methods, disease controlled by immunization. Biocontrol–Plant quarantine and legislation. Integrated Pest Management system.

Food Microbiology: Beneficial role of microbes –Fermented food. Spoilage of fruits, vegetables, meats, poultry, eggs, bakery products, dairy products and canned foods. Microbial toxins. Food Preservation – Soil Microbiology: Importance of Microbial flora of soil and factors affecting the microbial community in soil. Microorganisms in organic matter decomposition. Environmental Microbiology: Microbiology of water and air. Water borne diseases–Air borne diseases–Microbial degradation of chemical pesticides and hydrocarbon.

UNIT-3 Morphology, Taxonomy, Ethno botany and Economic botany.

Morphology: Morphological variation of root, stem, leaf, inflorescence, flowers and fruits.

Taxonomy: Principles of classification – Artificial – Linnaeus, Natural – Bentham and Hooker, Phylogenetic system–Hutchinson, Modern – Takhtajan. Botanical gardens and Herbarium, Botanical survey of India.

Modern trends in taxonomy, chemotaxonomy, numerical taxonomy, biosystemics. ICBN uninominal systems - genesis binomial nomenclature, importance and principle. Important articles, typification, principles of priority, effective and valid publication, author citation, recommendations and amendments of code. Glossories and

dictionaries, Taxonomic literature (Index Kewensis). systematic analysis of plants of various families Polypetalae – Annonaceae, Nympheaceae, Sterculiaceae, Portulaceae, Rhamnaceae, Vitaceae, Sapindaceae, Combretaceae, Turneraceae. Gamopetalae – Sapotaceae, Oleaceae, Boraginaceae, Scrophulariaceae, Bignoniaceae, Convolvulaceae, Acanthaceae, Verbenaceae. Monochlamydeae – Nyctaginaceae, Aristolochiaceae, Casuarinaceae. Monocots – Orchidaceae, Amarylidaceae, Lilliaceae, Poaceae.

ETHNOBOTANY:

History of ethnobotany: Distribution of tribes in India. Basic knowledge of following tribes of Tamil Nadu: Irulas, Kanis, Paliyars Badagas, Kurumbres, Thodas and Malayalis. Plants used by tribals of Tamil Nadu. Role of plants in naturopathy-Indian Systems of Medicine (Ayurveda, Siddha, Allopathy, Homeopathy, Unani, Tibetan, Yoga and Naturopathy). Disease diagnosis, treatment, and cure using natural Bioprospecting of drug molecules derived from Indian traditional plants; Methods for bio prospecting of natural resources; From folk Taxonomy to species confirmation-evidences based on phylogenetic and metabolomics analyses; Ethnobotanical databases and Traditional knowledge Digital Library (TKDL).

Economic Botany: Source and processing of Economically useful products of the following: 1) Cereals -Rice, maize 2) Pulses–Black gram, soybean 3) Sugarcane 4) Coffee 5) Spices – turmeric, cloves 6) Medicinal plants–Ocimum, Aloe 7) Fibre–Cotton, Jute 8) Essential oils – Eucalyptus.

UNIT-4 PLANT ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS

Cellwall, Plasmodesmata–types of pits Meristems: Simple and complex tissues. Vascular Cambium: Primary and secondary xylem and Phloem: Periderm. Normal secondary thickening in Dicots; Anomalous secondary growth in Dicots (Amaranthaceae, Aristolochiaceae, Bignoniaceae, Nyctaginaceae) and arborescent Monocots. Primary thickening in palms; Ontogeny of leaf, Structure and types of Stomata; Leaf abscission; Major nodal types; Kranz anatomy and its significance. Micro techniques and histochemistry.

EMBRYOLOGY

Microsporangium and Male gametophyte: Structure and development of Anther; Male gametophyte; Palynology: Morphology and ultrastructure of pollen wall, pollen sterility and pollen physiology.

Megasporangium and Female Gametophyte: Structure and development of Megasporangium; Types of ovules, Endothelium, obturator and nucellus. Megasporogenesis: Female gametophyte: Structure, types, haustorial behavior and Nutrition of embryo sacs. Fertilization: Endosperm: Embryogeny: Development of monocot (Grass) and dicot (Crucifer) embryos. Polyembryony, Apomixis. Seed and Fruit development and role of growth substances. Parthenocarpy.

UNIT–5 Plant Physiology, Biochemistry and secondary metabolites

Plant Physiology: Water Relations:— Transpiration– mechanism of stomatal opening and closing – mineral nutrition – Photosynthesis: light and dark reaction, C3 and C4 types, phloem loading and unloading-photorespiration-respiration–Glycolysis, Krebs cycle, ETP–Cyanide resistant respiration; Nitrogen metabolism: Nitrogen fixation (Biological–symbiotic and non-symbiotic), Physiology and Biochemistry of nitrogen fixation – enzymes and pathways. Growth and development –- Plant growth regulators–Photoperiodism —- Vernalization–biological rhythms and movements. Seed dormancy Plant senescence and its significance. Fruit ripening: Plant response to environmental stress: Biotic and Abiotic stress.

Biochemistry: Structure of atoms, molecules, and chemical bonds. Composition, structure and function of biomolecules–carbohydrates, lipids, proteins, nucleic acids and vitamins. Principles of biophysical chemistry -pH, buffer, reaction kinetics, thermodynamics, colligative properties. Bioenergetics, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes.

Conformation of proteins (Ramachandran plot, secondary structure, domains, motif, and folds).Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA).Stability of proteins and nucleic acids. Metabolism of carbohydrates, proteins, lipids, amino acids nucleotides and vitamins.

Secondary metabolites: Types and their roles, alkaloids, flavonoids, saponins, terpenes, phenols, tannins, coumarins, glycosides, nitrogenous compounds.

Unit-6 Instrumentation and Biostatistics

Microscopy - simple, compound, binocular, phase contrast, interference, polarizing, dark field, ultraviolet, fluorescent microscopes. Microtome and types. Electron microscope – SEM, TEM. Micrometry, haemo cytometer. Buffer (phosphate, acetate buffer), pH, Principles and applications of–pH meter – electrode, digital, oxygen electrode, cell fractionation, homogenizers, sonication. Centrifugation – principles and applications. Types of centrifuges. Types of centrifugation methods (differential, density gradient). Chromatography–principle, paper, thin layer, column chromatography, HPLC, Ion exchange chromatography, gas chromatography. Electrophoresis – polyacrylamide-PAGE, SDS-agarose. Spectrophotometer, fluorimeter, luminometer – principle, working mechanism and its application.

Detection of molecules using ELISA, RIA, western blot, immune precipitation, flow cytometry and immune fluorescence microscopy, detection of molecules in living cells, in situ localization by techniques such as FISH and GISH.

Biostatistics: 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; X2 test; Basic introduction to Multivariate statistics, etc.

UNIT-7 Cellular Organization

Membrane structure and function: structure of model membrane, lipid bilayer, and membrane protein diffusion, osmosis, ion channels, active transport; membrane pumps; mechanism of sorting and regulation of intracellular transport; electrical properties of membranes. Structural organization and function of intracellular organelles - Cell Wall, Nucleus, Mitochondria, Golgi bodies, Lysosomes, Endoplasmic reticulum, Peroxisomes, Plastids, Vacuoles, Chloroplast, structure & function of the cytoskeleton and its role in motility.

Organization of genes and chromosomes: Operon, unique and repetitive DNA, interrupted genes, gene families, the structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons.

Cell division and the cell cycle: mitosis and meiosis, their regulation, steps in cell cycle, regulation of cell cycle.

Microbial Physiology: Growth yield and characteristics, strategies of cell division.

UNIT-8 Genetics Plant Breeding and Horticulture

Genetics: Mendelian principles: Dominance, segregation, independent assortment. 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. Sex determination in plants. Concept of gene: Allele, multiple alleles, pseudo allele, complementation tests. Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants. Polygenic inheritance, heritability and its measurements, QTL mapping. karyotypes, genetic disorders. Extra chromosomal inheritance. Population genetics. Gene pool – Hardy Wienberg equilibrium.

Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, a gain of function, germinal verses somatic mutants, insertional mutagenesis.

Plant Breeding

Objectives of plant breeding, Genetic basis of breeding self and cross – pollinated crops. pure line selection and mass selection, clonal selection methods. Hybridization, Genetics and physiological basis of heterosis. Polyploidy, mutation breeding. Seed certification, National Biodiversity Policy.

Horticulture: Organic manures and fertilizers. Composition of fertilizer, NPK content of various fertilizers. Common organic manures. Vermicompost preparation. Panchakaviyam. Common garden tools. Methods of plant propagation by seeds. Vegetative propagation. Use of growth regulators for rooting. Gardening–types of garden. Rockery and artificial ponds. Ornamental garden – Bonsai – Glass house – Green house – Mist chamber. Floriculture, arboriculture, silviculture, olericulture.

UNIT-9 Molecular Biology, rDNA technology, Biotechnology and Bioinformatics

DNA–genetic material – Experiments that proved that DNA is the genetic material, Chargaff's rule. Genetic code. DNA replication: enzymes involved, replication origin and replication fork, the fidelity of replication, extra chromosomal replicons Central Dogma - 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, and polyadenylation, structure and function of different types of RNA, RNA transport.

Protein synthesis and processing: Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, amino acylation of tRNA, tRNA-identity, amino acyl tRNA synthetase and translational proof- reading, translational inhibitors, Post-translational modification of proteins.

DNA damage and repair mechanisms.

Gene regulation - Operon - types, structure and functioning of lac, trp operon, Control of gene expression at transcription and translation level: Regulating the expression of phages, viruses, prokaryotic and eukaryotic genes, the role of chromatin in gene expression and gene silencing. Cell communication and cell signaling.

rDNA technology: 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, Isoelectric focusing gels. Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems Expression of recombinant proteins using bacterial, animal and plant vectors. Isolation of specific nucleic acid sequences Generation of genomic and cDNA libraries in a plasmid, phage, cosmid, BAC and YAC vectors.

Biotechnology:

Plant tissue culture -– Laboratory organization-Plant culture media–Micropropagation: callus culture – Organogenesis and somatic embryogenesis–-Somaclonal & gametoclonal variation – synthetic seed technology-Cell and protoplast cultures and haploid production: Single cell and cell suspension culture-Anther culture and pollen culture.

Immobilization: **Bioreactors:** Immobilized cells; Bioseparations: Downstream Processing. Important products through fermentation, bakers yeast, biosurfactants, biopesticides, biopolymers. cryopreservation

Transgenic plants–Pest resistance, herbicidal resistance, Disease resistant, abiotic and biotic stress tolerant, in improving crop yield, Virus and Bacteria based transient gene expression systems. Virus induced gene complementation, Cytoplasmic male sterility and fertility restoration, terminator Seed technology, antisense technology for delayed fruit ripening, Plants as factories for useful products and pharmaceuticals. GMO-Bt plants, Flavr savr tomato, Golden rice, edible vaccine, bio fortification – ethical issues.

Intellectual Property Rights: Intellectual Property Rights–Introduction, Kinds of Intellectual Property Rights - Patents, Trademarks, Copyrights, Trade Secrets. Need for intellectual property right, Advantages and Disadvantages of IPR. International Regime Relating to IPR – TRIPS, WIPO, WTO, GATTS. IPR in India genesis and development. Geographical Indication – introduction, types. Patent filing procedure for ordinary application.

Bioinformatics: Genomics, Proteomics, Metabolomics, Pharmacogenomics. Database –sequence and structural database(NCBI), DNA (Genbank, EMBL, DDBJ) protein database (Swissport, prosite). Protein prediction, molecular visualization of proteins (RASMOL), phylogenetic analysis, drug targeting, drug discovery, nanotechnology, Rice genome project.

UNIT-10 Environmental Biology and Evolution

Ecosystem structure and function; energy flow and mineral cycling (C, N, P): terrestrial and aquatic.

Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. The Environment: Physical environment; biotic environment; biotic and abiotic interactions. Species Interactions-Ecological Succession-Population Ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and K selection); the concept of metapopulation – demes and dispersal, intergenic extinctions, age-structured populations. Food chain and food web, energy flow, laws of thermodynamics. Productivity – primary and secondary productivity – GPP & BPP. Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.

Energy resources; renewable and non-renewable. Environment Deterioration: Pollution – types and control-Climate change-Green house effect and global warming, ozone depletion and acid rain. Waste management–Solid and e-waste, recycling of wastes. Bioremediation- types. Eco- restoration/remediation ecological foot prints-carbon foot print-ecolabeling-environmental auditing.

Phytogeography: Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India. Phytogeographical Zones-Vegetation types of India and Tamil Nadu, Distribution: Continuous, Discontinuous and Endemism. Theories of discontinuous distribution: Continental drift, Age and area hypothesis. Geographical Information System (GIS) Principles of remote sensing and its applications. Biodiversity And Conservation – Hot spots – Threats to biodiversity–endangered and endemic plant species of India, Red list categories of IUCN, conservation–in situ and ex situ methods.

EVOLUTION

Origin of universe – big bang theory- origin of life – origin of species–Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism. The emergence of evolutionary thoughts: Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis. Speciation, Allopatricity and Sympatricity, Convengent evolution, Co-evolution, the evolutionary time scale.

Code No: 05

SUBJECT: BUSINESS ADMINISTRATION

SYLLABUS

UNIT – 1 :

Evolution of management thought: Systems and contingency approach for understanding organizations; Managerial processes, functions, skills and roles in an organization; Social Responsibility of Business; Understanding and Managing individual behaviour; Personality; Perceptions; Attitudes; Learning; Decision-making; Management by Objectives; Understanding and managing group processes–interpersonal and group dynamics; Applications of Emotional Intelligence in organizations. Leadership and influence process; Work Motivation. Understanding arid Managing organizational system—Organizational design and structure, Work stress, Organizational Change and development; Conflict Management; Stress Management.

UNIT – 2 :

Nature, components and determinants of business environment, dynamics of business environment, key indicators; Risk in business environment, Assessing business environment–country risk and political risk. Current state of business environment in India–Economic reforms–Liberalization, privatization, globalization, industrial policy and industrialization trends, public enterprise reforms and disinvestment programme; competitive environment; financial environment. India's current balance of payment position, globalization trends, Trade reforms & trends, FIJI poky & trends, India's share in world economy. Trends in global trade & investment; Nature & operations of multilateral economic institutions–World Bank, WTO, IMF and their impact on Indian business environment. Factors of global competitiveness. Strategic management process and Evaluation.

UNIT – 3 :

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 Break even Point & Indifference Level.

UNIT – 4 :

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 – 5 :

Nature, scope and concept of marketing, Corporate orientations towards the marketplace; TheMarketing environment and Environment scanning; Marketing information system and Marketing research; Understanding consumer and Industrial markets; Market segmentation, Targeting and positioning; Product decisions — product mix, product life cycle, new product development, branding and packaging decisions; Pricing methods and strategies; Promotion decisions — promotion mix, advertising, sales promotion, publicity and personal selling; Channel management–Evaluation and control of marketing efforts; Ethics in Marketing; New issues in marketing–Globalization, Consumerism, Green Marketing, Direct Marketing, Network Marketing, Event Marketing.

UNIT – 6 :

Concepts and Perspectives on Human Resource Management; Human Resources Management in a changing environment; Corporate objectives and Human Resource Planning; Career and succession planning; job analysis; Methods of manpower search; Attracting, Selecting and retaining human resources; Induction and socialization; Manpower training and development; Performance appraisal and potential evaluation; Job evaluation andcompensation;

Employee welfare; Industrial relations & trade unions; Dispute resolution & grievance management, Employee empowerment.

UNIT – 7 :

Nature and Scope of Production and Operations Management; Facility Location; Types of Manufacturing Systems and Layouts; Layout Planning and Analysis; Material Handling : Principles & Equipments; Line Balancing; Production Planning and Control in Mass Production, in Batch and Job Order manufacturing; Capacity Planning; Product Planning and Selection, Process Planning, Aggregate Planning and Master Production Scheduling; Maintenance Management, Work Study : Method Study and Work Measurement, Material Management; An Overview of Material Management, Material Requirement Planning and Inventory Control; JIT; Purchase Management; Stores Management; Quality Assurance : Acceptance Sampling, Statistical Quality Control, Total Quality Management.

UNIT – 8 :

Computers: An introduction; Computes in business; Elements of computer system set-up; Indian computing environment; components of a computer system; Software Packages–An Introduction–Disk Operating System and Windows; Introduction to Word Processor. Introduction to a spreadsheet software; Creation of spreadsheet applications; Range, Formulas, Functions, Data Base Functions in spreadsheet; Graphics on Spreadsheet; Data Files- Types/Organization; Master & Transaction File; Relevance of Data Base Management; Systems and Integration of Applications; Basics of Data Processing; Data Hierarchy & Data File Structures. Network Fundamentals, Analog and Digital Signals, Band width, Network Topology, Network Applications.

UNIT – 9 :

Significance of Entrepreneur in Economic Development; Economic, Social and psychologicalneed for entrepreneurship; Characteristics, qualities and pre – requisites of entrepreneur; The function of the entrepreneur in economic development of a Country; Methods and procedures to start and expand one's own business; Life cycle of new business and relationship with large enterprises; Achievement motivation; Environmental Factors affecting success of a new business; Reasons for the failure and visible problems for business-Feasibility Study – Preparation of Feasibility Reports : Selection of factory location, Demand Analysis, Market potential measurement, Capital saving and project costing, Working capital requirements, profit and tax planning; Economic, Technical, Financial and Managerial Feasibility of Project. Government support to new enterprise; Incentives; source of Finance; Role of Government and Promotional agencies in entrepreneurship development.

UNIT – 10 :

Nature and Scope of Research Methodology, Problem, Formulation and Statement of Research Objectives; Value and Cost of Information; Bayesian Decision Theory; Research Process; Research Designs–Exploratory, Descriptive and Experimental; Methods of Data Collection — Observational and Survey Methods; Questionnaire and Interviews. Attitude Measurement Techniques; Administration of Surveys; Sample Design; Selecting an Appropriate Statistical Technique. Field Work and Tabulation of Data; Analysis of Data.

Code No.06

SUBJECT : CHEMISTRY

SYLLABUS

UNIT 1

Inorganic Chemistry

- Chemical periodicity
- Structure and bonding in homo–and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
- Concepts of acids and bases, Hard-Soft acid base concept, Buffer Solutions Non-aqueous solvents.
- Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
- Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
- Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
- Organometallic compounds: synthesis, bonding and structure, and reactivity.
- Organometallics in homogeneous catalysis Cages and metal clusters.

UNIT 2

- Analytical chemistry–separation, spectroscopic, electro-and thermo analytical methods.
- Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron–transfer reactions; nitrogen fixation, metal complexes in medicine.
- Characterization of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.
- Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

UNIT 3

Physical Chemistry:

- Basic principles of quantum mechanics: Postulates; operator algebra; exactly- solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.
- Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.
- Atomic structure and spectroscopy; term symbols; many-electron systems and anti-symmetry principle.
- Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π-electron systems.
- Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.

UNIT 4

- Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities–selection rules; basic principles of magnetic resonance.
- Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.

- Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities-calculations for model systems.

UNIT 5

Physical Chemistry Continuation

- Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye Huckel theory; electrolytic conductance – Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.
- Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.
- Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.

UNIT 6

- Solid state: Crystal structures; Bragg's law and applications; band structure of solids.
- Polymer chemistry: Molar masses; kinetics of polymerization.
- Data analysis: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.

UNIT 7

Organic Chemistry

- IUPAC nomenclature of organic molecules including regio-and stereo isomers.
- Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereo selectivity, enantioselectivity, diastereoselectivity and asymmetric induction.
- Aromaticity: Benzenoid and non-benzenoid compounds–generation and reactions.
- Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.
- Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.
- Common named reactions and rearrangements–applications in organic synthesis.
- Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, region and stereoselective transformations.
- Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.

UNIT 8

- Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.
- Pericyclic reactions– electro cyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.
- Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).
- Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.
- Structure determination of organic compounds by IR, UV-Vis, ^{1}H&^{13} C-NMR and Mass spectroscopic techniques.

- Chemistry uses in medicine or medical technology
- Chemical applications to human health.
- Applications of surface tension
- Composition of food dye.

UNIT 9

Interdisciplinary topics

- Chemistry in nanoscience and technology.
- Catalysis and green chemistry.

UNIT 10

- Medicinal chemistry.
- Supramolecular chemistry.
- Environmental chemistry.

Code No: 07

SUBJECT: COMMERCE

SYLLABUS

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).
- 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, Costs and benefits of FDI to home and host countries; Trends in FDI; India's FDI policy.
- Balance of payments (BOP): Importance and components of BOP.
- 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 Organization (WTO): Functions and objectives of WTO; Agriculture Agreement; GATS; TRIPS; TRIMS.

Unit–2:

Accounting and Auditing

- 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.
- Auditing: Independent financial audit; Vouching; Verification ad valuation of assets and liabilities; Audit of financial statements and audit report; Cost audit.
- Recent Trends in Auditing: Management audit; Energy audit; Environment audit; Systems audit; Safety audit.

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

Unit – 5 :

Business Statistics and Research Methods

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

Unit – 6 :

Business Management and Human Resource Management

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

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.
- Insurance: Types of insurance- Life and Non-life insurance; Risk classification and management; Factors limiting the insurability of risk; Re-insurance; Regulatory framework of insurance - IRDA and its role.

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.
- Logistics management.

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.
- International Taxation: Double taxation and its avoidance mechanism; Transfer pricing.
- Corporate Tax Planning: Concepts and significance of corporate tax planning; Tax avoidance versus tax evasion; Techniques of corporate tax planning; Tax considerations in specific business situations: Make or buy decisions; Own or lease an asset; Retain; Renewal or replacement of asset; Shut down or continue operations.
- Deduction and collection of tax at source; Advance payment of tax; E-filing of income-tax returns.
- Income-tax: Basic concepts–Residential status and tax incidence–Exempted incomes; Agricultural income–Computation of taxable income under Salaries, House property, Capital gains, Profits and gains of business and profession and Income from other sources – Gross total income – Deductions from Gross total income–Clubbing of incomes–Set off and carry forward of losses–Assessment of Individuals.

- Deduction and collection of tax at source–Advance payment of tax–E-filing of income-tax returns.
- Tax planning, Tax avoidance and Tax evasion – Techniques of corporate tax planning and specific management decisions: Make or buy, Own or lease, Retain or replace, Shut down or continue.
- International Taxation: Transfer pricing and anti-avoidance measures – Non-resident taxation – Double taxation relief – Application and interpretation of tax treaties.

Code No:08

SUBJECT: COMPUTER SCIENCE /

COMPUTER APPLICATIONS

SYLLABUS

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.

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, ConcurrencyControl 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.

Unit – 4 :

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.

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 – 5:

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), Adoptive 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 Modeling; Requirement Review, Software Requirement 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 Testing; 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–6 :

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 – 7 :

Theory of Computation and Compilers

Theory of Computation: Formal Language, Non-Computational Problems, Diagonal Argument, Russel'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 – 8 :

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 – 9 :

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 Pragmatics.

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, Hop field Network.

Security and Cryptography

Network Security: Security Attacks, Security Services, Security Algorithm, Stream cipher and Block cipher, Traditional Block Cipher Structure, Symmetric and Asymmetric-key, Malwares, Cryptography and Steganography.

Cryptosystem: Secret-Key Algorithms, DES, Triple DES, AES, IDEA, Blowfish, RC5. Public- key Cryptosystem: RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography Message Authentication and Hash functions, Hash and Mac Algorithm Digital Signatures: Elgamal Digital Signature Scheme, Schnorr Digital Signature Scheme NIST Digital Signature Algorithm, Elliptic Curve Digital Signature Algorithm, RSA-

Digital Signature Algorithm – Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption – Symmetric Key Distribution Using Asymmetric Key Encryption

Web Security: Secure Socket Layer, Secure Electronic Transaction. System Security, Intruders and Viruses, Firewalls, Password Security.

Unit–10 :

Cloud Computing and Internet of Things

Cloud Computing: Roots of Cloud Computing, Layers and Types of Cloud, Features of a cloud, Infrastructure Management, Cloud Services, Challenges and Risks. Migrating into a Cloud : Broad Approaches, Seven Step Model. Integration as a Service-Integration Methodology, SaaS, PaaS, IaaS, Public and Private Cloud; Virtualization, Virtual Server, Cloud Storage, Database Storage, Resource Management, Service Level Agreement.

Fundamentals of IOT: Enabling Technologies, IOT Architectures: oneM2M, IOT World Forum (IOTWF) and Alternative IOT models, Simplified IOT Architecture and Core IOT, Functional Stack, Fog, Edge and Cloud in IOT, Functional blocks of an IOT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

IOT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IOT-Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

Prototyping Online Components: API, Writing a New API, Real-Time Reactions, Other Protocols. Techniques for Writing Embedded Code: Memory Management, Performance and Battery Life, Libraries, Debugging.

Code No: 09

SUBJECT: COSTUME DESIGN & FASHION

SYLLABUS

UNIT – 1 :

Apparel Designing, Manufacturing and Fashion Designing

Body measurements- Importance and procedure. Pattern Making —Types; Drafting, Draping and Flat pattern making. Methods of transferring pattern markings. Grain–Importance and types; Pattern alteration- Importance and principles. Fitting- Standards of good fit. Pattern layout- Purpose and types. Pattern grading. Spreading- Requirement and methods, Marker planning, marker efficiency and methods of marker planning, Cutting-objectives and methods. Sewing machineries. Sewing federal standards for Seams and stitches.

UNIT – 2 :

Design- definition and types; Elements and Principles of design and its application to apparel. Colour theories-Prang and Munsell; Dimensions of colour; Standard colour harmonies. Fashion-Terminologies; Fashion cycle - Length of fashion cycles; Adoption of Fashion theories- Trickle down, trickle up and trickle across. Fashion forecasting–Need and techniques; Factors affecting fashion; Selection of clothing for different age groups.

UNIT – 3 :

Textile Science and Textile Processing

Fibre—Definition, Classification, Identification, Manufacturing process of major natural and man made fibres, properties and their end uses. High performance fibers. Yarns—Definition and types. Spinning—Definition and classification; Chemical and Mechanical spinning; blending, opening, cleaning, doubling, carding, combing, drawing, roving, spinning. Different methods of fabric construction - Weaving- Mechanism, Parts and Functions of a simple loom; Classification of looms – Shuttle and shuttle less. Types of weaves. Knitting - Warp and Weft knitting. Non-woven–Definition and types-Web formation–Application and end uses. Developments in spinning, weaving, knitting and non-woven's.

UNIT – 4 :

Preparatory Processes: Desizing, Scouring and Bleaching- need and methods. Mercerizing and Degumming processes. Dyeing: Classification of dyes- Direct Vat, Sulphur, Napthol, Reactive, Acid, Basic and Disperse dyes. Stages of dyeing. Natural dyeing-Sources, extraction, Mordants- definition, need, types, Mordanting techniques, Dyeing procedure. Printing: Direct, discharge and resist styles. After treatment of printed fabrics. Digital Printing. Finishing- Definition and classification. Basic finishes. Special finishes- Antimicrobial, UV protection, Water repellent, fragrance, flame retardant and crease resistance. Plasma, Microencapsulation and Nano finishing techniques. Recent developments in Dyeing, Printing and Finishing.

UNIT – 5 :

Textile Testing and Technical textiles

Selection of samples for testing. Standard R H and temperature for testing. Fiber testing- Fiber length, Fineness, Maturity, Strength, Determination of trash and lint in cotton. Yarn Testing- Yarn numbering system, Yarn count, Strength, Twist, Evenness, Hairiness. Fabric testing- Fabric Particulars –length, width, crimp, GSM, Cover factor, Fabric thickness, Fabric Strength–Tensile, tearing, Bursting strength, Fabric Abrasion, Fabric Pilling, Fabric drape, Fabric Stiffness, Fabric crease resistance and crease recovery measurements, Absorbency, Wicking, Shrinkage. Garment testing-Seam strength and seam slippage. Colour fastness–Crocking, perspiration, sunlight, laundering, pressing and dry-cleaning. Computer colour matching. Evaluation of antimicrobial activity, comfort properties. Standards for various tests.

UNIT – 6 :

Technical Textiles**-** Definition and scope, Classification and application of technical textiles–Mobile Tech, Sport Tech, Agro Tech, Pack Tech, Geo Tech, Med Tech, Build tech, Home textiles, Protective textiles, Smart and Intelligent textiles -Functions, Fibers used, Properties of fibres and areas of application. Latest trends in technical textiles. Testing of technical textiles.

UNIT – 7 :

Sustainable Textiles and fashion

Sustainable textiles — definition and importance, Corporate Social Responsibility in the textile and clothing sector, Environmental Management Systems. Sustainability in Dyeing, Finishing, Processing-Enzymatic processing, Ecofriendly textile fibres. Sustainable Fashion — meaning and significance; Environmental concerns related to fashion; Linear fashion and circular fashion.

UNIT – 8 :

4R's in sustainability —Repair, Recycle, Reuse and Reduce. Moving towards sustainable fashion–Eco fashion, Zero waste designing upcycling & recycling, Slow fashion; Environmental impact of fast fashion. Terminologies related to sustainable fashion- Sustainable clothing, Eco design, Eco label, Eco mark, Green washing, Zero waste design, Green consumer.

UNIT – 9 :

Quality Control and Management

Definition and scope of Quality control, Apparel Quality testing –Quality standards and specification, Quality parameters and defects of fabrics and garments. Inspection – Incoming and raw material inspection: Fabric inspection — 4-point system. In process / on-line inspection during spreading, pattern making, cutting, sewing and ironing. Final inspection: Sampling plans and AQL charts—Level of final inspection. Packing & packaging quality tests. Care labelling.

UNIT – 10 :

Quality management-Basic concepts of Total Quality Management (TQM) —Principles of TQM—Quality Trilogy—Four pillars of TQM—PDCA cycle & PDSA cycle—Kaizan concept—5"S Philosophy—Quality circles. Application of seven QC tools in apparel industry. Quality Standards–Definition of a standard, benefits of standards. Understanding of ISO 9001:2000 standards.

Code No : 10

SUBJECT : DEFENCE STUDIES

SYLLABUS

UNIT- 1

THEORIES AND CONCEPTS

1. Defence and Strategic Studies : Assumptions and Approaches.
2. The Concepts of Nation:
    - State and Nation – State, Theories and Elements of State
    - National Power and its Components
3. Key Concepts of National Security: Defining National Security, National Defence and National Interest, National Character and Evolution-of the National Security concept in the 20th Century and Beyond.
4. National Security Concerns of Major Powers, Middle Powers and Small Powers
5. National Security Structures: Armed Forces, Intelligence Agencies, Police Forces, Decision-Making Structures, etc.
6. National Security Environment: Internal and External
7. Defence, Foreign, Security and Domestic Policies; Concept formulation, objectives and linkages.
8. Military Alliances and Pacts, Peace Treaties, Defence Cooperation, Strategic Partnership and Security Dialogue.
9. Non – Alignment, Balance of Power, Collective Security and Balance of Terror – Concept, Development and Relevance.
10. Deterrence and Détente: Concept and contemporary relevance.

UNIT – 2

STRATEGIC THOUGHT

1. Contribution of Sun Tzu,
2. Kautilya,
3. Machiavelli,
4. Jomini,
5. Carl von Clausewitz,
6. General Giulio Douhet
7. W.Mitchell,
8. J.F.C.Fuller,
9. Capt.B.H.Liddell Hart,
10. Marx, Lenin, Mao Zedong and Che Guevara.
11. Nuclear Deterrence: Andre Beaufre, Henry Kissinger and K. Subrahmanyam.
12. Thoughts of Gandhi and Nehru on Peace, Security and Development.

UNIT – 3

WAR AS AN INSTRUMENT IN INTERNATIONAL RELATIONS

1. Theories and causes of War.
2. Principles of War.
3. Contemporary Warfare : Conventional Warfare in Nuclear age, Limited War, Revolutionary Warfare, Low Intensity Operations, Guerilla Warfare, Insurgency and Counter – Insurgency.
4. Armaments : Arms Race, Arms Aid, Arms Trade, Arms Proliferation, Proliferation of Small Arms
5. Military Alliances and Pacts, Peace Treaties, Defence Cooperation, Strategic Partnership and Security Dialogue.
6. Terrorism : Concept and kinds (National, International and Cross border).
7. Conflicting Ideologies : Militarism, Nationalism, Fundamentalism, Separatism, Irredentism.
8. Concept and Elements of Deterrence: Nuclear & Conventional.
9. Evolution of Global Nuclear Doctrines
10. Democratic Peace Theory

UNIT – 4

WMD, NUCLEAR PROLIFERATION AND NATIONAL SECURITY

1. Basic Concepts and Theory
    - I. Concepts of Disarmament & Arms Control
    - II. Objectives and Conditions of Disarmament
    - III. Elements of Arms Control Mechanisms: Agreements, verification, inspection, control.
    - IV. Approaches to Disarmament & Arms Control
2. Historical Survey of Disarmament Efforts:
    - I. Under the League of Nations
    - II. Under the United Nations
    - III. Unilateral, Bilateral and Multilateral approaches
    - IV. Role of Non-aligned Nations in Disarmament Negotiations
3. Weapons of Mass Destruction: Nuclear, Chemical & Biological Weapons.
4. Nuclear Arms Limitation Nuclear Arms Control Treaties.
5. Chemical weapons Convention and Biological Weapons Convention
6. Concept of Non-proliferation, NPT, CTBT, PTBT, MTCR, FMCT & other treaties
7. Nuclear Export Control Regimes
8. New Challenges and Responses–Missile Defense, Cooperative Threat Reduction and G-7 Global Partnership
9. Disarmament & Arms Control and Economic Development
10. Terrorism and Nuclear Proliferation.
11. Concept of Star Wars and NMD

UNIT – 5

GLOBAL SECURITY CONCERNS

1. End of cold war and emergence of new world order.
2. Proliferation of Military, Nuclear and missile capabilities
3. Environmental Issues : Climate change and Global Warming, Desertification, Acid Rains, Industrial Pollution, Deforestation
4. Organized Crimes : Money Laundering, Narco – trafficking, Human Trafficking and small arms proliferation.
5. Migrants and Refugees: (a) Causes (b) Illegal migration and border management (c) Problem in South Asia (d) Role of International Committee of Red Cross and UN High Commission for Refugees.
6. Global Security Concerns: Palestinian-Israeli conflict & Arab Spring, Developments in Central Asian Republics (CARs), Rise of Fundamentalism, Challenges in Korean Peninsula, Taiwan and Power Rivalry in South China Sea.
7. Problem of System of Governance and Human Rights
8. Food Security, Energy Security and Water Security problems in modern era.
9. Millennium Development Goals.

UNIT – 6

INDIA'S SECURITY CONCERNS & POLICIES IN CONTEMPORARY INTERNATIONAL SCENARIO

1. Genesis of Sino-Indian Relations
2. The Boundary Dispute, Sino- Pakistan Nexus, OBOR and CPEC, China and India–Military Balance, Chinese Policy towards South Asia.
3. Rise of India and China: Cooperation and Competition, Chinese Interests in Indian Ocean and South China Sea
4. Strategic Dimension of India- Pakistan Relations: Genesis of India-Pakistan Conflict, Indo-Pak Military balance, The Kashmir Question, Pakistan Sponsored Terrorism, Pakistan's Nuclear Strategy, The Powers Structure of Pakistan, Contentious. Issues: Siachin, Sir Creek, River Waters, etc.
5. India and South Asia: Issues and Challenges for Regional Cooperation.
6. Making of India's Defence Policy since Independence: (a) Threat perception, assessment and preparedness (b) Political and military lessons of 1948,1962, 1965, 1971, 1999 wars (c) Future trends
7. India's Look East and Act East Policies, Indo–Pacific Cooperation, Strategic Partnerships.
8. India's maritime security and strategy in 21st century: (a) Indian Ocean (b) Asia-Pacific region(c) Security of Sea Lanes, India's Maritime Strategy for the 21st Century.
9. India's Defence Doctrines and Strategies including Nuclear Doctrine
10. Higher Defence Organization of India.

UNIT – 7

ISSUES IN CONFLICT RESOLUTION

1. Origin, Type and Structure of Conflict.
2. Ideologies and International conflicts.
3. Role of United Nations in Conflict Management and Re – Structuring of UNO
4. Techniques of Conflict Prevention
5. Conflict Management : Pacific Solutions of International Disputes, Coercive methods.

6. International Humanitarian Laws and Laws of Armed Conflicts.
7. Confidence Building Measures : Concept, kinds and utility.
8. IGOs & NGOs in Conflict Resolution: Peace Making, Peace Keeping and Peace Building.
9. Gandhian Philosophy on Peace and Non-violence
10. Nehruvian approach to National Security and Cooperation

UNIT – 8

DISASTER MANAGEMENT AND NATIONAL SECURITY

1. Basic Concept & meaning of Disaster, Introduction to terminologies associated with Disaster and National Security: Natural and Manmade, Vulnerability, Risk etc., Identifying various types of Disasters.
2. Natural Disaster and Human Induced Disaster: Floods, Cyclone, Earthquake, Tsunami–WMD Disaster–Disaster associated with various industries
3. Study of Disaster in India / Around the World: Case Studies: Tsunami 2004, Bhopal Gas Tragedy, Chernobyl, Fukushima, Uttarakhand etc.
4. Disaster Management: Meaning, Association and Distinction with related concepts like Disaster Mitigation, Response and Recovery, Relief, and Reconstruction
5. Institutional Mechanism for Disaster Management in India: Role of Armed Forces, Central and State Governments, NGO, National Disaster Management Authority, Indian National Centre for Ocean Information Services.

UNIT – 9

DEFENCE ECONOMICS

1. Economic Theories of Defence.
2. Sustainable Development: Challenges & Responses.
3. Basics of Defence Planning, Determinants of Defence Expenditure.
4. Defence Budgeting.
5. Economic Causes of War.
6. Economic Warfare in modern times.
7. Economic Problems of Post War reconstruction.
8. National Security and International Trade regimes (WTO, TRIPS, TRIMS, FTA's NAFTA, SAPTA & NSG).
9. India's role in Regional and Global Economic Forums and Organizations.
10. Geo-economics and its Implications for global / regional economic stability

UNIT –10

SCIENCE & TECHNOLOGY AND NATIONAL SECURITY

1. Broad Survey of Technological Changes from Industrial Revolution to Information Revolution.
2. India's Civil Nuclear and Space Programs, India's Energy Scenario.
3. Research and Development :
    - Relevance of Science and Technology in National Security.
    - Impact of Information Technology; Revolution in Military Affairs (RMA).
    - Choice of Weapon Systems.

4. Impact of Economic Liberalization and Globalization :

- Defence Production in India (Role of DPSU's and Ordnance factories).
- Defence and Development and Peace & Development Dichotomies.

5. Issues of Mobilization of Resources during War and Peace.

6. Military Industrial Complexes.

7. Transfer of Technology: Dual use and critical technologies and their impact on national security.

8. Interdependence and Cooperation at Regional and Global levels.

9. Cyber Security: Vulnerabilities of Information technology and internet, Need and importance of cyber security, Different kinds of cyber security vulnerabilities, Cyber wars including propaganda, measures for cyber security– Technology, laws and regulations, global issues in cyber security.

10. Social Media and its Impact on National Security - Global reach with rapid speed for propaganda and indoctrinate misinformation and rumour mongering cadre recruitment and use of social networking sites for mobilizing public opinion.

Code No: 11

SUBJECT: ECONOMICS

SYLLABUS

Unit- 1:

Micro Economics

- Theory of Consumer Behaviour
- Theory of Production and Costs
- Decision making under uncertainty Attitude towards Risk
- Game Theory – Non Cooperative games
- Market Structures, competitive and non-competitive equilibria and their efficiency properties
- Factor Pricing
- General Equilibrium Analysis
- Efficiency Criteria: Pareto-Optimality, Kaldor – Hicks and Wealth Maximization
- Welfare Economics: Fundamental Theorems, Social Welfare Function
- Asymmetric Information: Adverse Selection and Moral Hazard

Unit- 2:

Macro Economics

- National Income: Concepts and Measurement
- Determination of output and employment: Classical & Keynesian Approach
- Consumption Function
- Investment Function
- Multiplier and Accelerator
- Demand for Money
- Supply of Money
- IS – LM Model Approach
- Inflation and Phillips Curve Analysis
- Business Cycles
- Monetary and Fiscal Policy
- Rational Expectation Hypothesis and its critique

Unit- 3:

Statistics and Econometrics

- Probability Theory: Concepts of probability, Distributions, Moments, Central Limit theorem
- Descriptive Statistics – Measures of Central tendency & dispersions, Correlation, Index Numbers
- Sampling methods & Sampling Distribution
- Statistical Inferences, Hypothesis testing
- Linear Regression Models and their properties – BLUE

- Identification Problem
- Simultaneous Equation Models – recursive and non-recursive
- Discrete choice models
- Time Series Analysis

Unit- 4:

Mathematical Economics

- Sets, functions and continuity, sequence, series
- Differential Calculus and its Applications
- Linear Algebra – Matrices, Vector Spaces
- Static Optimization Problems and their applications
- Input-Output Model, Linear Programming
- Difference and Differential equations with applications

Unit-5 :

International Economics

- International Trade: Basic concepts and analytical tools
- Theories of International Trade
- International Trade under imperfect competition
- Balance of Payments: Composition, Equilibrium and Disequilibrium and Adjustment Mechanisms
- Exchange Rate: Concepts and Theories
- Foreign Exchange Market and Arbitrage
- Gains from Trade, Terms of Trade, Trade Multiplier
- Tariff and Non-Tariff barriers to trade; Dumping
- GATT, WTO and Regional Trade Blocks; Trade Policy Issues
- IMF & World Bank

Unit-6 :

Public Economics

- Market Failure and Remedial Measures: Asymmetric Information, Public Goods, Externality
- Regulation of Market – Collusion and Consumers' Welfare
- Public Revenue: Tax & Non-Tax Revenue, Direct & Indirect Taxes, Progressive and non-Progressive Taxation, Incidence and Effects of Taxation
- Public expenditure
- Public Debt and its management
- Public Budget and Budget Multiplier
- Fiscal Policy and its implications

Unit-7 :

Money and Banking

- Components of Money Supply
- Central Bank
- Commercial Banking
- Instruments and Working of Monetary Policy
- Non-banking Financial Institutions
- Capital Market and its Regulation

Unit-8 :

Growth and Development Economics

- Economic Growth and Economic Development
- Theories of Economic Development: Adam Smith, Ricardo, Marx, Schumpeter, Rostow, Balanced & Unbalanced growth, Big Push approach.
- Models of Economic Growth: Harrod-Domar, Solow, Robinson, Kaldor
- Technical progress – Disembodied & embodied; endogenous growth
- Indicators of Economic Development: PQLI, HDI, SDGs
- Poverty and Inequalities – Concepts and Measurement
- Social Sector Development: Health, Education, Gender

Unit-9 :

Environmental Economics and Demography

- Environment as a Public Good
- Market Failure
- Coase Theorem
- Cost-Benefit Analysis and Compensation Criteria
- Valuation of Environmental Goods
- Theories of Population
- Concepts and Measures: Fertility, Morbidity, Mortality
- Age Structure, Demographic Dividend
- Life Table
- Migration

Unit-10 :

Indian Economy

- Economic Growth in India: Pattern and Structure
- Agriculture: Pattern & Structure of Growth, Major Challenges, Policy Responses
- Industry: Pattern & Structure of Growth, Major Challenges, Policy Responses
- Services: Pattern & Structure of Growth, Major Challenges, Policy Responses

- Rural Development – Issues, Challenges & Policy Responses
- Urban Development – Issues, Challenges and Policy Responses.
- Foreign Trade: Structure and Direction, BOP, Flow of Foreign Capital, Trade Policies
- Infrastructure Development: Physical and Social; Public-Private Partnerships
- Reforms in Land, Labour and Capital Markets
- Centre-State Financial Relations and Finance Commissions of India; FRBM
- Poverty, Inequality & Unemployment

Code No : 12

SUBJECT: EDUCATION

SYLLABUS

Unit 1:

Educational Studies

a) Contribution of Indian Schools of philosophy (Sankhya Yoga, Vedanta, Buddhism, Jainism) with special reference to Vidya, Dayan and Darshan; and Islamic traditions towards educational aims and methods of acquiring valid knowledge.

b) Contribution of Western schools of thoughts (Idealism, Realism, Naturalism, Pragmatism, Marxism, Existentialism) and their contribution to Education with special reference to information, knowledge and wisdom.

c) Approaches to Sociology of Education (symbolic Interaction, Structural Functionalism and Conflict Theory). Concept and types of social Institutions and their functions (family, school and society), Concept of Social Movements, Theories of Social Movements (Relative Deprivation, Resource Mobilization, Political Process Theory and New Social Movement Theory).

d) Socialization and education- education and culture; Contribution of thinkers (Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhi, Aurobindo, J.Krishnamurthy, Paulo Freire, Wollstonecraft, Nel Noddings and Savitribai Phule) to the development of educational thought for social change, National Values as enshrined in the Indian Constitution–Socialism, Secularism, justice, liberty, democracy, equality, freedom with special reference to education.

Unit 2:

History, Politics and Economics of Education

a) Committees and Commissions' Contribution to Teacher Education Secondary Education Commission (1953), Kothari Education Commission (1964-66), National Policy of Education (1986,1992), National Commission on Teachers (1999), National Curriculum Framework 2005, National Knowledge Commission (2007), Yashpal Committee Report (2009), National Curriculum Framework for Teacher Education (2009), Justice Verma Committee Report (2012).

b) Relationship between Policies and Education, Linkage between Educational Policy and National Development, Determinants of Educational Policy and Process of Policy formulation: Analysis of the existing situation, generation of policy options, evaluation of policy options, making the policy decision, planning of policy implementation, policy impact assessment and subsequent policy cycles.

c) Concept of Economics of Education: Cost Benefit Analysis Vs Cost Effective Analysis in Education, Economic returns to Higher Education Signaling Theory Vs Human Capital Theory, Concept of Educational Finance; Educational finance at Micro and Macro Levels, Concept of Budgeting.

d) Relationship Between Politics and Education, Perspectives of Politics of Education Liberal, Conservative and Critical, Approaches to understanding Politics (Behaviouralism, Theory of Systems Analysis and Theory of Rational Choice), Education for Political Development and Political Socialization.

Unit 3:

Learner and Learning Process

a) Growth and Development: Concept and principles, Cognitive Processes and stages of Cognitive Development, Personality: Definitions and theories (Freud, Carl Rogers, Gordon Allport, Max Wertheimer, Kurt Koffka), Mental health and Mental hygiene.

b) Approaches to Intelligence from Unitary to Multiple: Concepts of Social intelligence, multiple intelligence, emotional intelligence Theories of Intelligence by Sternberg, Gardner, Assessment of Intelligence, Concepts of Problem Solving, Critical thinking, Metacognition and Creativity.

c) Principles and Theories of learning: Behaviouristic, Cognitive and Social theories of learning, Factors affecting social learning, social competence, Concept of social cognition, understanding social relationship and socialization goals.

d) Guidance and Counselling: Nature, Principles and Need, Types of guidance (educational, vocational, personal, health and social & Directive, Non-directive and Eclectic), Approaches to counselling – Cognitive-Behavioural (Albert Ellis – REBT) & Humanistic, Person- centred Counselling (Carl Rogers)–Theories of Counselling (Behaviouristic, Rational, Emotive and Reality).

Unit 4:

Teacher Education

a) Meaning, Nature and Scope of Teacher Education; Types of Teacher Education Programs, The Structure of Teacher Education Curriculum and its Vision in Curriculum Documents of NCERT and NCTE at Elementary, Secondary and Higher Secondary Levels, Organization of Components of Pre-service Teacher Education Transactional Approaches (for foundation courses) Expository, Collaborative and Experiential learning.

b) Understanding Knowledge base of Teacher Education from the view point of Schulman, Deng and Luke & Habermas, Meaning of Reflective Teaching and Strategies for Promoting Reflective Teaching, Models of Teacher Education–Behaviouristic, Competency-based and Inquiry Oriented Teacher Education Models.

c) Concept, Need, Purpose and Scope of In-service Teacher Education, Organization and Modes of In-service Teacher Education, Agencies and Institutions of In-service Teacher Education at District, State and National Levels (SSA, RMSA, SCERT, NCERT, NCTE and UGC), Preliminary Consideration in Planning in-service teacher education programme (Purpose, Duration, Resources and Budget).

d) Concept of Profession and Professionalism, Teaching as a Profession, Professional Ethics of Teachers, Personal and Contextual factors affecting Teacher Development, ICT Integration, Quality Enhancement for Professionalization of Teacher Education, Innovation in Teacher Education.

Unit 5:

Curriculum Studies

a) Concept and Principles of Curriculum, Strategies of Curriculum Development, Stages in the Process of Curriculum development, Foundations of Curriculum Planning–Philosophical Bases (National, democratic), Sociological basis (socio cultural reconstruction), Psychological Bases (learner's needs and interests), Bench marking and Role of National level Statutory Bodies–UGC, NCTE and University in Curriculum Development.

b) Models of Curriculum Design: Traditional and Contemporary Models (Academic / Discipline Based Model, Competency Based Model, Social Functions / Activities Model [social reconstruction], Individual Needs & Interests Model, Outcome Based Integrative Model, Intervention Model, C I P P Model (Context, Input, Process, Product Model).

c) Instructional System, Instructional Media, Instructional Techniques and Material in enhancing curriculum Transaction, Approaches to Evaluation of Curriculum: Approaches to Curriculum and Instruction (Academic and Competency Based Approaches), Models of Curriculum Evaluation: Tyler's Model, Stake's Model, Scriven's Model, Kirkpatrick's Model.

d) Meaning and types of Curriculum change, Factors affecting curriculum change, Approaches to curriculum change, Role of students, teachers and educational administrators in curriculum change and improvement, Scope of curriculum research and Types of Research in Curriculum Studies.

Unit 6:

Research in Education

a) Meaning and Scope of Educational Research, Meaning and steps of Scientific Method, Characteristics of Scientific Method (Replicability, Precision, Falsifiability and Parsimony), Types of Scientific Method (Exploratory, Explanatory and Descriptive), Aims of research as a scientific activity: Problem-solving, Theory Building and Prediction, Types of research (Fundamental, Applied and Action), Approaches to educational research (Quantitative and Qualitative), Designs in educational research (Descriptive, Experimental and Historical).

b) Variables: Meaning of Concepts, Constructs and Variables, Types of Variables (Independent, Dependent, Extraneous, Intervening and Moderator), Hypotheses–Concept, Sources, Types (Research, Directional, Non-directional, Null), Formulating Hypothesis, Characteristics of a good hypothesis, Steps of Writing a Research Proposal, Concept of Universe and Sample, Characteristics of a good Sample, Techniques of Sampling (Probability and Non-probability Sampling), Tools of Research–Validity, Reliability and Standardisation of a Tool, Types of Tools (Rating scale, Attitude scale, Questionnaire, Aptitude test and Achievement Test, Inventory), Techniques of Research (Observation, Interview and Projective Techniques).

c) Types of Measurement Scale (Nominal, Ordinal, Interval and Ratio), Quantitative Data Analysis–Descriptive data analysis (Measures of central tendency, variability, fiduciary limits and graphical presentation of data), Testing of Hypothesis (Type I and Type II Errors), Levels of Significance, Power of a statistical test and effect size, Parametric Techniques, Non–Parametric Techniques, Conditions to be satisfied for using parametric techniques, Inferential data analysis, Use and Interpretation of statistical techniques: Correlation, t-test, z-test, ANOVA, chi-square (Equal Probability and Normal Probability Hypothesis). Qualitative Data Analysis–Data Reduction and Classification, Analytical Induction and Constant Comparison, Concept of Triangulation.

d) Qualitative Research Designs: Grounded Theory Designs (Types, characteristics, designs, Steps in conducting a GT research, Strengths and Weaknesses of GT)–Narrative Research Designs (Meaning and key Characteristics, Steps in conducting NR design), Case Study (Meaning, Characteristics, Components of a CS design, Types of CS design, Steps of conducting a CS research, Strengths and weaknesses), Ethnography (Meaning, Characteristics, Underlying assumptions, Steps of conducting ethnographic research, Writing ethnographic account, Strengths and weaknesses), Mixed Method Designs: Characteristics, Types of MM designs (Triangulation, explanatory and exploratory designs), Steps in conducting MM designs, Strengths and weaknesses of MM research.

Unit 7:

Pedagogy, Andragogy and Assessment

a) Pedagogy, Pedagogical Analysis–Concept and Stages, Critical Pedagogy- Meaning, Need and its implications in Teacher Education, Organizing Teaching: Memory Level (Herbartian Model), Understanding Level (Morrison teaching Model), Reflective Level (Bigge and Hunt teaching Model), Concept of Andragogy in Education: Meaning, Principles, Competencies of Self-directed Learning, Theory of Andragogy (Malcolm Knowles), The Dynamic Model of Learner Autonomy.

b) Assessment – Meaning, nature, perspectives (Assessment for Learning and Assessment of Learning)– Types of Assessment (Placement, formative, diagnostic, summative) Relation between objectives and outcomes, Assessment of Cognitive (Anderson and Krathwohl), Affective (Krathwohl) and psychomotor domains (R.H. Dave) of learning.

c) Assessment in Pedagogy of Education: Feedback Devices: Meaning, Types, Criteria, Guidance as a Feedback Devices: Assessment of Portfolios, Reflective Journal, Field Engagement using Rubrics, Competency Based Evaluation, Assessment of Teacher Prepared ICT Resources.

d) Assessment in Andragogy of Education–Interaction Analysis: Flander's Interaction analysis, Galloway's system of interaction analysis (Recording of Classroom Events, Construction and Interpretation of Interaction Matrix), Criteria for teacher evaluation (Product, Process and Presage criteria, Rubrics for Self and Peer evaluation (Meaning, steps of construction)).

Unit 8:

Technology in/ for Education

a) Concept of Educational Technology (ET) as a Discipline: (Information Technology, Communication Technology & Information and Communication Technology (ICT) and Instructional Technology, Applications of Educational Technology in formal, non–formal (Open and Distance Learning), informal and inclusive education systems, Overview of Behaviourist, Cognitive and Constructivist Theories and their implications to Instructional Design (Skinner, Piaget, Ausubel, Bruner, Vygotsky), Relationship between Learning Theories and Instructional Strategies (for large and small groups, formal and non formal groups).

b) Systems Approach to Instructional Design, Models of Development of Instructional Design (ADDIE, ASSURE, Dick and Carey Model Mason's), Gagne's Nine Events of Instruction and Five E's of Constructivism, Nine Elements of Constructivist Instructional Design, Application of Computers in Education: CAI, CAL, CBT, CML,

Concept, Process of preparing ODLM, Concept of e learning, Approaches to e learning (Offline, Online, Synchronous, Asynchronous, Blended learning, mobile learning).

c) Emerging Trends in e learning: Social learning (concept , use of web 2.0 tools for learning, social networking sites, blogs, chats, video conferencing, discussion forum), Open Education Resources (Creative Common, Massive Open Online Courses; Concept and application), e Inclusion–Concept of e Inclusion, Application of Assistive technology in e learning, Quality of e Learning – Measuring quality of system: Information, System, Service, User Satisfaction and Net Benefits (D&M IS Success Model, 2003), Ethical Issues for e Learner and e Teacher–Teaching, Learning and Research.

d) Use of ICT in Evaluation, Administration and Research: e portfolios, ICT for Research–Online Repositories and Online Libraries, Online and Offline assessment tools (Online survey tools or test generators) – Concept and Development.

Unit 9:

Educational Management, Administration and Leadership

a) Educational Management and Administration – Meaning, Principles, Functions and importance, Institutional building, POSDCORB, CPM, PERT, Management as a system, SWOT analysis, Taylorism, Administration as a process, Administration as a bureaucracy, Human relations approach to Administration, Organisational compliance, Organinsational development, Organisational climate.

b) Leadership in Educational Administration: Meaning and Nature, Approaches to leadership: Trait, Transformational, Transactional, Value based, Cultural, Psychodynamic and Charismatic, Models of Leadership (Blake and Mouton's Managerial Grid, Fiedler's Contingency Model, Tri-dimensional Model, Hersey and Blanchard's Model, Leader-Member Exchange Theory).

c) Concept of Quality and Quality in Education: Indian and International perspective, Evolution of Quality: Inspection, Quality Control, Quality Assurance, Total Quality Management (TQM), Six sigma, Quality Gurus: Walter Shewart, Edward Deming, C.K Prahalad.

d) Change Management: Meaning, Need for Planned change, Three-Step-Model of Change (Unfreezing, Moving, Refreezing), The Japanese Models of Change: Just-in-Time, Poka yoke, Cost of Quality: Appraisal Costs, Failure costs and Preventable costs, Cost Benefit Analysis, Cost Effective Analysis, Indian and International Quality Assurance Agencies: Objectives, Functions, Roles and Initiatives (National Assessment Accreditation Council [NAAC], Performance Indicators, Quality Council of India [QCI], International Network for Quality Assurance Agencies in Higher Education [INQAAHE].

Unit 10:

Inclusive Education

a) Inclusive Education: Concept, Principles, Scope and Target Groups (Diverse learners; Including Marginalized group and Learners with Disabilities), Evolution of the Philosophy of Inclusive Education: Special, Integrated, Inclusive Education, Legal Provisions: Policies and Legislations (National Policy of Education (1986), Programme of Action (1992), Persons with Disabilities Act (1995), National Policy of Disabilities (2006), National Curriculum Framework (2005), Concession and Facilities to Diverse Learners (Academic and Financial), Rehabilitation Council of India Act (1992), Inclusive Education under Sarva Shiksha Abhiyan (SSA), Features of UNCRPD (United Nations Convention on the Rights of Persons with Disabilities) and its Implication.

b) Concept of Impairment, Disability and Handicap, Classification of Disabilities based on ICF Model, Readiness of School and Models of Inclusion, Prevalence, Types, Characteristics and Educational Needs of Diverse learners' Intellectual, Physical and Multiple Disabilities, Causes and prevention of disabilities, Identification of Diverse Learners for Inclusion, Educational Evaluation Methods, Techniques and Tools.

c) Planning and Management of Inclusive Classrooms: Infrastructure, Human Resource and Instructional Practices, Curriculum and Curricular Adaptations for Diverse Learners, Assistive and Adaptive Technology for Diverse learners: Product (Aids and Appliances) and Process (Individualized Education Plan, Remedial Teaching), Parent- Professional Partnership: Role of Parents, Peers, Professionals, Teachers, School.

d) Barriers and Facilitators in Inclusive Education: Attitude, Social and Educational, Current Status and Ethical Issues of inclusive education in India, Research Trends of Inclusive Education in India.

Code No. 13

SUBJECT: ELECTRONICS / ELECTRONICS & COMMUNICATION

SYLLABUS

UNIT-1. Electronic Devices

Introduction to Semiconductors, energy bands in solids, concept of effective mass, density of states, Fermi levels. PN Junction, Diode equation and diode equivalent circuit, Breakdown in diodes, Zener diode, Tunnel diode, Metal semiconductor junction – Ohmic and Schottky contacts, Characteristics and equivalent circuits of JFET, MOSFET. Low dimensional semiconductor devices– quantum wells, quantum wires, quantum dots. High Electron Mobility Transistor (HEMT), Solar cells, I-V characteristics, fill factor and efficiency, LED, LCD and flexible display devices. Photodetectors and Optical fiber devices.

UNIT-2. IC Fabrication Technology

IC fabrication – crystal growth, epitaxy, oxidation, lithography, doping, etching, isolation methods, metallization, bonding, Thin film deposition and characterization Techniques: XRD, SEM, TEM, EDX, Thin film active and passive devices, MOS technology and VLSI, scaling of MOS devices, NMOS and CMOS structures and fabrication, Characteristics of MOS transistors and threshold voltage, NMOS and CMOS inverters, Charge-Coupled Devices (CCD) – structure, charge storage and transfer, Basics of VLSI design, stick diagrams, Layout design rules.

UNIT-3. Network Theorems and AC Circuits

Superposition, Thevenin, Norton and Maximum Power Transfer Theorems, Network elements, Network graphs, Nodal and Mesh analysis. Laplace Transform, Fourier Transform and Z-transform. Time and frequency domain response, Passive filters,Two-port Network Parameters: Z,Y, ABCD and h-parameters, Transfer functions, Signal representation, State variable method of circuit analysis, AC circuit analysis, Transient analysis, Zero and Poles, Bode Plots. Continuous time signals, Fourier Series and Fourier transform representations, Sampling theorem and applications, Discrete time signal, Discrete Fourier transform (DFT), Fast Fourier transform (FFT), Basic concepts of digital signal processing, digital filters– IIR, FIR.

UNIT– 4. Amplifiers , Oscillators and wave shaping Circuits

Rectifiers, Voltage regulated ICs and regulated power supply, Biasing of Bipolar junction transistors and FETs, operating point and stability, Amplifiers, Classifiction of amplifiers, Concept feed back, Hartley, Colpitt's and Phase Shift oscillators, Operational amplifiers (OPAMP)–characteristics, computational applications, comparators, Schmitt trigger, Instrumentation amplifiers, wave shaping circuits, Phase locked loops, Active filters, Multivibrators, Voltage to frequency convertors (V/F), frequency to voltage convertors(F/V).

UNIT-5. Logic Families

Logic Families, Logic Gates, Boolean algebra and minimization techniques, Combinational circuits, Programmable Logic Devices (PLD), CPLD, flip-flops, memories, Sequential Circuits: Counters – Ring, Ripple, Synchronous, Asynchronous, Shift registers, multiplexers and de-multiplexers, A/D and D/A converters, Analysis and Design of fundamental mode state machines: State variables and State diagram. Sequential PLD, FPGA, Analysis and Design of digital circuits using HDL.

UNIT-6. Microprocessor, Microcontroller and Interfacing

Introduction of Microprocessor 8085 and 8086: Architecture, Addressing modes, instruction set, interrupts, Programming, Memory and I/O interfacing. Introduction of Microcontrollers – 8051 for embedded systems, Architecture and register **s**et of Microcontroller 8051, Addressing modes, Instruction set of 8051 – Data transfer instructions, Arithmetic and Logic instructions, bit-level and byte-level control transfer instructions, 8051 assembly programming – stack operations, subroutines, interrupts, 8051 programming as timer/counter, 8051 serial communication, 8051 interfacing RS232, LED/LCD display, Keyboard, Stepper motor.

UNIT-7. Antenna Design and Wave Propagation

Electrostatics–vector calculus, Gauss's Law, Laplace and Poisson's equations, Magnetostatics – Biot Savert's law, Ampere's law and electromagnetic induction, Maxwell's equations and wave equations, Plane wave propagation

in free-space, dielectrics and conductors, Poynting theorem, reflection and refraction, polarization, interference, coherence and diffraction, transmission lines and waveguides – line equations, impedance, reflections and voltage standing wave ratio, rectangular waveguides. Antennas–retarded potential and Hertzian dipole, half wave antenna, antenna patterns, radiation intensity, gain, effective area and Frii's free space receiver power equation. Microwave Sources and Devices-Reflex Klystron, Magnetron, TWT, Gunn diode, IMPATT diode, Crystal Detector and PIN diode. Radar – block diagram of radar, frequencies and power used, Radar range equation.

UNIT-8. Analog and Digital communication

Analog modulation and demodulation-AM, FM and PM, Principle of super heterodyne receiver, Random signals, noise, noise temperature and noise figure, Basic concepts of information theory, Error detection and correction, Digital modulation and demodulation – PCM, ASK, FSK, PSK, BPSK, QPSK and QAM, Time and Frequency-Division Multiplexing, Multiple Access techniques, Data Communications–Modems, Codes, Principles of Mobile and Satellite Communication, Optical communication, Optical sources–LED, spontaneous and stimulated emission, semiconductor Lasers, Detectors – PIN photodiodes, Avalanche photodiodes (APD), Optical fibers – attenuation and dispersion characteristics, Bandwidth, Wavelength division multiplexing. Fundamentals of Internet of Things (IoT) for communication.

UNIT-9. Power Electronics

Power devices – characteristics of SCR, DIAC, TRIAC, power transistors, Protection of thyristors against over voltage and over current. SCR triggering–dv/dt and di/dt, triggering with single pulse and train of pulses, A.C. and D.C. motors–construction and speed control. Switched Mode Power Supply (SMPS). Uninterrupted Power Supply (UPS).Open and closed-loop control systems, Block diagram reduction techniques, transfer function and signal flow diagram, Stability criterion: Routh-Hurwitz and Nyquist plot, On-off controller, Proportional(P),Proportional-Integral(PI), Proportional-Derivative (PD), PID controllers.

UNIT– 10. Electronic Instrumentation

Transducers–Resistance, Inductance, Capacitance, Piezoelectric, Thermoelectric, Hall effect, Photoelectric, Measurement of displacement, velocity, acceleration, force, torque, strain, temperature, pressure, flow, humidity, thickness, pH. Measuring Equipment – Measurement of R, L and C, Bridge and Potentiometers, voltage, current, power, energy, frequency/time, phase, Digital Multimeters, CRO, Digital Storage Oscilloscope, Spectrum Analyzer, Biomedical Instruments – ECG, EEG, Blood Pressure Measurements, MEMS / NEMS and its applications–Sensors for IoT applications.

Code No: 14

SUBJECT: ENGLISH

SYLLABUS

Unit – 1: British Literature prose and poetry.

Unit – 2: British Literature drama, fiction and short story.

Unit – 3: American literature, New Literatures — Canadian, Australian.

Unit – 4: New Zealand, African, Caribbean.

Unit – 5: Literary forms, Literary movements, Literary terms and concepts, Language and Linguistics – The English language–basic concepts and theory, phonology, morphology, semantics, syntax, pragmatics.

Unit – 6: English language teaching–Approaches and methods, Technology in teaching English language.

Unit – 7: Cultural Studies, Literary Criticism.

Unit – 8: Indian writing in English, Cultural studies.

Unit – 9: Literary Theory post World War II.

Unit – 10: Research Methods and Materials in English.

Code No: 15

SUBJECT: ENVIRONMENTAL SCIENCE

SYLLABUS

Unit-1:

Fundamentals of Environmental Sciences

Definition, Principles and Scope of Environmental Science. Environmental education and awareness. Environmental ethics.

Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere.

Laws of thermodynamics, heat transfer processes, mass and energy transfer across various interfaces, material balance.

Meteorological parameters–pressure, temperature, precipitation, humidity, mixing ratio, saturation mixing ratio, radiation and wind velocity, adiabatic lapse rate, environmental lapse rate. Wind roses.

Interaction between Man and Environment. Environmental susceptibility, utilization of resources, man-made imbalance in the environment. Biogeographic provinces of the world and agro-climatic zones of India. Concept of sustainable development.

Natural resources and their assessment. Remote Sensing and GIS: Principles of remote sensing and GIS. Digital image processing and ground truthing. Application of remote sensing and GIS in land cover/land use planning and management (urban sprawling, vegetation study, forestry, natural resource), waste management and climate change.

UNIT 2

Environmental Chemistry

Fundamentals of Environmental Chemistry: Classification of elements, Stoichiometry, Gibbs' energy, chemical potential, chemical kinetics, chemical equilibria, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, radioisotopes. Composition of air. Particles, ions and radicals in the atmosphere. Chemical speciation. Chemical processes in the formation of inorganic and organic particulate matters, thermochemical and photochemical reactions in the atmosphere, Oxygen and Ozone chemistry. Photochemical smog. Hydrological cycle.

Biogeochemical cycles–nitrogen, carbon, phosphorus and sulphur.

Toxic chemicals: Pesticides and their classification and effects. Biochemical aspects of heavy metals (Hg, Cd, Pb, Cr) and metalloids (As, Se). CO, O_3, PAN, VOC and POP. Carcinogens in the air.

Principles of analytical methods: Titrimetry, Gravimetry, Bomb Calorimetry, Chromatography (Paper Chromatography, TLC, GC and HPLC), Flame photometry, Spectrophotometry (UV-VIS, AAS, ICP-AES, ICP-MS), Electrophoresis, XRF, XRD, NMR, FTIR, GC-MS, Microscopy SEM, TEM.

Unit 3

Environmental Biology

Ecology as an inter- disciplinary science. Origin of life and speciation. Human Ecology and Settlement.

Ecosystem Structure and functions: Structures–Biotic and Abiotic components. Functions – Energy flow in ecosystems, energy flow models, food chains and food webs. Ecological pyramids. Ecological succession. Biodiversity–Species diversity, genetic diversity and ecosystem diversity Concept of ecotone, edge effects, ecological habitats and niche. Ecosystem stability and factors affecting stability. Ecosystem services.

Basis of Ecosystem classification. Types of Ecosystem: Desert (hot and cold), forest (tropical, deciduous and conifers), Grasslands wetlands, Aquatic marine and freshwater estuarine (mangrove).

Biomes: Concept, classification and distribution. Characteristics of different biomes: Tundra, Taiga, Grassland, Deciduous forest biome, Highland Icy Alpine Biome, Chapparal, Savanna, Tropical Rain forest.

Population ecology: Characteristics of population, concept of carrying capacity, population growth and regulations. Population fluctuations, dispersion and meta population. Concept of 'r' and 'k' species. Keystone species.

Community ecology: Definition, community concept, types and interaction–predation, herbivory, parasitism and allelopathy. Biological invasions.

Biodiversity and its conservation: Definition, types, importance of biodiversity and threats to biodiversity. Concept and basis of identification of 'Hotspots'; hotspots in India. Measures of biodiversity. Strategies for biodiversity conservation: *in situ*, *ex situ* and *in vitro* conservation. National parks, Sanctuaries, Protected areas and Sacred groves in India. Concepts of gene pool, biopiracy and bio-prospecting. Concept of restoration ecology. Extinct, Rare, Endangered and Threatened flora and fauna of India.

UNIT 4

Environmental Geosciences

Origin of earth. Primary geochemical differentiation and formation of core, mantle, crust, atmosphere and hydrosphere. Concept of minerals and rocks. Formation of igneous and metamorphic rocks. Controls on formation of landforms–tectonic including plate tectonic and climatic. Concept of steady state and equilibrium, Energy budget of the earth. Earth's thermal environment and seasons. Coriolis force, pressure gradient force, frictional force, geo-strophic wind field, gradient wind. Climates of India, western disturbances, Indian monsoon, droughts, *El Nino*, *La Nina*. Concept of residence time and rates of natural cycles. Geophysical fields.

Weathering including weathering reactions, erosion, transportation and deposition of sediments. Soil forming minerals and process of soil formation, identification and characterization of clay minerals, Soil physical and chemical properties, soil types and climate control on soil formation, Cation exchange capacity and mineralogical controls.

Geochemical classification of elements, abundance of elements in bulk earth, crust, hydrosphere and biosphere. Partitioning of elements during surficial geologic processes, Geochemical recycling of elements. Paleoclimate.

Distribution of water in earth, hydrology and hydrogeology, major basins and groundwater provinces of India, Darcy's law and its validity, groundwater fluctuations, hydraulic conductivity, groundwater tracers, land subsidence, effects of excessive use of groundwater, groundwater quality. Pollution of groundwater resources, Ghyben-Herzberg relation between fresh-saline water.

Natural resource exploration and exploitation and related environmental concerns. Historical perspective and conservation of non-renewable resources.

Disaster management: Natural Hazards: Catastrophic geological hazards–floods, landslides, earthquakes, volcanism, avalanche, tsunami and cloud bursts. Prediction of hazards and mitigation of their impacts.

Unit 5

Energy and Environment

Sun as source of energy; solar radiation and its spectral characteristics. Fossil fuels: classification, composition, physic–chemical characteristics and energy content of coal, petroleum and natural gas. Shale oil, Coal bed Methane, Gas hydrates. Gross-calorific value and net-calorific value.

Principles of generation of hydro-power, tidal energy, ocean thermal energy conversion, wind power, geothermal energy, solar energy (solar collectors, photo-voltaic modules, solar ponds).

Nuclear energy–fission and fusion, Nuclear fuels, Nuclear reactor – principles and types.

Bioenergy: methods to produce energy from biomass.

Environmental implications of energy use; energy use pattern in India and the world, emissions of CO_2 in developed and developing countries including India, radiative forcing and global warming. Impacts of large scale exploitation of solar, wind, hydro and nuclear energy sources.

Environmental Pollution and Control

Air Pollution:

Sources and types of Pollutants- Natural and anthropogenic sources, primary and secondary pollutants. Criteria air pollutants. Sampling and monitoring of air pollutants (gaseous and particulates); period, frequency and duration of sampling. Principles and instruments for measurements of (i) ambient air pollutants concentration and (ii) stack emissions. Indian National Ambient Air Quality Standards. Impact of air pollutants on human health, plants and

materials. Acid rain. Dispersion of air pollutants. Mixing height/depth, lapse rates, Gaussian plume model, line source model and area source model. Control devices for particulate matter: Principle and working of: settling chamber, centrifugal collectors, wet collectors, fabric filters and electrostatic precipitator. Control of gaseous pollutants through adsorption, absorption, condensation and combustion including catalytic combustion. Indoor air pollution, Vehicular emissions and Urban air quality.

Noise Pollution:

Sources, weighting networks, measurement of noise indices (L_{eq}, L_{10}, L_{90}, L_{50}, L_{DN}, TNI). Noise dose and Noise Pollution standards. Noise control and abatement measures: Active and Passive methods. Vibrations and their measurements. Impact of noise and vibrations on human health.

UNIT 6

Water Pollution:

Sources of water–Types and sources of water pollution. Impact on humans, plants and animals. Measurement of water quality parameters: sampling and analysis for pH, EC, turbidity, TDS, hardness, chlorides, salinity, DO, BOD, COD, nitrates, phosphates, sulphates, heavy metals and organic contaminants. Microbiological analysis – MPN. Indian standards for drinking water (IS:10500, 2012). Drinking water treatment: Coagulation and flocculation, Sedimentation and Filtration, Disinfection and Softening. Wastewater Treatment: Primary, Secondary and tertiary. Advanced treatment methods. Common effluent treatment plant.

Soil Pollution:

Physico- chemical and biological properties of soil (texture, structure, inorganic and organic components). Analysis of soil quality. Soil Pollution control. Industrial effluents and their interactions with soil components. Soil micro – organisms and their functions – degradation of pesticides and synthetic fertilizers.

Thermal, Marine Pollution and Radioactive:

Sources of Thermal Pollution, Heat Islands, causes and consequences. Sources and impact of Marine Pollution. Methods of Abatement of Marine Pollution. Coastal management. Radioactive pollution – sources, biological effects of ionizing radiations, radiation exposure and radiation standards, radiation protection.

Concept of Industrial Ecology:

Toxicology and Microbiology: Absorption, distribution and excretion of toxic agents, acute and chronictoxicity, concept of bioassay, threshold limit value, margin of safety, therapeutic index, biotransformation. Major water borne diseases and air borne microbes.

Environmental Biotechnology: Bioremediation–definition, types and role of plants and microbes for *in situ* and *ex situ* remediation. Bioindicators, Biofertilizers, Biofuels and Biosensors.

UNIT 7

Solid and Hazardous Waste Management

Solid Waste- types and sources. Solid waste characteristics, generation rates, solid waste components, proximate and ultimate analyses of solid wastes. Three R's

Solid waste collection and transportation: container systems–hauled and stationary, layout of collection routes, transfer stations and transportation.

Solid waste processing and recovery – Recycling, recovery of materials for recycling and direct manufacture of solid waste products. Electrical energy generation from solid waste (Fuel pellets, Refuse derived fuels), composting and vermicomposting, biomethanation of solid waste. Disposal of solid wastes – sanitary land filling and its management, incineration of solid waste.

Hazardous waste – Types, characteristics and health impacts. Hazardous waste management: Treatment Methods – neutralization, oxidation reduction, precipitation, solidification, stabilization, incineration and final disposal. e-waste: classification, methods of handling and disposal.

Flyash: sources, composition and utilisation.

Plastic waste: sources, consequences and management.

UNIT 8

Environmental Assessment, Management and Legislation

Aims and objectives of Environmental Impact Assessment (EIA). Environmental Impact Statement (EIS) and Environmental Management Plan (EMP). EIA Guidelines. Impact Assessment Methodologies. Procedure for reviewing EIA of developmental projects. Life-cycle analysis, cost- benefit analysis. Guidelines for Environmental Audit. Environmental Planning as a part of EIA and Environmental Audit. Environmental Management System Standards (ISO14000 series). EIA Notification, 2006 and amendments from time to time. Eco-labeling schemes.

Risk Assessment–Hazard identification, Hazard accounting, Scenarios of exposure, Risk characterization and Risk management.

Overview of Environmental Laws in India: Constitutional provisions in India (Article 48A and 51A). Wildlife Protection Act, 1972 amendments 1991, Forest Conservation Act, 1980, Indian Forest Act, Revised 1982, Biological Diversity Act, 2002, Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975, Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986, Motor Vehicle Act, 1988, The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, The Plastic Waste Management Rules, 2016, The Bio-Medical Waste Management Rules, 2016, The Solid Waste Management Rules, 2016, Thee-waste (Management) Rules 2016, The Construction and Demolition Waste Management Rules, 2016, The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000, The Batteries (Management and Handling) Rules, 2010 with Amendments, The Public Liability Insurance Act, 1991 and Rules 1991, Noise Pollution (Regulation and Control) Rules, 2000, Coastal Regulation Zones (CRZ) 1991 amended from time to time.

National Forest Policy, 1988, National Water Policy, 2002, National Environmental Policy, 2006.

Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Conference of Parties (COPs), Basel Convention (1989, 1992), Ramsar Convention on Wetlands (1971), Earth Summit at Rio de Janeiro, 1992, Agenda-21, Global Environmental Facility (GEF), Convention on Biodiversity (1992), UNFCCC, Kyoto Protocol, 1997, Clean Development Mechanism (CDM), Earth Summit at Johannesburg, 2002, RIO+20, UN Summit on Millennium Development Goals, 2000, Copenhagen Summit, 2009. IPCC, UNEP, IGBP.

Unit 9

Statistical Approaches and Modelling in Environmental Sciences

Attributes and Variables: Types of variables, scales of measurement, measurement of Central tendency and Dispersion, Standard error, Moments –measure of Skewness and Kurtosis, Basic concept of probability theory, Sampling theory, Distributions–Normal, log–normal, Binomial, Poisson, t, χ^2 and F- distribution. Correlation, Regression, tests of hypothesis (t-test, χ^2-test ANOVA: one-way and two-way); significance And confidence limits.

Approaches to development of environmental models; linear, simple and multiple regression models, validation and forecasting. Models of population growth and interactions: Lotka-Voltera model, Leslie's matrix model.

Contemporary Environmental Issues

Global Environmental Issues – Biodiversity loss, Global warming, acid rain, greenhouse effect, Climate change, Ozone layer depletion. Sea level rise. International efforts for environmental protection.

National Action Plan on Climate Change (Eight National missions–National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a 'Green India', National Mission for Sustainable Agriculture, National Mission on Strategic Knowledge for Climate Change).

Current Environmental Issues in India: Environmental issues related to water resource projects–Narmada dam, Tehri dam, Almatti dam, Cauvery and Mahanadi, Hydro-power projects in Jammu & Kashmir, Himachal and North-Eastern States.

UNIT 10

Sustainable development, human population explosion, food shortage and distribution pattern and food security, urbanization and related problems, consumerism and waste generation, role of individuals in environmental issues and pollution.

Water conservation -development of watersheds, Rain water harvesting and ground water recharge.

National river conservation plan – Namami Gange and Yamuna Action Plan.

Eutrophication and restoration of lakes. Conservation of wetlands, Ramsar sites in India.

Soil erosion, reclamation of degraded land, desertification and its control.

Climate change–adaptability, energy security, food security and sustainability.

Forest Conservation – Chipko movement, Appiko movement, Silent Valley movement and Gandhamardhan movement. People Biodiversity register.

Wild life conservation projects: Project tiger, Project Elephant, Crocodile Conservation, GOI-UNDP Sea Turtle project, Indo-Rhino vision.

Carbon sequestration and carbon credits.

Waste Management – Swachha Bharat Abhiyan.

Sustainable Habitat: Green Building, GRIHA Rating Norms. Vehicular emission norms in India.

Epidemiological Issues: Fluorosis, Arsenocosis, Goitre, Environmental Disasters: Minnamata Disaster, Love Canal Disaster, Bhopal Gas Disaster, 1984, Chernobyl Disaster, 1986, Fukusima Daiichi nuclear disaster, 2011.

Code No: 16

SUBJECT: GEOGRAPHY

SYLLABUS

UNIT-1 :

Geomorphology

Continental Drift, Plate Tectonics, Endogenetic and Exogenetic forces. Denudation and Weathering, Geomorphic Cycle (Davis and Penck), Theories and Process of Slope Development, Earth Movements (seismicity, folding, faulting and vulcanicity), Landform Occurrence and Causes of Geomorphic Hazards (earthquakes, volcanoes, landslides and avalanches).

UNIT-2 :

Climatology

Composition and Structure of Atmosphere; Insolation, Heat Budget of Earth, Temperature, Pressure and Winds, Atmospheric Circulation (air-masses, fronts and upper air circulation, cyclones and anticyclones (tropical and temperate), Climatic Classification of Koppen & Thornthwaite, ENSO Events (El Nino, La Nina and Southern Oscillations), Meteorological Hazards and Disasters (Cyclones, Thunderstorms, Tornadoes, Hailstorms, Heat and Cold waves Drought and Cloudburst, Glacial Lake Outburst (GLOF), Climate Change: Evidences and Causes of Climatic Change in the past, Human impact on Global Climate.

UNIT-3 :

Oceanography

Relief of Oceans, Composition: Temperature, Density and Salinity, Circulation: Warm and Cold Currents, Waves, Tides, Sea Level Changes, Hazards: Tsunami and Cyclone

Geography of Environment Components: Ecosystem (Geographic Classification) and Human Ecology, Functions: Trophic Levels, Energy Flows, Cycles (geo-chemical, carbon, nitrogen and oxygen), Food Chain, Food Web and Ecological Pyramid, Human Interaction and Impacts, Environmental Ethics and Deep Ecology, Environmental Hazards and Disasters (Global Warming, Urban Heat Island, Atmospheric Pollution, Water Pollution, Land Degradation), National Programmes and Policies: Legal Framework, Environmental Policy, International Treaties, International Programmes and Polices (Brundtland Commission, Kyoto Protocol, Agenda 21, Sustainable Development Goals, Paris Agreement)

UNIT-4 :

Population and Settlement Geography

Population Geography

Sources of population data (census, sample surveys and vital statistics, data reliability and errors). World Population Distribution (measures, patterns and determinants), World Population Growth (prehistoric to modern period). Demographic Transition, Theories of Population Growth (Malthus, Sadler, and Ricardo). Fertility and Mortality Analysis (indices, determinants and world patterns). Migration (types, causes and consequences and models), Population Composition and Characteristics (age, sex, rural-urban, occupational structure and educational levels), Population Policies in Developed and Developing Countries.

Settlement Geography

Rural Settlements (types, patterns and distribution), Contemporary Problems of Rural Settlements (rural-urban migration; land use changes; land acquisition and transactions), Theories of Origin of Towns (Gordon Childe, Henri Pirenne, Lewis Mumford), Characteristics and Processes of Urbanization in Developed and Developing Countries (factors of urban growth, trends of urbanisation, size, structure and functions of urban areas). Urban Systems (the law of the primate city and rank size rule) Central Place Theories (Christaller and Losch), Internal Structure of the City, Models of Urban Land Use (Burgess, Harris and Ullman ,and Hoyt), Concepts of Megacities, Global Cities and Edge Cities, Changing Urban Forms (peri-urban areas, rural-urban fringe, suburban , ring and satellite towns), Social Segregation in the City, Urban Social Area Analysis, Manifestation of Poverty in the City (slums, informal sector growth, crime and social exclusion).

UNIT-5 :

Geography of Economic Activities and Regional Development

Economic Geography

Factors affecting spatial organisation of economic activities (primary, secondary, tertiary and quarternary), Natural Resources (classification, distribution and associated problems), Natural Resources Management. World Energy Crises in Developed and Developing Countries.

Agricultural Geography

Land capability classification and Land Use Planning, Cropping Pattern: Methods of delineating crop combination regions (Weaver, Doi and Rafiullah), Crop diversification, Von Thunen's Model of Land Use Planning. Measurement and Determinants of Agricultural Productivity, Regional variations in Agricultural Productivity, Agricultural Systems of the World.

Industrial Geography

Classification of Industries, Factors of Industrial Location; Theories of Industrial Location (A. Weber, E. M. Hoover, August Losch, A. Pred and D. M. Smith). World Industrial Regions, Impact of Globalisation on manufacturing sector in Less Developed Countries, Tourism Industry, World distribution and growth of Information And Communication Technology (ICT) and Knowledge Production (Education and R & D) Industries.

UNIT-6 :

Geography of Transport and Trade

Theories and Models of spatial interaction (Edward Ullman and M. E. Hurst) Measures and Indices of connectivity and accessibility; Spatial Flow Models: Gravity Model and its variants, World Trade Organisation, Globalisation and Liberalisation and World Trade Patterns. Problems and Prospects of Inter and IntraRegional Cooperation and Trade.

Regional Development

Typology of Regions, Formal and Fictional Regions, World Regional Disparities, Theories of Regional Development (Albert O. Hirschman, Gunnar Myrdal, John Friedman) Dependency theory of Underdevelopment, Global Economic Blocks, Regional Development and Social Movements in India

Unit– 7 :

Cultural, Social and Political Geography Cultural and Social Geography

Concept of Culture, Cultural Complexes, Areas and Region, Cultural Heritage, Cultural Ecology. Cultural Convergence, Social Structure and Processes, Social Well-being and Quality of Life, Social Exclusion, Spatial distribution of social groups in India (Tribe, Caste, Religion and Language), Environment and Human Health, Diseases Ecology, Nutritional Status (etiological conditions, classification and spatial and seasonal distributional patterns with special reference to India) Health Care Planning and Policies in India, Medical Tourism in India.

Political Geography

Boundaries and Frontiers (with special reference to India), Heartland and Rimland Theories. Trends and Developments in Political Geography, Geography of Federalism, Electoral Reforms in India, Determinants of Electoral Behaviour, Geopolitics of Climate Change, Geopolitics of World Resources, Geo-politics of India Ocean, Regional Organisations of Cooperation (SAARC, ASEAN, OPEC, EU). Neopolitics of World Natural Resources.

UNIT- 8 :

Geographic Thought

Contributions of Greek, Roman, Arab, Chinese and Indian Scholars, Contributions of Geographers (Bernhardus Varenius, Immanuel Kant, Alexander von Humboldt, Carl Ritter, Scheafer & Hartshorne), Impact of Darwinian Theory on Geographical Thought. Contemporary trends in Indian Geography: Cartography, Thematic and Methodological contributions. Major Geographic Traditions (Earth Science, man-environment relationship, area studies and spatial analysis), Dualisms in Geographic Studies (physical vs. human, regional vs. systematic, qualitative vs. quantitative, ideographic vs. nomothetic), Paradigm Shift, Perspectives in Geography (Positivism, Behaviouralism, Humanism, Structuralism, Feminism and Postmodernism).

UNIT- 9 :

Geographical Techniques

Sources of Geographic Information and Data (spatial and non-spatial), Types of Maps, Techniques of Map Making (Choropleth, Isarithmic, Dasymetric, Chorochromatic, Flow Maps) Data Representation on Maps (Pie diagrams, Bar diagrams and Line Graph, GIS Database (raster and vector data formats and attribute data formats). Functions of GIS (conversion, editing and analysis), Digital Elevation Model (DEM), Georeferencing (coordinate system and map projections and Datum), GIS Applications (thematic cartography, spatial decision support system), Basics of Remote Sensing (Electromagnetic Spectrum, Sensors and Platforms, Resolution and Types, Elements of Air Photo and Satellite Image Interpretation and Photogrammetry), Types of Aerial Photographs, Digital Image Processing: Developments in Remote Sensing Technology and Big Data Sharing and its applications in Natural Resources Management in India, GPS Components (space, ground control and receiver segments) and Applications, Applications of Measures of Central Tendency, Dispersion and Inequalities, Sampling, Sampling Procedure and Hypothesis Testing (*chi* square test, *t* test, ANOVA), Time Series Analysis, Correlation and Regression Analysis, Measurement of Indices, Making Indicators Scale Free, Computation of Composite Index, Principal Component Analysis and Cluster Analysis, Morphometric Analysis: Ordering of Streams, Bifurcation Ratio, Drainage Density and Drainage Frequency, Basin Circularity Ratio and Form Factor, Profiles, Slope Analysis, Clinographic Curve, Hypsographic Curve and Altimetric Frequency Graph.

UNIT- 10 :

Geography of India

Major Physiographic Regions and their Characteristics; Drainage System (Himalayan and Peninsular), Climate: Seasonal Weather Characteristics, Climatic Divisions, Indian Monsoon (mechanism and characteristics), Jet Streams and Himalayan Cryosphere, Types and Distribution of Natural Resources: Soil, Vegetation, Water, Mineral and Marine Resources. Population Characteristics (spatial patterns of distribution), Growth and Composition (rural-urban, age, sex, occupational, educational, ethnic and religious), Determinants of Population, Population Policies in India, Agriculture (Production, Productivity and Yield of Major Food Crops), Major Crop Regions, Regional Variations in Agricultural Development, Environmental, Technological and Institutional Factors affecting Indian Agriculture; Agro-Climatic Zones, Green Revolution, Food Security and Right to Food. Industrial Development since Independence, Industrial Regions and their characteristics, Industrial Policies in India. Development and Patterns of Transport Networks (railways, roadways, waterways, airways and pipelines), Internal and External Trade (trend, composition and directions), Regional Development Planning in India, Globalisation and its impact on Indian Economy, Natural Disasters in India (Earthquake, Drought, Flood, Cyclone, Tsunami, Himalayan Highland Hazards and Disasters.)

Code No:17

SUBJECT : GEOLOGY

SYLLABUS

UNIT : 1

THE EARTH AND THE SOLAR SYSTEM:

Milky Way and the solar system. Modern theories on the origin of the Earth and other planetary bodies. Earth's orbital parameters, Kepler's laws of planetary motion, Geological Time Scale; Space and time scales of processes in the solid Earth, atmosphere and oceans. Radioactive isotopes and their applications. Meteorites Chemical composition and the Primary differentiation of the earth. Basic principles of stratigraphy. Theories about the origin of life and the nature of fossil record. Earth's gravity and magnetic fields and its thermal structure: Concept of Geoid and, spheroid. Isostasy.

EARTH MATERIALS, SURFACE FEATURES AND PROCESSES:

Gross composition and physical properties of important minerals and rocks; properties and processes responsible for mineral concentrations; nature and distribution of rocks and minerals in different units of the earth and different parts of India. Physiography of the Earth: weathering, erosion, transportation and deposition of Earth's material; formation of soil, sediments and sedimentary rocks; energy balance of the Earth's surface processes; physiographic features and river basins in India.

Unit : 2

INTERIOR OF THE EARTH, DEFORMATION AND TECTONICS:

Basic concepts of seismology and internal structure of the Earth. Physico-chemical and seismic properties of Earth's interior. Concepts of stress and strain. Behaviour of rocks under stress; Folds, joints and faults. Earthquakes – their causes and measurement. Interplate and intraplate seismicity. Paleomagnetism, sea floor spreading and plate tectonics.

OCEANS AND ATMOSPHERE:

Hypsography of the continents and ocean floor – continental shelf, slope, rise and abyssal plains. Physical and chemical properties of sea water and their spatial variations. Residence times of elements in sea water. Ocean currents, waves and tides, important current systems, thermohaline circulation and the oceanic conveyor belt. Major water masses of the world's oceans. Biological productivity in the oceans. Motion of fluids, waves in atmospheric and oceanic systems. Atmospheric turbulence and boundary layer. Structure and chemical composition of the atmosphere, lapse rate and stability, scale height, geopotential, greenhouse gases and global warming. Cloud formation and precipitation processes, air- sea interactions on different space and time scales. Insolation and heat budget, radiation balance, general circulation of the atmosphere and ocean. Climatic and sea level changes on different time scales. Coupled ocean-atmosphere system, El Nino Southern Oscillation (ENSO). General weather systems of India: Monsoon system, cyclone and jet stream, Western disturbances and severe local convective systems, distribution of precipitation over India.

Marine and atmospheric pollution, ozone depletion.

ENVIRONMENTAL EARTH SCIENCES:

Properties of water; hydrological cycle; water resources and management. Energy resources, uses, degradation, alternatives and management; Ecology and bio diversity. Impact of use of energy and land on the environment. Exploitation and conservation of mineral and other natural resources. Natural hazards. Elements of Remote Sensing.

UNIT : 3

GEOLOGY

MINERALOGY AND IGNENOUS AND METAMORPHIC PETROLOGY:

Concept of point group, space group, reciprocal lattice, diffraction and imaging. Concepts of crystal field theory and mineralogical spectroscopy. Lattice defects (point, line and planar).Electrical, magnetic and optical properties of minerals. Bonding and crystal structures of common oxides, sulphides, and silicates. Transformation of minerals – polymorphism, polytypism, and polysomatism. Solid solution and exsolution.

Steady-state geotherms. Genesis, properties, emplacement and crystallization of magmas. Phase equilibrium studies of simple systems, effect of volatiles on melt equilibria. Magma -mixing,–mingling and–immiscibility.

Metamorphic structures and textures; isograds and facies. Mineral reactions with condensed phases, solid solutions, mixed volatile equilibria and thermo-barometry. Metamorphism of pelites, mafic-ultra mafic rocks and siliceous dolomites. Material transport during metamorphism. P-T path in regional metamorphic terrains, plate tectonics and metamorphism.

Petrogenetic aspects of important rock suites of India, such as the Deccan Traps, layered intrusive complexes, anorthosites, carbonatites, charnockites, alkaline rocks, Kimberlites, ophiolites and granitoids.

STRUCTURAL GEOLOGY AND GEOTECTONICS:

Theory of stress and strain. Behaviour of rocks under stress. Mohr circle. Various states of stress and their representation by Mohr circles. Different types of failure and sliding criteria. Geometry and mechanics of fracturing and conditions for reactivation of pre-existing discontinuities. Common types of finite strain ellipsoids. L-, L-S-, and S-tectonic fabrics. Techniques of strain analysis. Particle paths and flow patterns. Progressive strain history. Introduction to deformation mechanisms. Role of fluids in deformation processes. Geometry and analyses of brittle-ductile and ductile shear zones. Sheath folds. Geometry and mechanics of development of folds, boudins, foliations and lineations. Interference patterns of superposed fold. Fault-related folding. Gravity induced structures. Tectonic features of extensional-, compressional-, and strike-slip-terrains and relevance to plate boundaries. mantle plumes. Himalayan Orogeny; concept of super continent, their assembly and breakup.

Unit : 4

PALEONTOLOGY AND ITS APPLICATIONS:

Theories on origin of life. Organic evolution–Punctuated Equilibrium and Phyletic Gradualism models. Mass extinctions and their causes. Application of fossils in age determination and correlation. Paleoecology, Life habitats and various ecosystems, Paleobiogeography. Modes of preservation of fossils and taphonomic considerations. Types of micro fossils. Environmental significance of fossils and trace fossils. Use of micro fossils in interpretation of sea floor tectonism. Application of micropaleontology in hydrocarbon exploration. Oxygen and Carbon isotope studies of microfossils and their use in paleoceanographic and paleoclimatic interpretation. Important invertebrate fossils, vertebrate fossils, plant fossils and microfossils in Indian stratigraphy.

SEDIMENTOLOGY AND STRATIGRAPHY:

Classification of sediments and sedimentary rocks; elastic, volcanoclastic and chemical. Classification of elastic rocks. Flow regimes and processes of sediment transport. Sedimentary textures and structures. Sedimentary facies and environments, reconstruction of paleoenvironments. Formation and evolution of sedimentary basins. Diagenesis of siliciclastic and carbonate rocks.

Recent developments in stratigraphic classification. Code of stratigraphic nomenclature–Stratotypes, Global Boundary Stratotype Sections and Points (GSSP). Lithostratigraphic, chronostratigraphic and biostratigraphic subdivisions. Methods of startigraphic correlation including Shaw's Graphic correlation. Concept of sequence stratigraphy. Rates of sediment accumulation, unconformities. Facies concept in Stratigraphy–Walther's law. Methods for paleogeographic reconstruction. Earth's Climatic History. Phanerozoic stratigraphy of India with reference to the type areas–their correlation with equivalent formations in other regions. Boundary problems in Indian Phanerozoic stratigraphy.

MARINE GEOLOGY AND PALE OCEANOGRAPHY:

Morphologic and tectonic domains of the ocean floor. Structure, composition and mechanism of the formation of oceanic crust. Hydrothermal vents. Ocean margins and their significance. Ocean Circulation, Coriolis effect and Ekman spiral, convergence, divergence and upwelling, El Nino. Indian Ocean Dipole Thermohaline circulation and oceanic conveyor belt. Formation of Bottom waters; major water masses of the world's oceans. Oceanic sediments: Factors controlling the deposition and distribution of oceanic sediments; geochronology of oceanic sediments, diagenetic changes in oxic and anoxic environments. Tectonic evolution of the ocean basins. Mineral resources. Paleoceanography – Approaches to paleoceanographic reconstructions; various proxy indicators for paleoceanographic interpretation. Reconstruction of monsoon variability by using marine proxy records Opening and closing of ocean gateways and their effect on circulation and climate during the Cenozoic. Sea level processes and Sea level changes. Methods of paleo Sea Surface temperature. Quantifications.

UNIT : 5

GEO CHEMISTRY:

Atomic Structure and properties of elements, the Periodic Table; ionic substitution in minerals; Phase rule and its applications in petrology, thermodynamics of reactions involving pure phases, ideal and non-ideal solutions, and fluids; equilibrium and distribution coefficients. Nucleation and diffusion processes in igneous, metamorphic and sedimentary environments, redox reactions and Eh-pH diagrams and their applications. Mineral/ mineral assemblages as "sensors" of ambient environments. Geochemical studies of aerosols, surface- ,marine-, and ground waters. Radioactive decay schemes and their application to geochronology and petrogenesis. Stable isotopes and their application to earth system processes; geochemical differentiation of the earth; geochemical cycles.

ECONOMIC GEOLOGY:

Magmatic, hydrothermal and surface processes of ore formation. Metallogeny and its relation to crustal evolution; Active ore-forming systems, methods of mineral deposit studies including ore microscopy, fluid inclusions and isotopic systematics; ores and metamorphism- cause and effect relationships. Geological setting, characteristics, and genesis of ferrous, base and noble metals. Origin, migration and entrapment of petroleum; properties of source and reservoir rocks; structural, stratigraphic and combination traps. Methods of petroleum exploration. Concepts of petrophysics, Petroliferous basins of India. Origin of peat, lignite, bitumen and anthracite. Classification, rank and grading of coal; coal petrography, coal resources of India. Gas hydrates and coal bed methane. Nuclear and non- conventional energy resources.

PRECAMBRIAN GEOLOGY AND CRUSTAL EVOLUTION:

Evolution of lithosphere, hydrosphere, atmosphere, biosphere, and cryosphere; lithological, geochemical and stratigraphic characteristics of granite–greenstone and granulite belts. Stratigraphy and geochronology of the cratonic nuclei, mobile belts and Proterozoic sedimentary basins of India. Life in Precambrian. Precambrian–Cambrian boundary with special reference to India.

QUATERNARY GEOLOGY:

Definition of Quaternary. Quaternary Stratigraphy – Oxygen Isotope stratigraphy, biostratigraphy and magnetostratigraphy. Quaternary climates – glacial-interglacial cycles, eustatic changes, proxy indicators of paleoenvironmental/ paleoclimatic changes-land, ocean and cryosphere (ice core studies). Responses of geomorphic systems to climate, sea level and tectonics on variable time scales in the Quaternary, Quaternary dating methods,– radiocarbon, Uranium series, Luminescence, Amino- acid. Quaternary stratigraphy of India– continental records (fluvial, glacial, aeolian, palaeosols and duricrust); marine records; continental-marine correlation of Quaternary record.

Evolution of man and Stone Age cultures. Plant and animal life in relation to glacial and interglacial cycles during Quaternary.

Tectonic geomorphology, neotectonics, active tectonics and their applications to natural hazard assessment.

Unit :6

APPLIED GEOLOGY:

- **Remote Sensing and GIS:** Elements of photogrammetry, elements of photo-interpretation, electromagnetic spectrum, emission range, film and imagery, sensors, geological interpretations of air photos and imageries. Global Positioning Systems (GPS).GIS-data structure, attribute data, thematic layers and query analysis.
- **Engineering Geology:** Engineering properties of rocks and physical characteristics of building stones, concretes and other aggregates. Geological investigations for construction of dams, bridges, highways and tunnels. Remedial measures. Mass movements with special emphasis on landslides and causes of hillslope instability. Seismic design of buildings.
- **Mineral Exploration:** Geological, geophysical, geochemical and geo-botanical methods of surface and sub-surface exploration on different scales. Sampling, assaying and evaluation of mineral deposits.
- **Hydrogeology:** Groundwater, Darcy's law, hydrological characteristics of aquifers, hydrological cycle. Precipitation, evapotranspiration and infiltration processes. Hydrological classification of water-bearing formations. Fresh and salt-water relationships in coastal and inland areas. Groundwater exploration and water pollution. Groundwater regimes in India.

PHYSICAL GEOGRAPHY

Geomorphology: Concepts in geomorphology. Historical and process Geomorphology. Landforms in relation climate, rock type, structure and tectonics. Processes–weathering, pedogenesis, mass movement, erosion, transportation and deposition. Geomorphic processes and landforms – fluvial, glacial, aeolian, coastal and karst. River forms and processes – stream flow, stage- discharge relationship; hydrographs and flood frequency analysis. Submarine relief. Geomorphology and topographic analysis including DEM, Environmental change–causes, effects on processes and landforms. Extra-terrestrial geomorphology.

Climatology: Fundamental principles of climatology. Earth's radiation balance; latitudinal and seasonal variation of insolation, temperature, pressure, wind belts, humidity, cloud formation and precipitation, water balance. Air masses, monsoon, Jet streams, tropical cyclones, and ENSO. Classification of climates – Koppen's and Thornthwaite's scheme of classification. Climate change.

Bio-geography: Elements of biogeography with special reference to India; environment, habitat, plant-animal association; zoo-geography of India; Biomes, elements of plant geography, distribution of forests and major plant communities. Distribution of major animal communities. Conservation of forests. Wildlife sanctuaries and parks.

Environmental Geography: Man-land relationship. Resources – renewable and non-renewable. Natural and man-made hazards – droughts, floods, cyclones, earthquakes, landslides, tsunamis. Ecological balance, environmental pollution and deterioration.

Geography of India: Physiography, drainage, climate, soils and natural resources – the Himalaya, Ganga-Brahmaputra Plains, and peninsular India Precambrian shield, the Gondwana rift basins, Deccan Plateau. Indian climatology with special reference to seasonal distribution and variation of temperature, humidity, wind and precipitation; Climate zones of India. Agricultural geography of India. Population – its distribution and characteristics. Urbanization and migration. Environmental problems and issues.

UNIT – 7

GEOPHYSICS

Signal Processing: Continuous and discrete signals; Fourier series; auto and cross correlations, linear time invariant systems with deterministic and random inputs; band limited signal and sampling theorem; Fourier and Fast Fourier transforms; Z-transform; convolution; Filters: discrete and continuous, recursive, non-recursive, optimal and inverse filters; deconvolution; fractal analysis.

Field theory: Newtonian potential; Laplace and Poisson's equations; Green's Theorem; Gaus's law; Continuation integral; equivalent stratum; Maxwell's equations and electromagnetic theory; Displacement potential, Helmhotz's theorem and seismic wave propagation.

Numerical analysis and inversion: Numerical differentiation and integration, finite element, and finite difference techniques; Simpson's rules; Gaus's quadrature formula; initial value problems; pattern recognition in Geophysics. Well-posed and ill-posed problems; method of least squares; direct search and gradient methods; generalized inversion techniques; singular value decomposition; global optimization.

Gravity and Magnetic fields of the earth: Normal gravity field; Clairaut's theorem; Shape of the earth; deflection of the vertical, geoid, free-air, Bouguer and isostatic anomalies, isostatic models for local and regional compensation. Geomagnetic field, secular and transient variations and their theories; palaeomagnetism, construction of polar wandering curves.

Plate Tectonics and Geodynamics: Marine magnetic anomalies, sea floor spreading; mid-oceanic ridges and geodynamics; plate tectonics hypothesis; plate boundaries and seismicity. Heat flow mechanisms, thermal modeling of earth, core-mantle convection and mantle plumes.

Seismology Elastic theory: Seismometry: short period, long period, broad band and strong motion; elements of earthquake seismology; seismic sources: faulting source, double couple hypothesis, seismic moment tensor, focal mechanism and fault plane solutions; seismic gaps; seismotectonics and structure of the earth; Himalayan and stable continental region earthquakes, reservoir induced seismicity; seismic hazards; earthquake prediction, travel time residuals, velocity anomalies, seismic tomography.

Gravity and Magnetic Methods: Gravimeters and magnetometers; data acquisition from land, air and ship; corrections and reduction of anomalies; ambiguity; regional and residual separation; continuation and derivative

calculations; interpretation of anomalies of simple geometric bodies, single pole, sphere, horizontal cylinder, sheet, dyke and fault. Forward modelling and inversion of arbitrary shaped bodies and 2-D, 3-D interfaces. Interpretations in frequency domain.

Electrical and Electromagnetic Methods: Electrical profiling and sounding, typical sounding curves, pseudo-sections; resistivity transform and direct interpretation; induced polarization methods. Electromagnetic field techniques; elliptic polarization, in-phase and out of phase components, horizontal and vertical loop methods; interpretation; VLF (very low frequency); AFMAG (Audio frequency magnetic) methods; and central frequency sounding; transient electro magnetic methods; magneto-telluric method; geomagnetic depth sounding.

Seismic Methods: Generalized Snell's Law; Ray theory; reflection, refraction, diffraction; Zoeppritz' sequation; seismic energy sources; detectors; seismic noises and noise profile analysis; seismic data recording, reduction to a datum and weathering corrections; Interpretation of refraction and reflection data; CDP/CMP; velocity analysis, F-K filtering, stacking, deconvolution, migration before and after stack; bright spot analysis; wavelet processing; attenuation studies, shear waves, AVO; VSP; introduction to 3D seismics; seismic stratigraphy.

Well logging: Open hole, cased hole and production logging; Electrical logs; lateral, induction, temperature, S.P; porosity logs; sonic, density, neutron; natural gamma; determination of formation factor, porosity, permeability, density, water saturation, lithology; logging while drilling.

UNIT 8

METEOROLOGY- CLIMATOLOGY

Physical Meteorology: Thermal structure of the atmosphere and its composition. Radiation: basic Laws – Rayleigh and Mie scattering, multiple scattering, radiation from the sun, solar constant, effect of clouds, surface and planetary albedo. Emission and absorption of terrestrial radiation, radiation windows, radiative transfer,Green house effect, net radiation budget; Thermodynamics of dry and moist air: specific gas constant, Adiabatic and isoentropic processes, entropy and enthalpy, Moisture variables, virtual temperature; Clausius – Clapeyron equation, adiabatic process of moist air; thermodynamic diagrams: Hydrostatic equilibrium: Hydrostatic equation, variation of pressure with height, geopotential, standard atmosphere, altimetry. Vertical stability of the atmosphere: Dry and moist air parcel and slice methods. Tropical convection. Atmospheric optics–visibility–optical phenomenon–rainbows, haloes, corona, mirage.

Atmospheric Electricity: Fair weather electric field in the atmosphere and potential gradients, ionization in the atmosphere. Electrical fields in thunderstorms, theories of thunderstorm electrification- Structure of lightening flash-mechanism of earth-atmospheric change balance-role of thunder storms.

Cloud Physics: Cloud classification, condensation nuclei, growth of cloud drops and ice-crystals, precipitation mechanisms: Bergeron, Findeisen process, coalescence process– Precipitation of warm and mixed clouds, artificial precipitation, hail suppression, fog and cloud–dissipation, radar observation of clouds and precipitation, radar equation, rain drop spectra, radar echoes of hail storm and tornadoes, radar observation of hurricanes, measurements of rainfall by radar.

Dynamic Meteorology: Basic equations and fundamental forces: Pressure, gravity, centripetal and Corolis forces, continuity equation in Cartesian and isobaric coordinates. Momentum equation Cartesian and spherical coordinates; scale analysis, inertial flow, geostrophic and gradient winds, thermal wind. Divergence and vertical motion Rossby, Richardson, Reynolds and Froude numbers. Circulation, vorticity and divergence; Bjerknese circulation theorem and applications, vorticity and divergence equations, scale analysis, potential vorticity, stream function and velocity potential. Atmospheric turbulence: Mixing length theory, planetary boundary layer equations, surface layer, Ekmanlayer, eddy transport of heat, moisture and momentum, Richardson criterion; Linear Perturbation Theory: Internal and external gravity waves, inertia waves, gravity waves, Rossbywaves, wave motion in the tropics, barotropic and baroclinic instabilities. Atmospheric Energetics: Kinetic, potential and internal energies – conversion of potential and internal energies into kinetic energy, available potential energy.

UNIT 9

Numerical Weather Prediction: computational instability, filtering of sound and gravity waves, filtered forecast equations, barotropic and equivalent barotropic models, two parameter baroclinic model, relaxation method. Multi-layer primitive equation models. Short, medium and long range weather prediction. Objective analysis; Initialization of the data for use in weather prediction models; data assimilation techniques, application of satellite in NWP (Numerical Weather Prediction) and remotely sensed data.

General Circulation and Climate Modelling: Observed zonally symmetric circulations, meridional circulation models, mean meridional and eddy transport of momentum and energy, angular momentum and energy budgets; zonally asymmetric features of general circulation; standing eddies; east-west circulations in tropics: climate variability and forcings; feedback processes, low frequency variability, MJO Madden-Julian oscillation), ENSO, QBO (quasi-biennial oscillation) and sunspot cycles. Basic principles of general circulation modelling; grid-point and spectral GCMs; role of the ocean in climate modelling; interannual variability of ocean fields (SST, winds, circulation, etc.) and its relationship with monsoon, concepts of ocean – atmosphere coupled models.

Synoptic Meteorology: Weather observations and transmission, synoptic charts, analysis of surface, upper air another derivative chart, stream-lines, isotachs and contour analysis; tilt and slope of pressure/weather systems with height. Synoptic weather forecasting, prediction of weather elements such as rain, maximum and minimum temperature and fog; hazardous weather elements like thunder storms, dust storms, tornadoes. Tropical meteorology: Trade wind inversion, ITCZ; monsoon trough tropical cyclones, their structure and development theory; monsoon depressions; tropical easterly jet stream; low level jets, Somali jet, waves in easterlies; western disturbances; SW and NE monsoons; synoptic features associated with onset, withdrawal, break active and weak monsoons and their prediction. Air masses and fronts: sources, origin and classification of air masses; and fronts, frontogenesis and frontolysis; structure of cold and warm fronts; weather systems associated with fronts. Extra-tropical synoptic scale features: jet streams, extra tropical cyclones and anticyclones.

Aviation Meteorology: Role of meteorology in aviation, weather hazards associated with take off cruising and landing, inflight – icing, turbulence, visibility, fog, clouds, rain, gusts, wind shear and thunderstorms, now-casting and very short range forecasting.

Satellite Meteorology: Meteorological satellites – Polar orbiting and geostationary satellites, visible and infrared radiometers, multiscanner radiometers; identification of synoptic systems, fog and sandstorms, detection of cyclones, estimation of SST, cloud top temperatures, winds and rainfall: temperature and humidity soundings.

UNIT 10

OCEAN SCIENCES

Physical Oceanography: T-S diagrams; mixing processes in the oceans; characteristics of important water masses.

Wind generated waves in the oceans; their characteristics; shallow and deep water waves. Propagation, refraction, and reflection of waves. Wave spectrum, principles of wave forecasting. Tide-producing forces and their magnitudes; prediction of tides by the harmonic method; tides and tidal currents in shallow seas, estuaries and rivers. Factors influencing coastal processes; transformation of wave in shallow water; effects of stratification; effect of bottom friction, phenomena of wave reflection, refraction and diffraction; breakers and surf; littoral currents; wave action on sediments–movement to beach material; rip currents; beach stability, ocean beach nourishment; harbor resonance; seiches; tsunami; interaction of waves and structure. Estuaries: classification and nomenclature; tides in estuaries; estuarine circulation and mixing; depth – averaged and breadth – averaged models; sedimentation in estuaries; salinity intrusion in estuaries; effect of stratification; coastal pollution; mixing and dispersal of pollutants in estuaries and near-shore areas; coastal zone management.

The global wind system; action of wind on ocean surface; Ekman's theory; Sverdrup, Stommel and Munk's theories; upwelling and sinking with special reference to the Indian ocean. Inertial currents; divergences and convergences; geostrophic motion; barotropic and baroclinic conditions; oceanic eddies, relationship between density, pressure and dynamic topography; relative and slope currents. Wind driven coastal currents; typical scales of motion in the ocean. Characteristics of the global conveyor belt circulation and its causes.

Formation of subtropical gyres; western boundary currents; equatorial current systems; El Nino; monsoonal winds and currents over the North Indian Ocean; Somali current; southern ocean. Upwelling process in the Arabian Sea.

Chemical Oceanography: Composition of seawater – Classification of elements based on their distribution; major and minor elements, their behavior and chemical exchanges across interfaces and residence times in seawater.

Element chemistry in atypical conditions-estuaries, hydrothermal vents, anoxic basins, HNLC waters, sediment pore fluid and anthropogenic inputs.

Chemical and biological interactions–Ionic interactions; biochemical cycling of nutrients, trace metals and organic matter. Air-sea exchange of important biogenic dissolved gases; carbon dioxide- carbonate system; alkalinity and control of pH; biological pump.

Factors affecting sedimentary deposits-CaCO3, Silicate, Manganese nodules, phosphorites and massive single deposits.

Geological Oceanography

Biological Oceanography: Classification of the marine environment and marine organisms.

Physio-chemical factors affecting marine life–light, temperature, salinity, pressure, nutrients, dissolved gases; adaptation and biological processes.

Primary and secondary production; factors controlling phytoplankton and zooplankton abundance and diversity; nekton and fisheries oceanography; benthic organisms; coastal marine communities and community ecology – estuaries, coral reefs and mangrove communities, deep-sea ecology including hydrothermal vent communities.

Energy flow and mineral cycling – energy transfer and transfer efficiencies through different trophic levels; food webs including the microbial loop.

Human impacts on marine communities; impacts of climate change on marine biodiversity. Impact of pollution on marine environments including fisheries.

Code No: 18

विषय - हिन्दी

पाठ्यक्रम

इकाई - 1

हिन्दी भाषा और उसका विकास।

हिन्दी की ऐतिहासिक पृष्ठभूमि: प्राचीन भारतीय आर्य भाषाएं, मध्यकालीन भारतीय आर्य भाषाएं- पालि, प्राकृत शौरसेनी, अर्द्धमागधी, मागधी, अपभ्रंश और उनकी विशेषताएं, अपभ्रंश अवहठ और पुरानी हिन्दी का संबंध, आधुनिक भारतीय आर्य भाषाएं और उनका वर्गीकरण। हिन्दी का भौगोलिक विस्तार : हिन्दी की उपभाषाएं, पश्चिमी हिन्दी, पूर्वी हिन्दी, राजस्थानी, बिहारी तथा पहाड़ी वर्ग और उनकी बोलियां - खड़ीबोली, व्रज और अवधी की विशेषताएं। हिन्दी के विविध रूप : हिन्दी, उर्दू, दक्खिनी, हिन्दुस्तानी। हिन्दी का भाषिक स्वरूप: हिन्दी की स्वनिम व्यवस्था खंड्य और खंड्येतर, हिन्दी ध्वनियों के वर्गीकरण का आधार, हिन्दी शब्द रचना-उपसर्ग, प्रत्यय, समास, हिन्दी की रूप रचना: लिंग, वचन और कारक व्यवस्था के सन्दर्भ में संज्ञा, सर्वनाम, विशेषण और क्रिया रुप, हिन्दी - वाक्य रचना। हिन्दी भाषा प्रयोग के विविध रूप: बोली, मानक भाषा, राजभाषा, राष्ट्रभाषा और सम्पर्क भाषा। संचार माध्यम और हिन्दी, कम्प्यूटर और हिन्दी, हिन्दी की संवैधानिक स्थिति। देवानागरी लिपि: विशेषताएं और मानकीकरण।

इकाई - 2

हिन्दी साहित्य का इतिहास

हिन्दी साहित्येतिहास दर्शन

हिन्दी साहित्य के इतिहास लेखन की पद्धतियां

हिन्दी साहित्य का कालविभाजन और नामकरण, आदिकाल की विशेषताएं एवं साहित्यिक प्रवृत्तियां, रासो-साहित्य, आदिकालीन हिन्दी का जैन साहित्य, सिद्ध और नाथ साहित्य, अमीर खुसरो की हिन्दी कविता, विद्यापति और उनकी पदावली तथा लौकिक साहित्य

भक्तिकाल

भक्ति-आंदोलन के उदय के सामाजिक-सांस्कृतिक कारण, भक्ति-आंदोलन का अखिल भारतीय स्वरुप और उसका अन्तःप्रादेशिक वैशिष्ट्य।

भक्ति काव्य की सामाजिक-सांस्कृतिक पृष्ठभूमि, आलवार सन्त, भक्ति काव्य के प्रमुख सम्प्रदाय और उनका वैचारिक आधार। निर्गुण-सुगण कवि और उनका काव्य।

रीतिकाल

सामाजिक-सांस्कृतिक पृष्ठभूमि, रीतिकाल की प्रमुख प्रवृत्तियां (रीतिबद्ध, रीतिसिद्ध, रीतिमुक्त) रीतिकवियों का आचार्यत्व।

रीतिकाल के प्रमुख कवि और उनका काव्य

आधुनिक काल

हिन्दी गद्य का उद्भव और विकास। भारतेन्दु पूर्व हिन्दी गद्य, 1857 की क्रान्ति और सांस्कृतिक पुनर्जागरण, भारतेन्दु और उनका युग, पत्रकारिता का आरम्भ और 19वीं शताब्दी की हिन्दी पत्रकारिता, आधुनिकता की अवधारणा।

द्विवेदी युग : महावीर प्रसाद द्विवेदी और उनका युग, हिन्दी नवजागरण और सरस्वती, राष्ट्रीय काव्य धारा के प्रमुख कवि, स्वछन्दतावाद और उसके प्रमुख कवि।

छायावाद : छायावादी काव्य की प्रमुख विशेषताएं, छायावाद के प्रमुख कवि, प्रगतिवाद की अवधारणा, प्रगतिवादी काव्य और उसके प्रमुख कवि, प्रयोगवाद और नई कविता, नई कविता के कवि, समकालीन कविता (वर्ष 2000 तक) समकालीन साहित्यिक पत्रकारिता।

हिन्दी साहित्य की गद्य विधाएं

हिन्दी उपन्यास : भारतीय उपन्यास की अवधारणा।

प्रेमचन्द पूर्व उपन्यास, प्रेमचन्द और उनका युग।

प्रेमचन्द के परवर्ती उपन्यासकार (वर्ष 2000 तक)। हिन्दी कहानी: हिन्दी कहानी का उद्भव और विकास, 20वीं सदी की हिन्दी कहानी और प्रमुख कहानी आंदोलन एवं प्रमुख कहानीकार।

हिन्दी नाटक : हिन्दी नाटक और रंगमंच, विकास के चरण, भारतेन्दुयुग, प्रसाद युग, प्रसादोत्तर युग, स्वातंत्र्योत्तर युग, साठोत्तर युग और नया नाटक, प्रमुख नाट्यकृतियाँ, प्रमुख नाटककार (वर्ष 2000 तक), हिन्दी एकांकी, हिन्दी रंगमंच और विकास के चरण, हिन्दी का लोक रंगमंच और नुक्कड़ नाटक ।

हिन्दी निबंध : हिन्दी निबन्ध का उद्भव और विकास, हिन्दी निबंध के प्रकार और प्रमुख निबंधकार।

हिन्दी आलोचना - हिन्दी आलोचना का उद्भव और विकास, समकालीन हिन्दी आलोचना एवं उसके

विविध प्रकार और प्रमुख आलोचक।

हिन्दी की अन्य गद्य विधाएँ: रेखाचित्र, संस्मरण, यात्रा साहित्य, आत्मकथा, जीवनी और रिपोर्ताज, डायरी।

हिन्दी का प्रवासी साहित्य : अवधारणा एवं प्रमुख साहित्यकार।

इकाई - 3

साहित्यशास्त्र

काव्य के लक्षण, काव्य हेतु और काव्य प्रयोजन।

प्रमुख संप्रदाय और सिद्धान्त रस, अलंकार, रीति, ध्वनि, वक्रोक्ति और औचित्य।

रस निष्पत्ति, साधारणीकरण, शब्दशक्ति, काव्यगुण, काव्य दोष और प्लेटो के काव्य सिद्धान्त।

अरस्तू : अनुकरण सिद्धान्त, त्रासदी विवेचन, विरेचन सिद्धान्त। वर्ड्सवर्च का काव्यभाषा सिद्धान्त।

कॉलरिज : कल्पना और फैंटेसी।

टी.एस.इलिएट : निर्वैयक्तिकता का सिद्धान्त, परम्परा की अवधारणा।

आई.ए. रिचर्ड्स : मूल्य सिद्धान्त, संप्रेषण सिद्धान्त तथा काव्य-भाषा सिद्धान्त। रूसी रूपवाद और नयी समीक्षा। मिथक, फन्तासी, कल्पना, प्रतीक, बिम्ब।

इकाई - 4

वैचारिक पृष्ठभूमि

भारतीय नवजागरण और स्वाधीनता आन्दोलन की वैचारिक पृष्ठभूमि हिन्दी नवजागरण । खड़ीबोली आन्दोलन। फोर्ट विलियम कॉलेज

भारतेन्दु और हिन्दी नवजागरण,

महावीर प्रसाद द्विवेदी और हिन्दी नवजागरण

गांधीवादी दर्शन अम्बेडकर दर्शन

लोहिया दर्शन

मार्क्सवाद, मनोविश्लेषणवाद, अस्तित्ववाद, उत्तर आधुनिकतावाद, अस्मितामूलक विमर्श

(दलित, स्त्री, आदिवासी एवं अल्पसंख्यक)

इकाई - 5

हिन्दी कविता

पृथ्वीराज रासो - रेवा तट

अमीरखुसरो - खुसरों की पहेलियाँ और मुकरियाँ

विद्यापति की पदावली (संपादक डॉ. नरेन्द्र झा) पद संख्या 125

कबीर (सं. हजारी प्रसाद द्विवेदी) पद संख्या - 160 - 209

जायसी ग्रंथावली - (सं. रामचन्द्र शुक्ल) नागमती वियोग खण्ड

सूरदास - भ्रमरगीत सार (सं. रामचन्द्र शुक्ल) - पद संख्या 21 से 70

तुलसीदास - रामचरितमानस, उत्तर काण्ड

बिहारी सतसई - (सं. जगन्नाथ दास रखाकर) – दोहा संख्या 1 - 50

घनानन्द कवित्त - (सं. विश्वनाथ मिश्र) कवित्त संख्या 1 - 30

मीरा - (सं. विश्वनाथ त्रिपाठी) प्रारम्भ से 20 पद

अयोध्या सिंह उपाध्याय हरिऔध - प्रियप्रवास

मैथिलीशरण गुप्त - भारत भारती, साकेत (नवम् सर्ग)

जयशंकर प्रसाद - आंसू, कामायनी (श्रद्धा, लज्जा, इड़ा)

निराला - जुही की कली, जागो फिर एक बार, सरोजस्मृति, राम की शक्तिपूजा, कुकरमुत्ता, बाँधो न नाव इस ठाँव बंधु।

सुमित्रानंदन पंत - परिवर्तन, प्रथम रश्मि

महादेवी वर्मा - ग्रीन भी हूँ मैं तुम्हारी रागिनी भी हूँ, मैं नीर भरी दुख की बदली, फिर विकल है प्राण मेरे, यह मन्दिर का दीप इसे नीरव जलने दो, द्रुत झरो जगत के जीर्ण पत्र, रामधारी सिंह दिनकर - उर्वशी (तृतीय अंक), रश्मिरथी

नागार्जुन - कालिदास, बादल को घिरते देखा है, अकाल और उसके बाद, खुरदरे पैर, शासन की बंदूक, मनुष्य हूँ।

सच्चिदानंद हीरानन्द वात्स्यायन अज्ञेय-कलगी बाजरे की, यह दीप अकेला, हरी घास पर क्षण 'भर, असाध्यवीणा, कितनी नावों में कितनी बार

भवानीप्रसाद मिश्र - गीत फरोश, सतपुड़ा के जंगल

मुक्तिबोध - भूल गलती, ब्रह्मराक्षस, अंधेरे में

धूमिल - नक्सलवाड़ी, मोचीराम, अकाल दर्शन, रोटी और संसद

इकाई -6

हिन्दी उपन्यास

पं. गौरीदत्त - देवरानी जेठानी की कहानी

लाला श्रीनिवास दास - परीक्षा गुरु

प्रेमचन्द - गोदान

अज्ञेय - शेखर एक जीवनी (भाग - 1)

हजारी प्रसाद द्विवेदी - बाणभट्ट की आत्मकथा

फणीश्वर नाथ रेणु - मैला आंचल

यशपाल - झूठा सच

अमृत लाल नागर - मानस का हंस

भीष्म साहनी - तमस

श्रीलाल शुक्ल - राग दरबारी

कृष्णा सोबती - जिन्दगी नामा

मन्नू भंडारी - आपका बंटी

जगदीश चन्द्र - धरती धन न अपना

इकाई - 7

हिन्दी कहानी

राजेन्द्र बाला घोष (बंग महिला) चन्द्रदेव से मेरी बातें, दुलाईवाली

माधवराव सप्रे - एक टोकरी भर मिट्टी

सुभद्रा कुमारी चौहान - राही

प्रेमचंद - ईदगाह, दुनिया का अनमोल रतन

राजा राधिकारमण प्रसाद सिंह - कानों में कंगना

चन्द्रधर शर्मा गुलेरी - उसने कहा था

जयशंकर प्रसाद - आकाशदीप

जैनेन्द्र - अपना-अपना भाग्य

फणीश्वरनाथ रेणु - तीसरी कसम, लाल पान की बेगम

अज्ञेय - गैंग्रीन

शेखर जोशी - कोसी का घटवार

भीष्म साहनी - अमृतसर आ गया है, चीफ की दावत

कृष्णा सोबती - सिक्का बदल गया

हरिशंकर परसाई - इंस्पेक्टर मातादीन चांद पर

ज्ञानरंजन - पिता

कमलेश्वर - राजा निरवंसिया

निर्मल वर्मा - परिंदे

इकाई - 8

हिन्दी नाटक

भारतेन्दु - अंधेर नगरी, भारत दुर्दशा

जयशंकर प्रसाद - चन्द्रगुप्त, स्कंदगुप्त, ध्रुवस्वामिनी

धर्मवीरभारती - अंधायुग

लक्ष्मीनारायण लाल - सिंदूर की होली

मोहन राकेश - आधे-अधूरे, आषाढ़ का एक दिन

हबीब तनवीर - आगरा बाज़ार

सर्वेश्वरदयाल सक्सेना - बकरी

शंकरशेष - एक और द्रोणाचार्य

उपेन्द्रनाथ अश्क - अंजो दीदी

मन्नू भंडारी - महाभोज

इकाई -9

हिन्दी निबंध

भारतेन्दु - दिल्ली दरबार दर्पण, भारतवर्षोन्नति कैसे हो सकती है

प्रताप नारायण मिश्र - शिवमूर्ति

बाल कृष्ण भट्ट - शिवशंभु के चिट्ठे

रामचन्द्र शुक्ल - कविता क्या है

हजारी प्रसाद द्विवेदी - नाखून क्यों बढ़ते हैं

विद्यानिवास मिश्र - मेरे राम का मुकुट भीग रहा है

अध्यापक पूर्ण सिंह - मजदूरी और प्रेम

कुबेरनाथ राय - उत्तराफाल्गुनी के आस-पास

विवेकी राय - उठ जाग मुसाफिर

नामवर सिंह - संस्कृति और सौंदर्य

इकाई -10

आत्मकथा, जीवनी तथा अन्य गद्य विधाएं

रामवृक्ष बेनीपुरी - माटी की मूरतें

महादेवी वर्मा - ठकुरी बाबा

तुलसीराम - मुर्दहिया

शिवरानी देवी - प्रेमचन्द घर में

मन्नू भंडारी - एक कहानी यह भी

विष्णु प्रभाकर - आवारा मसीहा

हरिवंशराय बच्चन - क्या भूलूँ क्या याद करूँ

रमणिका गुप्ता - आपहृदरी

हरिशंकर परसाई - भोलाराम का जीव

कृष्ण चन्दर - जामुन का पेड़

दिनकर - संस्कृति के चार अध्याय

मुक्तिबोध - एक लेखक की डायरी

राहुल सांकृत्यायन - मेरी तिब्बत यात्रा

अज्ञेय - अरे यायावर रहेगा याद

Code No.19

SUBJECT: HISTORY

SYLLABUS

Unit-1: Ancient Indian History

Sources of Ancient Indian History: Archaeological Sources: Exploration, Excavation, Epigraphy, Numismatics, Monuments. Literary Sources: Indigenous: Primary and Secondary–Problem of Dating- Myths, Legends, etc.–Religious and Secular Literature–the Puranas and the Epics – Foreign accounts: Greek, Chinese and Arabs- Geographical Factors -Pre-Historic Age- Hunting and Gathering- Paleolithic Age or Early Stone Age and Mesolithic Age–Mesolithic Culture–Neolithic Age–Beginning of Agriculture, the Age of Metals–Pastoralism and Food production: Chalcolithic Age [Generally, the Prehistoric Period categorized in three archaeological periods: the Stone Age, Bronze Age and Iron Age]. Indus Valley Civilisation: Introduction to Indus Valley Civilisation–Extent of the Civilisation–Main Cities of Indus Valley Civilization–Town Planning–Religion, Society and Polity–Decline of Indus Valley Civilisation.

Unit-2:

First urbanization in India–Megalithic Cultures–Megaliths of South India–Introduction of Iron Technology (Use of Iron in Agriculture)–Iron Age in India–Urban Occupations, Crafts and Pottery. Vedic Period: Migrations and Settlements–Original Home of the Aryans–Evolution of Social and Political Institutions–Four Stages of life (chaturashrama system): Economic Condition–Religious Condition–Vedic Gods and their Importance–The Later Vedic Age or The Epic Age–Political, Social, Economic and Religious Conditions – Philosophical Ideas, Rituals and Practices–Vedic Literature- Condition of India during the Epic Period–Development of Image-worship among the Aryans–Significance of the Vedic Age–Evolution of Monarchy.

Unit–3: Expansion of State System

Formation of States (Mahajanapada): From State to Empire: Monarchies and Republics–Economic and Social Developments and Emergence of Second Urbanization in 6th century BCE:

Emergence of Heterodox sects- Jainism, Buddhism and Ajivikas–From State to Empire: Rise of Magadha and Foreign Invasions- Persian and Macedonian Invasions and their Impact–Greek invasion under Alexander and its effects–Mauryan Empire: Foundation of the Mauryan Empire–Chandragupta Maurya -Mauryan Polity, Society and Economy -Mauryan Art and Architecture–Ashoka-Kalinga Warandits Impact-Concept of Ashoka's Dhamma and its Nature-Ashokan edicts–Brahmi and Kharoshthi Scripts–Arthashastra of Kautilya–Indian Society under the Mauryas- Downfall of the Mauryan Empire–Dissolution of Empire and Emergence of Regional Powers: Indo-Greeks, Sungas: Pushyamitra-Importance of the Sungas–Growth of Bhagavata Cult and Revival of Brahmanical Religion -Satavahanas, The Kushanas–Origin and Original Home of the Kushanas–Kanishka I–Contact with Outside World–Growth of Urban Centres–Economy–Crafts and Guilds–Coinage–Development of Religions–Bhagavatism and Saka- Ksatrapas.

Unit-4:

Sangam literature: Polity and Society in South India as reflected in Sangam literature–Trade and commerce from 2nd century BCE to 3rd century CE – Trade with the Roman World–Emergence of Mahayana Buddhism–Kharavela and Jainism – Post–Mauryan Art and Architecture –School of Art in Ancient India: Gandhara, Mathura and Amaravati Schools.

Gupta Vakataka age: Sources–Founders–Chandragupta I–Administration of Guptas–Bureaucracy of the Government–Council of Ministers–Agrarian Economy: Land Grants, Land Revenue and Land Rights–Coinage of the Guptas–Beginning of Temple Architecture -Emergence of Puranic Hinduism–Decline of Urban Centres–Indian Feudalism–Caste System: Changing Social Structure–Position of Women–Education and Educational Institutions–Development of Sanskrit Language and Literature. Developments in Science and Technology, Astronomy, Mathematics and Medicine–Contact with Neighbouring Countries: Central Asia, South-East Asia, China–Harsha and his Times: Administration and Religion–Salankayanas and Visnukundins in Andhradesa.

Unit-5: Emergence of Regional Kingdoms

Emergence of Regional Kingdoms: Kingdoms in Deccan: Gangas, Kadmabas, Western and Eastern Chalukyas, Rashtrakutas, Kalyani Chalukyas, Kakatiyas, Hoysalas and Yadavas–Kingdoms in South India: Pallavas, Ceras, Cholas and Pandyas–Kingdoms in Eastern India: Palas and Senas of Bengal, Varmans of Kamarupa, Bhaumakaras and Somavamsis

of Odisha–Kingdoms in Western India: Maitrakas of Vallabhi and Chalukyas of Gujarat–Kingdoms in North India: Gurjara-Pratiharas, Kalacuri-Chedis, Gahadavalas and Paramaras–Characteristics of Early Medieval India: Administration and Political Structure–Legitimation of Kingship–Agrarian Economy: Land Grants–Changing Production Relations: Graded Land Rights and Peasantry, Water Resources, Taxation System, Coins and Currency System–Trade and Urbanization: Patterns of Trade, Urban Settlements, Ports and Trade Routes, Merchandise and Exchange–Guilds: Trade and Colonization in South–East Asia–Temple Architecture and Regional Styles–Growth of Brahminical Religions: Vaisnavism and Saivism–Temples: Patronage and Regional Ramification- Society: Varna, Jati and Proliferation of Castes–Position of Women: Gender, Marriage and Property Relations–Women in Public Life–Tribes as Peasants and their place in Varna order–Untouchability – Growth of Regional Languages.

Education and Educational Institutions: Institution of Temples and Mathas–Agraharas and Mahaviharasas the Centres of Education. Kayastha System of Teaching–The Arab Invasion of Sindh–Suleiman Ghaznavid conquests Alberuni's Accounts.

Unit-6: Research in History:

Scope and Importance of History- Objectivity and Bias in History–Criticism in History, Causation of History–History and its Auxiliary Science–Significance of Regional History–Synthesis and Presentation–Recent Trends of Indian History–Research Methodology–Hypothesis in History–Area of Proposed Research- Sources: Data Collection, Primary, Secondary, Original and Transit Sources–Research Versus Review Articles–Trends in Historical Research–Recent Indian Historiography–Selection of Topic in History- Notes Taking, References, Footnotes and Bibliography–Thesis and Assignment Writing–Plagiarism–Beginnings of Historical Writings – Greek, Roman and Church Historiography–Renaissance and its Impact on History Writing –Negative and Positive Schools of Historical Writing- Cyclical Theory of History– Oswald Spengler; Challenge and Response Theory – Arnold Joseph Toynbee; Post Modernism in History.

Unit–7: Medieval Indian History

Sources of Medieval Indian History: Archaeological: Epigraphic, Numismatic Sources–Material Evidences and Monuments–Chronicles; Literary Sources–Arabic, Persian and Sanskrit Literature–Regional languages–Archival Materials–Foreign Traveller's Accounts: Persian and Arab. Political Developments: Foundation of Delhi Sultanate–The Ghoris, the Turks, the Khaljis, the Tughlaqs, the Sayyids and the Lodis–Decline of Delhi Sultanate–Administrative Structure, Society and Culture, Art and Architecture and Literature during Delhi Sultanate–Religious Movements–Sufism and Bhakti Movement–Famous Saints of Medieval Period–The Mongol Invasions and its Impact- Rise of Provincial Kingdoms–Vijayanagara Bahmani Kingdoms: Vijayanagara Empire–Foundation of Vijayanagara Kingdoms–Krishnadeva Raya–Nature of Vijayanagara State–Nayankara System–Ayagar System–Revenue Administration- Economy–Trade–The Bahmani Kingdom: Administration–Economy and Society–Social Structure.

Mughal Period: Sources and Monuments of the Mughal Period-Foundation of Mughal Empire–Suris–Expansion and Consolidation from Akbar to Aurangzeb–Mughal Relations with the Nobility and the Rajputs–India in the first half of the 17th Century–Jahangir–The Period of Stability of Expansion- The Period of Crises–Nur Jahan–Shah Jahan–Aurangzeb.

Unit–8:

Crisis of the Jagirdari System–Decline of Mughal Empire -Later Mughals and Disintegration of the Mughal Empire. Rise of the Marathas–the foundation of Swaraj by Shivaji and its expansion under the Peshwas – Maratha Administration-Asta Pradhan- Mughal Expansion and Consolidation: Maratha Confederacy–Mahadaji Scindia, Maharaj Yashwant Rao Holkar–British Intervention–Decline of Maratha Empire–Deccan Sultanate (Post- Bahamani Era): Ahmadnagar, Berar, Bidar, Bijapur and Golconda -Rise, Expansion and Disintegration: Eastern Gangas–Anantavarman Chodaganga and Suryavamshi Gajapatis–Kapilendra Deva. Sher Shah Suri–Administrative Reforms and his Contribution–Mughal Administration–Mansabdari System and the Army–Jagirdari System–Organisation of Government and State–Land Revenue System–Inam Grants–Bhaktism: Dana, Tirtha and Bhakti–Tamil Bhakti Movement- Shaivism, Vaishnavism and Shaktism–Nayanmars (Shivism) and Alvars (Vaishnavism) Shankaracharya (Advaita), Ramanuja(Vishista Advaitavada) The Saints of the Medieval Period (North and South) – their impact on Socio- Political and Religious Life – Women Saints of Medieval India–The Sikh Movement – Guru Nanak Devand His Teachings and Practices, Adi Granth, the Khalsa-Social Classification: The Ruling Classes: The Nobles and Zamindars – the Rural Gentry–Middle Strata–Major Religious Groups: the Ulemas, the Mercantile and Professional Classes – Trade and Commerce: Dutch and English Traders–Hundis – Foreign Trade and the European Traders –Rajput Society: Position of Women – Zanana System – Devadasi System. Development of Education–Madarasa Education–Fine Arts: Major Schools of Painting – Mughal, Rajasthani, Pahari and Garhwali–Development of Music–Art and Architecture:

Indo-Islamic Architecture, Mughal Architecture, Regional Styles–Indo-Arabic Architecture–Mughal Gardens–Maratha Forts, Shrines and Temples.

Unit-9: Modern Indian History

Sources of Modern Indian History: Archieval Materials, Biographies and Memoirs, Newspapers, Oral Evidence, Creative Literature and Painting, Monuments, Coins–Rise of British Power: The Early European Settlements and Anglo-French Conflicts–European Traders in India in the 16th to 18th Centuries–The Portuguese: Francisco De Almeida–Naval Battle -Maritime Trade and Supremacy over the Indian Ocean–End of Portuguese Power in India–The Dutch: Dutch Settlements in India–Birth and Decline of Coromandel Government–The Dutch in Bengal and Malabar–The English: Establishment and Expansion of British Dominion in India–The French: The Impact of the European Trade–British Relations with Principal Indian States–Bengal, Oudh, Hyderabad, Mysore, Carnatic and Punjab–Revolt of 1857: Causes, Nature and Impact–Administration of the Company and the Crown–Evolution of Central and Provincial Structure under East India Company. Paramountcy, Civil Service, Judiciary, Police and the Army under the Company–British Policy and Paramountcy in the Princely States under the Crown: Local Self- Government–Constitutional Changes, 1909 – 1935–Colonial Economy: Changing Composition, Volume and Direction of Trade–Transformation of Indian Economy into Colonial Economy–Expansion and Commercialization of Agriculture: Land Rights, Land Settlements, Rural Indebtedness, Landless Labour, Irrigation and Canal System–Decline of Industries. Changing Socio-Economic Conditions of Artisans – De-urbanisation–Economic Drain–World Wars and Economy–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–Communications – Post & Telegraph–Growth of New Urban Centres: New Features of Town Planning and Architecture, Urban Society and Urban Problems–Famines, Epidemics and the Government Policy–Tribal and Peasant Movements.

Unit-10:

Indian Society in Transition: Contact with Christianity – the Missions and Missionaries; Critique of Indian Social and Economic Practices and Religious Beliefs; Educational and Other Activities–The New Education: Government Policy- Levels and Contents–English Language–Development of Science, and Technology, Public Health and Medicine – Towards Modernism. Indian Renaissance – Socio–Religious Reforms–Emergence of Middle Class–Caste Associations and Caste Mobility. Women's Question – Nationalist Discourse–Women's Organisations–British Legislation concerning Women–Gender Identity and Constitutional Position–The Printing Press – Journalistic Activity and the Public opinion- Modernisation of Indian Languages and Literary Forms – Re-orientation in Painting, Music and Performing Arts.

Rise of Indian Nationalism

Rise of Nationalism: Social and Economic basis of Nationalism – Birth of Indian National Congress–Ideologies and Programmes of the Indian National Congress 1885 -1920: Early Nationalists, Assertive Nationalists and Revolutionaries–Trends in Swadeshi and Swaraj Movement–Indian Revolutionary Movement in India and Abroad–Gandhian Mass Movements–Subas Chandra Bose and INA–Role of Middle Class in National Movement–Women Participation in National Movement–Left Wing Politics–Depressed Class Movement–Ideologies and Programmes of the Justice Party–Towards Independence and Partition (1930-1947)–Communal Politics; Muslim League and Genesis of Pakistan–Towards Independence and Partition–Indian Independence Act, 1947–India Wins Freedom -India after Independence: Challenges of Partition–Integration of the Indian Princely States; Kashmir, Hyderabad and Junagarh–B.R.Ambedkar – The Making of the Indian Constitution and its Features–The Structure of Bureaucracy–New Education Policy–Economic Policies and the Planning process: Development, Displacement and Tribal Issues–Linguistic Re-organisation of States–Centre-State Relations–Foreign Policy Initiatives–Panchsheel–Dynamics of Indian Politics–Emergency–Liberalisation–Privatisation and Globalisation of Indian Economy.

Code No: 20

SUBJECT : HISTORY EDUCATION

SYLLABUS

Unit 1 Introduction to Indian History

Sources of Indian – History – Geography of Indian- Harappan civilization – Vedic age – Jainism and Buddhism – Mauryas: Chandra Gupta–Ashoka – Mauryan administration – Kanishka – Guptas: Samudra Gupta – Chandra Gupta II – Classical age – Harshavarthana. Arab conquest of Sindh and Muslim invasions slave dynasty – Alauddin Khilji – Thuglaqs–Society – Religion and culture under the Vijayanagar rule – Mughals–Babar to Aurangzeb – Shershah Suri–Administration – Society, Religion and Culture under the Mughals – Shivaji – Maratha administration.

Unit 2 British Rule in India

Foundation of British rule in India – Robert Clive – Warren Hastings – Corn Wallis, Wellesley, Hastings, William Bentinck – Dalhousie–Great Mutiny 1857 – Social and religious reform movements in India in the nineteenth century – Indian – National Movement – Constitutional development in India from 1858 to 1947 and afterwards.

Unit – 3 Developmental Policies

Integration of Indian States – Republican Constitution of India, Gandhian and Nehru Eras – India's role in world affairs–Sources of the History of Tamil Nadu – Sangam age and its culture – Pallava dynasty – Social, Economic, Religious and Cultural developments under Pallavas – Imperial Cholas and their administration, Social Life, religion and culture.

Unit – 4 History of Tamil Nadu

Later Pandyas and the Muslim invasions in Tamil Nadu Thirumalainaickar – Later Polygar rebellion – Tamil Nadu and Freedom struggle – Social reform movements in Tamil Nadu – Political social and economic developments in Tamil Nadu since 1947–The coming of the Europeans–European Settlements in Tamil Nadu–economic and religious activities–European interference in native states. Karnatic wars–Hyder Ali and Tipu Sultan in Tamil Nadu–Nayaks of Madurai–Gingee–Tanjore–Vellore–Administration-Art, Architecture–Social Life and Cultural expansion.

Unit – 5 International History

Unification of Italy and Germany – Russian revolution – First World War and Peace Treaties – League of Nations, Rise of Dictatorships – Hitler, Mussolini and Kamal Paksha – II World War – U.N.O. and Cold War– Geographical discoveries, Renaissance and Reformation Age of Enlightened depots – Industrial and Agrarian revolutions – French revolution – Napoleon – Congress of Vienna.

Unit 6–Foundations of Education

Philosophical Perspectives: Idealism, Naturalism, Pragmatism, Progressivism, Existentialism, Humanism, Realism, Eclecticism – Philosophers and their contributions: Western Philosophers: Rousseau, Froebel, Maria Montessori, Pestalozzi, Bertrand Russell, John Dewey – Indian Philosophers: Mahatma Gandhi, Rabindranath Tagore, Swami Vivekananda, J.Krishnamurti, Aurobindo – Development of Indian Education during Pre-Independence, Post-Independence, Modern era–Important Education Committees – Recommendations of National Education Policies, National Curriculum Frameworks.

Sociological Perspectives: Concepts of Special and Inclusive Education, Women Education, Population Education, Vocational Education, Environmental Education for sustainable development-UN SDG goals, Human Rights: UN Declaration of Human Rights, Peace and Value Education – Indian Constitution: Articles and Amendments related to Education–Culture and Communication in Education – Social issues: Measures and Reforms – Social Structure, Socialization process – Social stratification – Indigenous Value systems – History and Culture of Tamil Nadu: Social Equality, Language, Culture and Politics.

Unit 7 - Educational Psychology

Educational Psychology – Cognitive, Humanistic, Behavioural and Transpersonal school of thoughts – Role of heredity and environment – Dimensions of Development: Physical, Cognitive, Psycho-Social, Moral, Behavioural, Language – Theories of Development: Piaget, Bruner, Kohlberg, Erickson, Vygotsky, Noam Chomsky, Watson–Developmental tasks – Sensation and Perception–Factors of learning: Attention, Interest, Aspiration,

Motivation and its types, Motivational Theories: Maslow, McDougall's, McClelland – Learning, Factors of Learning, Theories: Trial & Error, Operant and Classical Conditioning, Insight and Gestalt – Intelligence: Theories – Single-Factor, Two-Factor, Triarchic, Group and Multi-factor theory, Guilford's Structure of Intellect, Gardner's Multiple Intelligence theory, Factor Personality: Type and Trait theories – Personality Assessment methods and techniques – Educational Implications of Learning, Intelligence and Personality theories – Mental Health, Adjustment and Defense mechanisms – Concepts of Guidance and Counselling.

Unit 8- Pedagogical approaches

Nature, Scope, Aims and Objectives, Values of Teaching the subject, Inter-disciplinary aspects, Taxonomy of Educational Objectives: Bloom's, Anderson's, RCEM, NCERT –Micro-teaching: Skills and Components, Micro Cycle, Link Lesson–Planning of the lesson: Curricular Plan, Unit Plan and Lesson Plan, General and Specific Instructional objectives, Action verbs – Methods of Teaching: Traditional and Modern Methods – Techniques of Teaching: Small and Large Group Techniques – Models of Teaching: Concept attainment, Advanced Organizers, Inquiry Training, Information Processing, Personalized Model – Resources for Teaching-Learning: Text Books, Laboratory, Library, E-resources and Field-trips – Flander's Classroom Interaction Analysis – Dale's Cone of Experience – Educational Technology and ICT Resources in Teaching-Learning: Blended Learning, Simulation, Augmented Reality, Virtual Learning – Digital Resources – Assessment and Evaluation: Types of Tests, Steps in construction of an achievement test – Continuous and Comprehensive Evaluation – Analysis and Interpretation of test scores.

Unit 9–Curriculum Components and Teacher Education

Curriculum – Principles, Bases of Curriculum: Philosophical, Psychological and Sociological, Criteria of selection of content – Types: Subject, Learner, Community and Activity centred curriculum – Concepts of core and hidden curriculum – Curriculum Organization: Articulation, Balance and Continuity – Approaches: Concentric, Spiral, Topical, Logical, Vertical and Horizontal – Curricular Materials – Role of NCERT and SCERT in curriculum planning – Stakeholders contribution and participation in the curricular, co-curricular and extra-curricular activities – Curriculum Evaluation and Theories: Tyler's model, Hilda Taba model, Beauchamp's model, D.K.Wheeler's model, Virgil V. Herrick model.

Teacher Education – National Council for Teacher Education: Functions–Teacher Education systems and Programmes: Pre-service and In-service – Integrated Teacher Education Programmes–Concept of Teaching Profession;–Changing roles and responsibilities – Continuous Professional development and Professional ethics–National Professional Standards for Teachers – Teacher Appraisal and accountability – Significance of Teachers In-service education and training–Research and innovations in Teacher education, NAAC's Assessment and Accreditation process – Autonomy in Education: Institutional, Administrative and Teacher autonomy – Teacher Eligibility Tests – Concepts of Andragogy – Life-long and continuing education.

Unit 10 Research Methodology and Statistics

Research – Types of Research: Basic, Applied and Action Research, Sources of Selecting Research Problem, Importance of Review of Literature, Hypothesis, Variables, Sampling Techniques: Probability and Non-Probability techniques, Steps in writing research proposal and research report – Academic and Research Writing – Experimental Research Designs: Pre-Experimental, True and Quasi Designs – Factors affecting internal and external validity of experimental research, Quantitative, Qualitative and Mixed Research Methods–Research Tools: Likert and Thurstone, Personality, Interest and Intelligence test, Item and Factor analysis – Characteristics of Research tools – Statistical Analysis: Descriptive and Inferential Analysis, Hypothesis testing: Type I and Type II errors, Level of Significance, Graphical Representation of Data – Issues related to plagiarism–Research Ethics and Integrity.

Code No: 21

SUBJECT: HOME SCIENCE

SYLLABUS

UNIT-1:

FOOD SCIENCE AND FOODS SERVICE MANAGEMENT

- Food science and nutrition.
- Properties of food – physical and chemical properties
- Quality evaluation of foods–objectives and subjective.
- Effects of cooking and processing techniques on nutritional components and other physical parameters, food preservation and application.
- Food pigments and additives.
- Food standards, microbiological safety of food, HACCP, food packaging.
- Perspectives of food service–menu planning, food cost analysis.
- New product development–nano technology
- Food service management of institutional level-hospital, educational institutions, social and special institutions
- Research methods–fundamental issues, concept, need relevance, scope and ethics in research

Unit 2 :

NUTRITION AND DIETETICS

- Food groups – balanced diet, food pyramid, macro and micro nutrition.
- Nutrients – role of nutrients in the body, nutrient deficiencies and requirements for Indians.
- Public health nutrition
- Nutrition through life span–physiological changes, growth and development from conception to adolescence, nutritional needs and dietary guidelines for adequate nutrition through life cycle, nutrition concerns.
- Community nutrition, sports nutrition, nutrition in emergencies and disasters.
- Nutritional assessment–methods and techniques.
- Nutritional intervention–national nutrition policies and programme, food and nutrition security.
- Clinical and therapeutic nutrition.
- Diet counseling and management.
- Research methods–research designs, principles and purpose of research

Unit-3 :

TEXTILES

- Textile terminologies–fibre, yarn, weave, fabric etc., classification of fibers, yarns and weaves, Identification of fibers and weaves.
- Manufacturing process of major natural and manmade fibres, properties and their end uses.
- Different methods of fabric construction–woven, knitted and non woven fabrics, their properties and end uses.
- Textiles finishes–classification, processing and purposes of finishes.

- Dyeing and printing–classification, method of block printing, tie and dye, batik, roller printing, screen printing, discharge, heat transfer printing and digitized printing.
- Traditional textiles of India–embroidered textiles, printed textiles, woven textiles, dyed textiles of various regions in India. Identification on the basis of fibre content , technique, motif, colour and designed.
- Textile Testing and quality control–need of testing, sampling method, techniques of testing fibres, yarn, fabrics and garments. Testing of colour – fastness, shrinkage, pilling and GSM of fabrics.
- Textile and environment–banned dyes, eco-friendly textiles, contamination and effluent treatment, Eco-label and eco marks.
- Recent developments in textiles and apparels–nano textiles, technical textiles, occupational clothing, zero waste designing, up cycling and recycling.
- Research methods–types of research, descriptive, survey, historical, qualitative, quantitative, analytical and action research

Unit 4 :

APPAREL DESIGNING

- Body measurements–procedure, need, figure types and anthropometry.
- Equipments and tools used for manufacturing garments–advancements and attachments used for sewing machine. Types of machines used and their parts.
- Elements and principle so design and its application to apparel. Illustrations and parts of garments.
- Fashion–Terminologies, fashion cycle, fashion theories, fashion adoption, fashion forecasting and factors affecting fashion.
- Pattern making–drafting, draping and flat pattern making techniques, pattern alteration and dart manipulation techniques.
- Apparel manufacturing–terminology used, seams, techniques and machines used, process of fabric to apparel manufacture.
- Apparel Quality testing–Quality standards and specification, Quality parameters and defects of fabrics and garments.
- Care and maintenance of clothing–principles of washing, laundry agents, storage techniques case labels and symbols.
- Selection of clothing for different age groups. Selection of fabrics for different end uses.
- Research methods–hypothesis testing, types and scope

UNIT-5

RESOURCE MANAGEMENT AND CONSUMER ISSUES

- Management–concept, approaches, management to time, energy, money, space, motivating factors, motivation theories, decision making.
- Functions of management–planning, supervision, controlling, organizing, evaluation, family life cycle–stages, availability and use of resources.
- Resources–classification, characteristics, factors affecting use, resource conservation, time management ,work simplification techniques, classes of change, fatigue and its management.
- Management of natural resources–land, forest, water, air, water harvesting, municipal solid waste management, concept of sustainable development, SDGs.
- Money management–family income, types, supplementation, budgeting, household accounts, family savings and investment, tax implications.

- Human resource management–functions, need, human resource development- challenges, functions, manpower planning, training need assessment, training methodologies, training evaluation.
- Consumer–definition, role, rights and responsibilities, consumer behavior, consumer problems, education and empowerment.
- Consumer protection–consumer organization, cooperatives, alternative redressal, standardization, standard marks, quality control, buying aids, consumer legislation.
- Entrepreneurship–concept, process, barriers, entrepreneurial motivation, challenges, enterprise setting, project planning and appraisal, enterprise management.
- Research methods–sampling techniques, types of sampling, sampling procedures, probability and non probability sampling

Unit–6

HOUSING AND INTERIOR DESIGN

- Design fundamentals – elements of art, principles of design, principles of composition.
- Colour–dimensions of colour, psychological effects of colour, colour schemes, factors affecting use of colour.
- Space planning and design–housing need and important principles of planning spaces, types of house plans, economy in construction, planning for different income groups.
- Building regulations–norms and standards, zoning, housing for special group sand areas, housing finance.
- Housing and environment–building materials–impact on environment, green rating systems, energy efficiency in buildings, energy auditing, indices of indoor comfort.
- Energy as a resource–conventional and non-conventional sources, renewable /non-renewable energy, energy management, national efforts on energy conservation.
- Product design–design thinking process, diffusion and innovation, design communication, ergonomic considerations.
- Ergonomics–significance, scope, anthropometry, man, machine, environment relationship, factors affecting physiological cost of work, body mechanics, functional design of work place, time and motion study, energy studies.
- Furniture and furnishing–historical perspectives, architectural styles, contemporary tends, wall finishes, window and window treatments.
- Research methods–selection and preparation of tools for data collection–questionnaire, interview, observation, measuring scales, ranking and measurement, reliability and validity of tools

UNIT-7:

CHILD / HUMAN DEVELOPMENT

- Principles of growth and development, care during pregnancy and prenatal and neonatal development.
- Theories of human development and behavior.
- Early childhood care and education – activities to promote holistic development.
- Influence of family, peers, school, community and culture on personality development.
- Children and persons with special needs, care and support, special education, prevention of disabilities, rehabilitation.
- Children at risk–child labour, street children, children of destitute, orphans, child abuse and trafficking.
- Adolescence and youth–changes, challenges and programs to promote optimal development.
- Adulthood, characteristics, changing roles and responsibilities in early and middle adulthood.

- Aging–physical and psychological changes and care needs.
- Research methods – types of variables and their selection.

Unit–8 :

FAMILY STUDIES

- Dynamics of marriage and family relationships.
- Family welfare–approaches, programmes and challenges, role in national development.
- Domestic violence, marital disharmony, conflict, resolution of conflict.
- Parent education, positive parenting, community education.
- Family disorganization, single parent families.
- Family studies – family in crisis, family therapy, initiatives for child development.
- Human rights, rights of children, rights of women, status of women, gender roles.
- Guidance and counseling–across life span and for care givers.
- Health and well being across life span development.
- Research methods–data collection and classification, coding, tabulation, inferential and descriptive statistics.

UNIT- 9 :

COMMUNICATION FOR DEVELOPMENT

- Basics of communication–nature, characteristics, functions, process, models, elements, principles, barriers, perception, persuasion and empathy, types of communication, levels (settings) of communication transactions, process of listening.
- Communication systems and communication theories–human interaction theories, mass communication theories, message design theories, communication systems, culture and communication.
- Concept of development–theories, models, measurement and indicators of development.
- Concept of development–communication models and approaches, diffusion and innovation, mass media, social marketing.
- Role of communication in development–need and importance, development journalism, writing for development-print, radio, television and internet.
- Concerns of development communication–gender, health, environment, sustainability, human rights, population, literacy, rural and tribal development.
- Advocacy and behavior change communication–concept, theories, models, approaches, application and challenges.
- Traditional, modern and new media for development–folk forms of songs, art, dance, theatre, puppetry, advertisement, cinema, ICTs for development -community radio, participatory video, social media and mobile phones.
- Organisation/ agencies/ institutes working for development communication–international /national/ state and local.
- Research methods–analysis of data through parametric and non parametric tests.

Unit 10 :

EXTENSION MANAGEMENT AND COMMUNITY DEVELOPMENT

- Historical perspectives of extension – genesis of extension education and extension systems in India and other countries, objectives of extension education and extension service, philosophy and principles of extension programme development.

- Programme management–need assessment, situation analysis, planning, organization, implementation, monitoring and evaluation.
- Extension methods and materials–interpersonal, small and large group methods, audio-visual aids–need, importance, planning, classification, preparation and field testing, use and evaluation of audio-visual materials.
- Curriculum development and planning for extension education and development activities, Bloom's taxonomy of educational objectives and learning.
- Non-Formal, adult and lifelong education–historical perspectives, concept, theories, approaches, scope, methods and materials used, challenges of implementation and evaluation, issues to be addressed.
- Training, skill development and capacity building for human resource development–methods of training, entrepreneurship development.
- Community development–perspectives, approaches, community organization, leadership, support structures for community development, Panchayath raj institutions, NGOs and community based organisations.
- People's participation and stakeholders' perspectives, Participatory Learning and Action–methods and techniques.
- Development programmes in India for urban, rural and tribal population groups–programmes for nutrition, health, education, wage and self employment, women's development, skill development, sanitation and infrastructure.
- Research methods–scientific report writing, presentation of data, interpretation and discussion.

Code No : 22

SUBJECT : HUMAN RESOURCE DEVELOPMENT (HRD)

SYLLABUS

Unit–1

Principles and Practices of Management: Evolution of management Thought, Contributions of Taylor, Fayol, Mayo, Mary Parker Follett and C.I. Barnard – various approaches to management- Behavioural Approach, Systems Approach, Quantitative Approach and Contingency Approach. Function of Management: Planning and Decision Making, Organising, Staffing, Directing, Controlling, Coordinating.

Unit–2

Human Resource Management and IHRM: Concept, functions and scope of HRM. Human Resource Planning, Job Analysis, Recruitment, Selection, Placement, Induction, Training and Development, Performance Management, Job Evaluation, Compensation Management, Employee Benefits and Incentives. Organisational context of IHRM, IHRM and Sustainable Business, Functions of IHRM, Cross–Cultural Studies, Cultural Diversity, Transnational Organisations, IHRM models.

Unit–3

Organisational Behaviour: Concept, Scope, Nature of human behavior, Personality, Perception, Learning, Attitude, Motivation, Interpersonal Behaviour, Group Dynamics, Leadership qualities and theories, team building and team effectiveness. Power and Authority, Stress, Organisational Change and transactional analysis.

Unit–4

Industrial Relations: Concept, Scope, causes for poor industrial relations, industrial relations machinery – joint consultation, works committee, conciliation, adjudication, attribution, grievance procedure, code of conduct and collective bargaining. Workers Participation in Management (WPM) Trade Unions**–**Concepts, Role and Evolution, Problems of trade unions in India. International labour movement. Trade Union Act 1926.

Unit–5

Labour Legislation and industrial disputes: Classification and Evolution of International Labour Organisation, Social Justice and Labour Legislation in India–Indian Constitution and Labour Laws. The Factories Act, 1948. The Mines Act, 1952. The Inter-state Migrant Workmen (Regulation of employment and conditions of service) Act, 1979. The Contract Labour (Regulation and Abolition) Act, 1970. The Building and other Construction workers (Regulation of employment and conditions of service) Act, 1996. The Child Labour (Prohibition and Regulation) Act, 1986. The Industrial Employment Act, 1946- Factors and forms of disputes- Central and State Labour Administration- strikes and lockouts. Industrial Dispute Act 1947

Unit–6

Wages: Concept, Types, Factors influencing wages, Wage Theories and WageDifferentials, wage components ,wage criteria and machinery-The Minimum Wages Act-1948. The Payment of Wages Act, 1936–The Payment of Bonus Act, 1965–The Equal Remuneration Act, 1976–The Payment of Gratuity Act, 1972–The Employees' Provident Fund and Miscellaneous Provisions Act, 1952.

Unit–7

Labour Welfare and Compensation: Concept, Scope, Types of labor welfare–Theories and Principles–Employee safety program and its measures in organization–Industrial Health and Hygiene, Industrial Accidents and safety, Occupational Diseases–Social Security–counseling and mental health–Concept and Scope, Social assistance and Social assurance and other fringe benefits .

Unit – 8

Labour Economics: Concept and evolution of labour Economics–Demand and Supply of Labour, Nature and Composition of Indian Labour Force, Unemployment and Underemployment, Types of Labour Market, Characteristics of Indian Labour Market, Emerging trends in mobility, migration and efficiency–New Dynamics of Labour Market in India, Economic Systems and Labor Market, Problems of Labour in India.

Unit 9

Human resource Development–concept, mechanism, process and outcomes. HRD intervention–HRD audit–HRD culture and climate–Career management -competency mapping–new trends in HRD. Consultant, client relationship. Knowledge management and Human Resource Information System.

Unit 10

Organisational Development – Concept and process, assumptions and values underlying OD. OD interventions–change agents–trends in OD–foundations of OD - emergence of OD as an applied behavioural science – challenges and future of OD.

Code No: 23

SUBJECT : HUMAN RIGHTS AND DUTIES

SYLLABUS

Unit-1

HUMAN RIGHTS AND DUTIES: CONCEPT AND NATURE

- The Basic Concepts: Individual, Group, State, Non-State Actors, Civil Society, Liberty, Freedom, Equality, Rights, Justice; Human Values: Humanity, Compassion, Virtues, Human Dignity and Human Duties.
- Human rights as universal, inherent, inalienable rights and moral rights; Universal human rights Vs. Cultural Relativism, Naturalist-Positivists Debat.
- Indian Concepts: Raj Neeti, Lok Neeti, Danda Neeti, Nyaya, Dharma
- Different Generations of Human Rights
- Liberal Perspective: Locke, Rousseau, Thomas Paine, J.S. Mill, Classical Liberalism, Neo-liberalism
- Marxian Perspective: Marx, Gramsci, Rosa Luxemberg
- Gandhian Perspective (Ruskin, Thoreau, Tolstoy): State, Power, *Swaraj*, Rights and Duties
- Dalit Perspective: Phule, Narayna Guru, Ambedkar
- Religious Perspectives
- Feminist Perspective

Unit-2

ORIGIN AND EVOLUTION OF HUMAN RIGHTS AND INTERNATIONAL STANDARDS

- Human Rights in Ancient Thoughts
- Human Rights in Middle Ages, *Magna Carta*
- Modern Movement of Human rights, Lockean Philosophy: Theory of Natural Rights, American Declaration of Independence, American Bill of Rights, The French Revolution and its goals of Liberty, Equality and Fraternity, Marxist Revolutions, Anti-Colonial Movements, Freedom Movement in India
- International Standard Setting — Universal Declaration of Human Rights (1948)
- Impact of the UDHR on the Constitutions of the “New” States
- International Standards: UN Sponsored or “Core” International Conventions on Human Rights: International Covenant on Civil and Political Rights (ICCPR), International Covenant on Economic, Social and Cultural Rights (ICESCR), Convention on the Elimination of ALL Forms of Discrimination against Women (CEDAW), Convention against Torture, Rights of Child Convention, Convention on the Rights of Migrant workers, Convention against Racial Discrimination (CRD), Convention on Rights of Persons with Disabilities (CRPD)
- State Responsibility for Protection of Human Rights: The Concept of the “Responsibility to Protect”
- Vienna Declaration on Human Rights 1993
- Helsinki Declaration
- ASEAN Declaration

Unit-3

SOCIETY, ECONOMY, POLITY, RELIGION AND CULTURE — THEIR INTER- RELATIONSHIP

- Impact of Social Structure on Human Behaviour; Role of Socializations in Human Values, Human Rights and Duties
- Science and Technology, Modernization, Globalization and Dehumanization

- Social Stratification: Racial and Caste Prejudice and Discrimination; Human Rights Issues of Weaker Sections and Ethnic Minorities
- Women: Gender Discrimination, Domestic Violence and Offences against Women; Gender Sensitive Laws Children: Child Abuse, Child Labour, Street Children
- Social Structure and Social Problems: Social and Communal Conflicts and Social Harmony
- Rural Poverty, Unemployment, Bonded Labour, Modern Forms of Slavery
- Urban Poverty, Slums, Lack of Basic Civil Amenities, Sex Workers
- Rights of Refugees, Rights of Indigenous People, Aged Persons, Migrant Workers and Human Rights Violations, Human Rights of Persons with Disabilities (PwDs) under the Rights of Persons with Disabilities Act, 2016 Rights of Displaced Persons
- Challenges in Human Rights: Religious Fundamentalism, Terrorism, Under development, Human trafficking International Crimes,

Unit - 4

STATE AND INDIVIDUAL LIBERTY

- The Changing Nature of State with Special Reference to the Developing Countries
- Soft State, Interventionist State, Welfare State, Repressive State
- Political Regimes and Human Rights.
- Impact of Science and Technology on Human Rights and Duties
- Human Rights and International Politics: Emergence of a New Global Order - Tehran Conference (1968) — Vienna Conference (1993)
- International Humanitarian Law: 1949 Geneva Conventions and Additional Protocols of 1977— International Red Cross Society
- International Criminal Tribunals (Rwanda and Former Yugoslavia) and the International Criminal Court (ICC)
- International Intervention: The Question of Nation-State, Citizenship and Sovereignty
- Right of Self-Determination: Autonomous Movements, Secessionist Movements
- Grassroots Movements and Human Rights

Unit-5

UN AND VARIOUS AGENCIES, INTER-GOVERNMENTAL (IGOs) AND NON-GOVERNMENTAL ORGANIZATIONS (INGOs)

- UN: Establishment, Objectives and the Charter Provisions
- UN Principal Organs: General Assembly, Economic and Social Council, Security Council
- Subsidiary Organ: Human Rights Council
- The Human Rights Council Advisory Committee
- Specialized Agencies: UNICEF, UNESCO, ILO, WHO
- INGOs such as the International Commission of Jurists (ICJ), Amnesty International (AI), Human Rights Watch, Green peace
- People's Union for Civil Liberties (PUCL), People's Union for Democratic Rights (PUDR) and Other Civil and Democratic Rights Organizations in India.
- UN High Commission for Refugees (UNHCR)

- UN Commission on the Status of Women
- UN High Commissioner for Human Rights

Unit-6

GROWTH MODELS AND HUMAN RIGHTS

- Models of Development: Growth Approach, Basic Needs Approach, Sustainable Human Development, Rio Declaration on Environment and Development, 1992, Rio +20, Conservation of Natural Resources, Agenda 21, Bio-Diversity Convention 1992
- Globalization and Human Rights: Dynamics of Globalization, Emergence of Market Forces, Assertion of Civil Society, Retreat of State, Privatization, Liberalization
- Emergence of Information Age
- Economic Growth Strategies (Developing Countries): Implications for Poverty Eradication, Employment issues, Planned Development and Social Inequality
- World Trade Organization: Implication for Human Rights, Impact on Developing Countries with special reference to India
- Intellectual Property Rights: Patents Law, Trade Related Intellectual Property Rights (TRIPS), Trade Related Investment Measures (TRIMS),General Agreement on Trade and Services (GATS), Agreement On Agriculture (AOA)
- Transnational Corporations (TNCs) and Human Rights Situation in Developing Countries
- Right to Development: The Third World Concerns, Working Group Recommendations, UNDP—initiatives, UN Declaration on the Right to development
- State and Development of the Marginalized/Disadvantaged Groups in India: The Poor, the Unemployed and the Socially Dislocated People
- Workers' Rights, Minimum Wages Act — Problems of Implementation, Right to Security of Food, Health, Education

Unit-7

DEVELOPMENT, UNDER DEVELOPMENT AND SOCIAL ACTION

- Need for Collective Action in Developing Societies and Methods of Social Action
- Land, Water and Forest Issues with special reference to India
- Social Movements: Political, Social and Religious Reform
- National Commission for Women, Children, Minorities, Scheduled Castes and Scheduled Tribes
- Backward Class, Dalit and Women Movements
- Agrarian and Peasant Movements
- Right to a Healthy Environment
- Principle of Sustainable Development
- Ecological and Environment Movements
- Civil Societies and NGOs, NGOs of India

Unit-8

HUMAN RIGHTS AND INDIAN CONSTITUTION

- Indian Civilization: Change and Continuity.
- Indian Constitution: Freedom Movement

- Indian Constitution: Sociological Foundation
- Constitutional Vision of Role of the State
- Constitutional Vision of Freedom: Fundamental Rights and the International standards
- Constitutional Vision of Justice: Directive Principles of State Policy and international standards
- Public Interest Litigation (PIL), Indian Judiciary and Human Rights
- Judicial Interpretations: Landmark Judgments Fundamental Duties
- Constitutional Amendments
- Fundamental Duties

Unit-9

CONSTITUTIONAL GOVERNANCE

- Rule of law, Good Governance
- Constitutional Organs: Inter and intra-Relationships / Conflict and Cooperation.
- Fundamental Rights and Repressive Laws: Preventive Detention and Anti-Terrorist Legislations, Armed Forces Special Power Act
- Imposition of National Emergency: The Societal Experience.
- The Criminal Justice System: Crime, Punishment and Human Rights with Special Reference to IPC & Cr. P.C. and Indian Evidence Act
- Economic, Social and Cultural Rights: The Directive Principles of State Policy: The Question of Effectiveness and Enforcement; their relationship with Fundamental Rights
- Legislation for the Weaker Sections: The Questions of Enforcement
- Law Enforcing Agencies: Police, Military and Para-Military Forces — Emerging Experience
- Human Rights Enforcement: The Protection of Human Rights Act, 1993, NHRC, State Human Rights Commissions, Human Rights Courts
- Human Rights Education: Problems and Prospects

Unit-10

INTERNATIONAL ENFORCEMENT OF HUMAN RIGHTS

- Treaty Bodies under the “Core” Human Rights Conventions: General Overview
- “Universal Periodic Review” and “Special Procedures”
- Human Rights Committee (HRC)
- Committee on Economic and Social Rights (CESCR)
- Committee on Elimination of All Forms of Discrimination against Women (CEDAW)
- European Court of Human Rights (ECHR)
- Inter-American Commission on Human Rights
- Inter-American Court of Human Rights
- African Commission on Human and Peoples’ Rights
- African Court of Justice and Human rights 2008

Code No : 24

SUBJECT: INDIAN CULTURE AND TOURISM

SYLLABUS

Unit – 1

Traditional and Modern concepts of culture

Notions of Culture in textual tradition, Anthropological and Sociological understanding of the term Culture – Elements of Culture–Concept of Indianness and value system–Relation between culture and civilization – Heritage of India and Indian contribution to world culture.

Sources for the study of Culture -Archaeological: Cultural remains, Monuments, Numismatics – Evidences in Tamilnadu–Epigraphy – Literary sources – Foreign accounts – Archival Sources.

Unit – 2

Pre –historic and Vedic Culture

Stone Age cultures – Paleolithic, Mesolithic and Neolithic cultures — Chalcolithic culture – Harappan Culture : Town planning, Art and Architecture–Evolution of Indian language families.

Early Vedic and Later Vedic Ideas and Institutions–Social and Religious conditions – Economic and Political ideas –Religious movements and Emergence of states–Shramana Traditions – Buddhism, Jainism Ajivikas and other sects – Education system – Major Education centers : Taxila and Kashi.

Unit – 3

Mauryan and Gupta Period

Mauryan Period :Ideas and Institutions : Social Religious, Economic and political – Ashoka's Dhamma – Scripts : Brahmi and Kharosthi – Impact of foreign invasions – Art and Architecture – Literature – Scientific Achievements – Contacts with outside World–Society, culture, values and Literature of Sangam Age.

Gupta Period : Institutions : Social, Religious, Economic and Political – Scientific achievements : Mathematics, Astronomy, Metallurgy – Art and Architecture – Evolution of Temples – Paintings of Ajanta, Ellora and Bagh – Literature – Education centers, Nalanda and Valabhi – Relations with Foreign Countries.

Unit – 4

Philosophical and Ethical foundations of culture

Central teachings of Bhagavad Gita – Identity of Atman and Brahman according to Sankara–Ramanuja's concept of unity in difference – Ashtanga Marga – Concept of Liberation–Concept of God in Saivism and Vaishnavism.

Existence of God – Immortality of soul – Freedom of will–Law of Karma – Bhakthi movement – Pilgrimage Tradition–Kabir – Ravidass – Emergence of sufism.

Unit – 5

Culture of Medieval and Modern Period

Medieval Period : Social conditions – Position of women – Polity – Feudalism – Extent of slavery – Emergence of Sultanate school of Architecture – Styles of Architecture : Nagara, Dravida, Vesara – Ideas and Institutions of Mughal period – Mansab and Jagir – Art and Architecture of Mughals – Temples of Vrindhavan : Govinda Deva and Keshava Das Temple – Four Quarter Gardens–Religious syncretism in coinage, miniatures and structures – Arrival of Europeans and their impact.

Modern Period: Impact of western ideas and Indian responses – European studies of India: William Jones and Asiatic society – Influence of Christian Missionaries – Emergence of New Education system – Indian Cultural renaissance – Socio – Religious Reform movements: Brahma Samaj, Arya Samaj, Aligarh Movement, Ramakrishna Mission and Theosophical Society–Dalit Movements – Sikh Reform Movements – Legislation on Women Education and Social evils – Emergence of Modern Science and Technology.

UNIT- 6

Fundamentals and Global Tourism

Definition of Tourism–Definition of Tourist–Early and Medieval period Travel -Forms of Tourism : Inbound and Outbound, National and International – Importance and Characteristics of Tourism–Basic components of Tourism: Transport and Accommodation–Impacts of Tourism: Social Cultural and Environmental–Travel Motives.

Global Tourism : Three letter city code – Two letter Airlines and Airport Code –Time zones – Elements of Weather and Climate–Vegetation of United States of America, Europe, Asia and Australia–Contemporary trends in International Tourist Movements – Demand and Resource Factors–Functions of Tourist Organisations:

UNWTO, IATA, ICAO, PATA, IATO, UFTAA, ASTA, IHA, TAAI, ITDC–Ministry of Tourism, Culture, Railways and Civil Aviation.

UNIT- 7

Tourism Products in India

Climate and Vegetation of India – Physical Geography-Distributions of Rivers, Mountains , Coastal areas and Deserts–Heritage – Art and Architecture – Museums –Art Galleries — Music and Dances — Major Religious centres: Hinduism, Buddhism, Islam, Christianity and Sikhism–Historical monuments – Palaces — National Parks –Wild life Sanctuaries–Biosphere reserves–Beach Resorts and Hill Stations: Major attractions : Eco – Tourism, Village Tourism, Cultural Tourism, Natural Tourism, Adventure Tourism, Agri–Tourism, Medical Tourism, Wellness Tourism

UNIT-8

Transport and Travel

Evolution of Transport Systems–Major Transport System: Road, Rail, Air and Water Transport – Major Transportations in India –Types of Air lines and Air crafts –GDS in Air Transports – Facilities in Airports – Flight services – Open sky Policy -Frequent flyer programme–Baggage rules–Travel documents – Railway systems of the world: British Rails, Euro Rails, Amtrak, Orient Express, Trans-Siberian Railway —Indian Railways: Types of Tours, Special Schemes and Packages–Palace on Wheels, Deccan Odissy, Golden Chariot, Maharaja's Express, Royal orient–Water Transport systems: Cruises, Ships, Ferry services, Hovercrafts and Boats.

History of Travel trade–Types of Travel Agents–Whole sale and Retail Agents–Types of Tour Operators: Inbound, Outbound, National and International–Types of Tours and Packages–Procedure for obtaining recognition for Travel Agency–Organisation structure–Functions of Travel Agency – Types of Itinerary–Planning and essentials of Itinerary–Passport and Visa: Types, Procedure and validity – Insurance and Health certificates – FEMA–Cargo handling – Dangerous and Prohibited Goods.

UNIT-9

Hospitality and Management

Characteristics of Hospitality Industry–Types of Hotels–Classifications of Hotels–Hotel Departments–Activities: Front Office, Housekeeping, Bar and Restaurant, Supporting services–Reservation and Registration–Meals Plans–Types of Guests – Food production – Organisation – Functions – Room services–Food services–Catering services.

Managerial Functions – Roles in Organisations–Functions of Planning, Organising, Staffing, Directing and Controlling–Understanding and Managing Individual and Group behaviour – Communications – Leadership–Organisation structure–Basic Accounting Records and Books of Accounts – Double entry system–Cash Book–Final Accounts with adjustments – Financial Management: Capital Structure, Capital Budgeting, Internal Financial Control–Types of Budgets–Preparation of Budget —Working Capital Management–Cash Management–Role of IFCI and Other Financial Institutions–Elements of Contract Act–Indemnity and Guarantee–Consumer Production Act.

UNIT-10

Tourism Policy, Planning and Marketing

Tourism Planning: Role of Government and Private sectors–Tourism planning for Thrust areas and Special Tourism areas – Sustainable Tourism Development–Tourism Policy: Features influencing Tourism Policy – National Tourism Policy–WTO Guidance for Planning–Concept of Goods and Services

Characteristics of Services – Service Marketing–Marketing Strategy–Market Segmentation–Marketing Functions–7Ps of Tourism Marketing – Branding and Packaging – Product Life cycle–Destination development – Attributes and Resources of Destinations–Destination Image formation Process – Advertising–Sales Promotion – Publicity – Personal selling - Tour Brochures - Tourism Distributions - Channels of Distribution – Travel Agencies and Online Travel Agencies.

Code No: 25

SUBJECT: INDIAN MUSIC

SYLLABUS

Unit – 1 :

Technical Terms:

Sangeet, Nada: ahata & anahata , Shruti & its five jatis, Seven Vedic Swaras, Seven Swaras used in Gandharva, Suddha & Vikrit Swara, Vadi-Samvadi, Anuvadi-Vivadi, Saptak, Aroha, Avaroha, Pakad / vishesa sanchara, Purvanga, Uttaranga, Audava, Shadava, Sampoorna, Varna, Alankara, Alapa, Tana, Gamaka, Alpatva-Bahutva, Graha, Ansha, Nyasa, Apanyas, Avirbhav, Tirobhava, Geeta; Gandharva, Gana, Marga Sangeeta, Deshi Sangeeta, Kutapa, Vrinda, Vaggeyakara Mela, Thata, Raga, Upanga,Bhashanga ,Meend, Khatka, Murki, Soot, Gat, Jod, Jhala, Ghaseet, Baj, Harmony and Melody, Tala, laya and different layakari, common talas in Hindustani music, Sapta Talas and 35 Talas, Taladasa pranas, Yati, Theka, Matra, Vibhag, Tali, Kaida, Quida, Peshkar, Uthaan, Gat, Paran, Rela, Tihai, Chakradar, Laggi, Ladi, Marga-Deshi Tala, Avartana, Sama, Vishama, Atita, Anagata, Dasvidha Gamakas, Panchdasa Gamakas ,Katapaydischeme, Names of 12 Chakras, Twelve Swarasthanas, Niraval, Sangati, Mudra, Shadangas , Alapana, Tanam, Kaku, Akarmatrik notations.

Folk Music

Origin, evolution and classification of Indian folk song / music. Characteristics of folk music. Detailed study of folk music, folk instruments and performers of various regions in India. Ragas and Talas used in folk music Folk fairs & festivals in India.

Rasa and Aesthetics:

Rasa, Principles of Rasa according to Bharata and others. Rasa nishpatti and its application to Indian Classical Music. Bhava and Rasa. Rasa in relation to swara, laya, tala, chhanda and lyrics. Aesthetics according to Indian and western Philosophers. General knowledge of 64 kalas according to Vatsyayan General history of Raga-Ragini Paintings and Raga Dhayana. Interrelation of Fine Arts.

Unit – 2 :

Research Methodology and Pedagogy, Avenues, Interdisciplinary aspects and Modern Technology:

Research Pedagogy: Research areas, review of literature, selection of suitable research topics and research problems, Methodology of Music research, Preparing synopsis, Data collection and its sources, Analysis of data collection, Writing project report, Research project Indexing, references and bibliography etc.

Research Avenues and its Interdisciplinary aspects: Music and Literature, Music Therapy, Philosophy, Psychology, Physics, Mathematics, Economics, Social Sciences, Religion and Culture.

Modern Technology: Electronic equipments, computer, internet etc.

New trends in Indian Music in post - independence era.

HINDUSTANI MUSIC

(VOCAL, INSTRUMENTAL AND MUSICOLOGY)

Unit – 3 :

Applied Theory:

Detail study of Sangeet Utpatti; Musical scales (Indian and western); Detail study of Gram, Murchchhana and Chatussarna; Jaati Lakshana, Jaati Bhed, concept of Raag, Raag-Lakshan.

Classification of Raag: 1) Gram Raag and Deshi Raag Classification 2) Male Raag classification 3) Thaat Raag classification 4) Shuddha, Chhayalag and Sankeerna Raag classification 5) Raag-Raagini classification 6) Raagang classification; Time theory of Raagas; Placement of shuddha and vikrit swaras on shruties in Ancient, Medieval

and Modern Period; Description of popular Raagas and Taalas; Notation systems of Hindustani, Karnataka and Western Music; Merits and demerits of a vocalist (Gayak); Remix, Fusion, Orchestra, Coir and Acoustic; Comparative studies of Hindustani and Karnatak Swaras and Taalas; Karnatak names of Popular Hindustani Ragas; Knowledge of different Layakaaries such as dugun, Tigun, Chaugun, Aad, Kuad and Viaad.

History of Indian Music, contribution of Musicologists and their textual tradition:

Study of the Historical Development of Hindustani Music from Vedic to Modern period; Ancient Medieval and Modern Musicologist and Scholars:- Bharat, Naarad, Matang, Someshwardev, Jagdekmall, Nanyadev, Sharangdev, Parshwadev, Sudhakalash, Maharana Kumbha, Ramamatya, Damodar Pandit, Pt. Ahobal, Shriniwas, Hridyanarayana, Vyankatmakhi, Pt. Vishnu Digambar Palushkar, Pt. Vishnu Narayan Bhatkhande, Pt. Vinayak Rao Patwardhan, Pt. Omkarnanath Thakur, Acharya Birhaspati, Thakur Jaidev Singh, Sharachchandra Shridhar Paranjape, Bhagwat Sharan Sharma, Dr. Prem LataSharma, Dr. Subhadra Choudhary, Prof. R.C. Mehta, Prof. Pradeep Kumar Dixit.

Study of ancient, Medieval and Modern Treatises in Indian Music like Natya Shastra, Nardiya Shiksha, Sangeet makarand, Brihaddeshi, Manasollaas, Sangeet Chudamani, Bharat Bhashya, Sangeet Ratnakar, Sangeet Samaysar, Sangeet opanishat saaroddhar, Sangeet Raj, Swaramalekalanidhi, Sangeet Darpan, Sangeet Paarijaat, Raga Tatvavibodh, Hridaya Kautuk, Hridaya Prakash, Chaturdandi Prakashika, Sangeet Chintamani, Pranavbharati etc.

Contribution of Western Scholars to Indian Music: Capt. N.A. Willard William Johnes, Capt. C.R. Day, E. Clements, Fox Strangwayes, H.A. Popley & Alain Danielou.

Compositional forms and their evolution:

Prabandh, Dhrupad, Dhamaar, Saadra Kheyaal, Tarana, Trivat, Chaturang, Sargam Geet, Lakshan Geet, Raagmaala etc.

Thumri, Dadra, Tappa, Hori, Kajri, and Chaiti etc. Light Music: Geet, Gazal and Bhajan etc.

Firozkhani Gat, Maseetkhani Gat, Razakhani Gat and Zafarkhani Gat and its kind.

Jaati, Javali, Kriti, Tillana, Raagam, Taanam, Pallavi.

Origin, development and presentation of above said vocal and instrumental compositions. Popular artists in the field of above said forms.

Unit – 4 :

Musical Instruments and its Classification:

Classification of Indian Musical Instruments in Ancient, Medieval and Modern period Different types of Veenas in ancient period Tat–Sitar, Sarod, Violin, Dilruba, Israj, Santoor, Tanpura, Surbahhar, Guitar. Ghan–Jaltarang, Ghatam, Morsing, Chipali, Manjeera, Jhanjh, Kartal Sushir–Flute and its varieties, Shehnai**,** Nagaswaram**,** Harmonium Avanaddha–Pakhawaj, Tabla, Mridangam, Kanjira, Khol, Chang, Nakkara, Duff, Hudaka, Dholak. Origin, evolution, playing techniques and famous artist of these Instruments.

Contribution of composers / performers to Indian Music:

Tansen, Haridas, Gopal Nayak, Sadarang, Pandit Balkrishna Bua Ichalkaranjikar, Pandit Vishnu Digambar Palushkar, Pandit Vishnu Narayan Bhatkhand, Ustaad Faiyaz Khan, Ustad Bade Gulam Ali Khan, Ustad Nisaar Hussain Khan, Pandit Omkar Nath Thakur, Pandit Vinayak Rao Patwardhan,Pandit Naryan Rao Vyas, Pandit C.R. Vyas, Pandit Krishna Rao Shankar Pandit, Pandit Mallikarjun Mansoor, Smt Gangubai Hangal, Kesar Bai Kerkar, Abdul Kareem Khan, Heerabai Barodekar, Suhasini Koretkar, Bade Ramdas, Siddheswari Devi, Begham Akhtar, Shobha Gurtu, Girija Devi, Savita Devi, Moghubai Kurdikar, Kishori Amonkar, Pandit Kumar Gandharv, Pandit Jasraj, Pandit Balvant Rai Bhatt. Pt. Ramashraa Jha.

Asad Ali Khan, Pt. Lal Mani Mishra, Abdul Halim Zafar Khan, Ali Akbar Khan, Sharan Rani, Amjad Ali Khan, Anath Lal, Panna Lal Ghosh, Vijay Raghav Rao, Ragunath Seth, Hari Prasad Chaurasia, Ahmad Jaan Thirakava, Pt. Samta Prasad, Kishan Maharaj, Kudau Singh, Paagal Das, Brij Bhooshan Kabra, Vishwa Mohan Bhatt, Shiv Kumar Sharma, Bhajan Sopori, M.S. Gopal Krishnan, V.G. Jog, N. Rajam,Appa Jalgaonkar, Mehmood Dhaulpuri. Recipient of Bharat Ratna:- M.S. Subbhalakshmi, Pt. Ravi Shankar, Utsad Bismillah Khan, Lata Mangeshkar and Pt. Bhim Sen Joshi.

Purandar Das, Shyam Shastri, Mutthuswami Dixitar, Tyagraja, Swathi Tirunal Bach, Beethoven, Mozart, Yahudi Menuhin. **Gharna and Institutional System and conferences of Hindustani Music:** General study of origin and development of Gharana. Institutionalised system and their contribution to Hindustani Music. Four baanies of Dhrupad and its importance to Hindustani Music.

General study of various Gharanas of Dhrupad Kheyal and Instrumental Music.

Special features of Gharanas in vocal and Instrumental Music and its famous artists.

Purab and Punjab Angas of Tumari.

Important music conferences in India.

National and International awards in the field of music.

Contribution of Music educational institutes Akademies, Prasar Bharati, Song and Drama Division and Film in Indian Music.

Unit – 5 :

KARNATAKA MUSIC

Applied Theory:

Musical scales (Indian & Western), Suddha and vikrita svaras , Sruti in ancient, medieval & modern period, Detailed study of grama, murchana- jaati , Jaati lakshana in ancient period , Concept of Raga, Classification of Raga from ancient to modern period, Ragalakshana-s of popular ragas, Mela- Janya system, Katapayadi and Bhuta sankhya, Janya- Raga classification, Ancient- Palai-Pan system, 22 Srutis & their distribution among Swaras and Ragas, Suladi sapta Tala- s, Scheme of 35 Talas, Tala dasa pranas, Marga and Desi talas, Talas of Tirupugazh, Shadangas and Shodasangas, important Ragas and Talas of Hindustani music. Notation systems in Hindustani, Karnatak and Western music (Staff Notation). Voice culture, Orchestration and Acoustics.

Historical perspective of music- Contributions of Scholars, Musicologists, Musical concepts in Treatises:

Narada–Naradiya siksha, Sangita makaranda; Bharata–Natya sastra; Dattila-Dattilam, Matanga – Brihaddesi; Someshwara – Manasollasa; Parsvadeva–Sangita Samayasara; Sarangadeva–Sangita Ratnakara, Simhabhupala; Nanyadeva- Bharata Bhashyam; Lochana kavi–Raga Tarangini; Jagadekamalla–Sangita Chudamani; Vidyaranya–Sangita Sara, Ramamatya–Swaramelakalanidhi; Rana Kumbha– Sangita Raja; Somnatha–Raga Vibodha, Ahobala–Sangita Parijata; Govinda Dikshita– **Sangita Sudha; Venkatamakhi–Chaturdandi Prakasika; Tulaja–Sangita Saramrita ; Govinda Acharya–Sangraha Chudamani; Subbarama Dikshitar– Sangita Sampradaya Pradarsini; Abraham Panditar–Karunamrita Sagaram;**

Nadamuni Panditar–Swara Prastara Sagaram; Atoor krishna Pisharoti- Sangita Chandrika. References to Musical concepts in Silappadikaram, Sangam Texts,Panchamarabu, Tala Samudram, Mahabharata Chudamani, Yazhnool and other important texts in Tamil, Telugu, Kannada and Malayalam.

Musicologists

V.N.Bhatkhande, V.D.Paluskar, Swami Prajnanananda, B.C.Deva, P. Sambamurthy, S.Seetha, V.Raghavan, Premalata Sharma, R.Satyanarayana, T.S.Parthasarthy, N.Ramanathan, S.A.K. Durga, Balantrapu Rajanikantarao, R.C Mehta & their works . Contribution of western scholars to Indian Music; Curt Sachs, N.A.Willard, William Jones, C.R.Day, E.Clements, Fox Strangways, H.A.Popley & Alain Danielou.

Compositional forms and their evolution: Origin and development of Prabandha, Gitam, Swarajati, Jatisvarm, Tanavarnam, Padavarnam, Kirtana, Kriti, Padam, Javali, Tillana, Ragam–Tanam–Pallavi, Niraval, Kalpanasvara, Tevaram, Divyaprabandham, Tiruppugazh, Thaya, Ragamalika, Viruttam, Dandakam, Churnika, Sloka, Daru, Ashtapadi, Tarangam, Thiruvaimozhi, Thiruppavai, Chindu, Thiruvasagam, Group kritis.

Geya nataka-a, Nritya nataka-s Hindustani musical forms Dhrupad, Dhamar, Khayal, Thumri, Tappa, Tarana, Trivat, Chaturang, Vrindgan.

Music Instruments of India: Indian concept of classification of music Instruments.

Origin, Evolution, Structure and playing Technique of Veena, Tambura, Violin, Chitra Vina, Viola, Mandolin, Flute, Nadasvaram, Pancha mukha vadyam, Mridangam, Tavil, Kanjira, Dappu, Chenda, Maddalam,Timila, Jaltarang,

Ghatam, Morsing, Chipla, Jalra, Kartala and other Tala instruments. Outline knowledge of–Sitar, Sarangi, Sarod, Shehnai, Tabla, Pakhwaj, Piano,Guitar, Clarionet.

Contribution of Composers / Performers to Music (Indian and Western):

Tevaram, Alwars, Jayadeva, Dasa Kuta, Purandara Dasa, Annamacharya, Tallapaka composers, Bhadrachala Ramadasa, Arunagirinathar, Muthutandavar, Marimuttupillai, Arunachala Kavirayar, Sangeeta Mummurthy viz., Syamasastry, Tyagaraja, Muttuswami Dikshitar, Swati Tirunal, Gopalakrishna Bharati, Tanjore Quartette, Patnam Subramanya Iyer and other prominent post Trinity composers.

Ariyakudi Ramanuja Iyengar, Musiri Subrahmanya Iyer, G.N Balasubramaniam, Maharajapuram Vishwanatha Iyer, Semangudi Srinivas Iyer, Chembai Vaidyanatha Bhagavatar, K.V Narayana Swamy, M.D Ramanathan, R.K Srikanthan, M.Balamurali Krishna, M.S.Subbalakshmi, D.K. Pattammal, M.L.Vasantkumari, Brinda, Mukta and other prominent vocalists.

Karaikudi Samba Siva Iyer, Veena Dhanammal, S.Balachander, Mysore Doraiswami Iyengar, S. Balachander, Chitti Babu, Mysore Chowdiah, Lalgudi Jayaraman, Dwaram Venkataswami Naidu, T.N.Krishnan, M.S.Gopalakrishnan, Sarabha Sastri, T.R.Mahalingam, N.Ramani, Sheikh Chinna Moulana, Ambalapuzha Brothers, Namagiri Pettai Krishnan, Palghat Mani Iyer, Palani Subramaniam, Viku Vinayakram, Harishankar and other prominent musicians of Veena, Violin, Flute, Nadaswaram, Mridangam, Ghatam and Kanjira.

Unit – 6 :

Prominent Banis, Music training, Education and Propagation:

Merits and limitations of Gurukula sampradya, Institutional training and Academic teaching system in Universities Nagasvaram Bani–Tanjavur style, Mridanga Bani–Tanjavur, Pudukkotai and Palakadu Styles, Banis of Dhanammal School, Ariyakudi, Musiri, GNB, Maharajapuram, Chembai and Semmangudi.

Styles of Music Trinity and analysis of their Ragas, Compositions with various musical versions.

Music propagation through Music academies, Prasar Bharati, Song and Drama Division, Films, Music festivals like Tiruvaiyaru, Chembai, Melattur etc.

Influence of other music systems on Karnatak music–Hindustani and Western.

National and International Awards in Music.

Applied Theory – Taal & Avanadhavadhya:

Description and playing techniques of Varna's and their combinations in Tabla and Pakhwaj instruments. Ten Pranas of Taal (detailed study). Detailed study of Margi and Deshi Taal system (Paddhati), knowledge of Karnataka Taal system: Detailed knowledge of Uttar Bhartiya Taal Padhati and Taalas used in Uttar Bhartiya Sangeet.

A brief knowledge of Taalas used with Rabindra Sangeet.

Laya and Layakari. Detailed knowledge of Hindustani and Karnatak taal notation system.

Brief knowledge of staff notation system.

Tabla accompaniment with vocal, (classical, semi-classical music) instrumental music and Kathak Dance.

Relationship between Taal and Chhand, Knowledge of composing Tihaies of different matras.

Detailed knowledge of Tihai—Damdar, Bedam, Nauhakka and chakradar Tihaies. Mathematical calculation of chakradar- (Sadharan, Firmaishi and Kamalichakradar).

Difference between Chakradar Gat, Chakradar Tukada and Chakradar Paran. The Chakra of Thirty two tihaies describe by Acharya Brihaspati.

History of Music, Treatise and Contribution of Musicologist:

Bharat, Sharangdeva, Matang, Parashwadev Nanyadev, Ramamatya, Somnath, Damodar Pandit, Ahobal, Venkatmakhi, V.N. Bhatkhande, V.D. Paluskar, Pundarik Vitthal, Dr. Subhadra Chaudhary, Nikhil Ghosh, Madhukar Ganesh Godbole, Swami Pagal Das, Purshottam Das Pakhawaji, Girish Chandra Shrivastava,

Bhagawat Sharan Sharma, Prof.Sudhir Kumar Saxena, Dr. Aban Mistry, Dr. Yogmaya Shukla, Arvind Mulgaonkar, Sudhir Mainkar, Dr. Arun Kumar Sen, Chhote Lal Mishra.

Detailed study of the following texts:

Natya Shastra, Sangeet Ratnakar, Bruhad Deshi, Sangeet Samyasar Sangeet Raj, Ashtottar Shat Taal, Lakshanam, Bhartiya Sangeet Vadya, Table Ka Udagam Vikas avam Vadan Shailiyan, Bhartiya Talon Ka Shastriya Vivechan, Pakhawaj avam Table ke Gharane avam, Parmparayen, Taal Kosh, Tabla Vadan Kala avam Shastra, Tabla, Bhartiya Taal Men Anekata Mein Ekta, Aesthetics of Tabla, Tabla Puran, Taal Vadya Parichaya, Tabla Granth Manjusha, Laya Taal Vichar Manthan, Tabla Vadan Mein Nihit Saundaraya, Solo Tabla Drumming of North India, Tabla of Lucknow, Taal Vadya Shashtra, Bhartiya Sangeet Men Taal, Chand Avam Roop Vidhan.

Unit – 7 :

Detailed study of Compositional Forms of avanaddha vadyas Definition of Bandish–expandable and nonexpendable compositions. The aesthetics of bandishen. Importance of presentation of Bandishen Detailed study of Theka, Peshkar, Quaida and its prastar (Paltas), Bant, Rela, Rau, Tukda, Mukhada, Gat and its various kinds, Rang-Rela, Fird, Paran, Tihaies of various kinds. Gats and Quaidas of different Gharanas, Laggi- Ladi.

Study of different compositions popular in classical vocal, Semi-Classical and instrumental music:- Khayal, Masitkhani Gat, Raza Khani Gat, Thumari, Dadra, Tappa, Kajari, Chaiti, Dhrupad, Dhamar, Sadra, Jhoola, Bhajan, Gazal, Geet.

General Knowledge of compositions used in Kathak dance:- Aamad, Paran, Tatkar, Toda, Stuti Paran.

Classification of Musical Instruments, descriptions of Musical Instruments fromAncient to present period in India.

Classification of Indian Musical Instruments as per described by Bharat, Sharangdev and Dr. Lalmani Mishra. Detailed study of Origin, Evolution, Structure and playing technique of the following instruments:-

a) Tat Vadya:- Veena, Vichitra Veena, Naradiya Veena, Saraswati Veena, Rudra Veena, Sitar, Sarod, Sarangi, Violin, Dilruba, Israj, Santoor, Surbahar, Tanpura, Guitar, Eaktara, Dotara.

b) Sushir Vadya:- Flute, Shehanai, Nagasvaram, Claronate, Algoza, Sundari, Maguti.

c) Avanaddha Vadya:- Panav, Patah, Mirdang, Pakhawaj, Tabla, Mridangam, Tavil, Khanjira, Khol, Chenda, Chang, Upang, Duff, Nakkara, Dhol, Dholak, Sambal, Dholaki, Naal, Huddaka, Pung.

d) Ghana Vadya:- Jal-Tarang, Nal-Tarang, Ghatam, Morsinq, Chipli, Jalra, Kartaal, Jhanjh, Manjira.

Popular percussion instruments used in Western Music:-

Kittle Drum, Snare Drum, Bass Drum, Tenor Drum and other important percussions.

Performer & Composers:-

Tabla:- Natthu Khan, Modu Khan, Bakshu Khan, Abid Hussian Khan, Haji Vilayat Ali, Salari Khan, Chudiya Imam Baksh, Ram Sahay, Munir Khan, Habibuddin Khan, Ahmemadjan Thirukuwa, Amir Hussain, Jahangir Khan, Shekh Daud, Bade Munne Khan, Karamtullah Khan, Allarakha Khan,Gyan Prakash Ghosh, Nikhil Ghosh, Gama Maharaj, Kishan Maharaj, Kanthe Maharaj, Samta Prasad (Gudai Maharaj), Anokhe Lal Mishra, Bhai Gaitonde, Pandharinath Nageshkar, Suresh Talwalkar, Hashamat Ali Khan, Zakir Hussain and contemporary tabla and pakhawaj vizards & scholars.

Pakhawaj:- Kudau Singh Jodhsingh, Nana Panse, Ayodhya Prasad, Pagal Das, Chatrapati Singh, Arjun Sejwal, Madhav Rao Alkutkar, Sakhara Ram. Nakkara Vadak:- Dilawar Khan, Aggan Khan.

Dholak Vadak:- Bafati Khan, Gulam Jafer, Dholki:- Vijay Chauhan.

Unit – 8 :

Karnatak Music:-

Vocalists and Instrumentalists Bharat Ratan Subbalakshmi, S. Balchandar, Bal Muralikrishnan, Lalgudi Jairaman, T.N. Krishnan, Palghat Raghu, Palghat Mani Iyer, Umayalpuram Shivraman, U. Srinivasan, Vikku Vinayak Ram, Hari Shankar.

North Indian Vocalist & Instrumentalist:-

Allauddin Khan, Vilayat Khan, Ravishankar, Abdul Haleem Jafer, Balram Pathak, Nikhil Banerjee, Hafeez Ali Khan, Ali Akbar Khan, Amajad Ali Khan, V.G. Jog, D.K. Datar, N Rajam, Hari Prasad Chourasiya, Pannalal Ghosh, Bismillah Khan, Ali Hussain, Siddharam Jadhav, Krishna Rao Shankar Pandit, Mogubai Kurdikar, Kesar Bai Kerkar, Mallikarjun Mansoor, Abdul Karim Khan, Faiyaz Khan, Bhimsen Joshi, Gangubai Hangal Malini Rajurkar, Kishori Amonkar, Jas Raj, Kumar Gandharava and Aamir Khan.

Dancers:-

Acchan Maharaj, Lacchu Maharaj, Sitara Devi, Gopi Krishna, Birju Maharaj, Durga Lal, Yamini Krishnamurty Sanyukta Panigrahi and Kalyani Kutti Amma.

All National and International Awardees in the field of Music, Dance, folk music and folk dances with special reference to percussion instrumentalists.

Detailed Study of Gharanas and Institutional System in Music

Definition of Baaj & Gharanas.

Historical Evaluation & Developments of Gharanas of Tabla & Pakhawaj, Delhi Gharana, Ajarada Gharana, Farrukhabad Gharana, Lucknow Gharana, Benaras Gharana, Punjab Gharana, Nana Panase Gharana, Kudau Singh Gharana.

Varna Nikas (Playing Technique) in different Gharanas.

Main Characteristics of Peshkar, Quida, Rela, Gat, Tukada, Paran, Tihai, Chakradar & Laggi Ladi on the basis of Gharanas.

Importance and utility of Tabla & Pakhawaj in classical music, semi classical, sugam & film music.

Universities, Academies and other institutions, Renowned Professors, Gurus, Academicians, Administrators who are propagating music.

Unit – 9 :

RABINDRA SANGEET

Applied Theory:

The Knowledge of round the clock ragas and raginis, the knowledge of talas, the knowledge of kirtana, baul and other folk songs of Bengal, the Knowledge of monsoon and vernal ragas and raginis, selected provincial songs, selected verses from the Vedas and upanisads frequently chanted by Tagore. Rabindra Nath Tagore specially created talas i.e., Jhampak (5 matra), Sasthi (6 matra), Rupakra (8 matra), Nabatal (9 matra), Ekadasi (11 matra), Nabapanchatal (18 matra). Mulgan and Bhanga Gan. Brahma sangeet by Tagore's. Tagore's poetic songs, (Kabyageeti), Vedic hymns (tuned by Tagore). Patriotic songs. Akarmatrik Notation system.

Historical Perspective of Music:

Conversation between Tagore and eminent personalities of India and abroad. Western scholars on Tagore Music. 'Sangeet Chinta' full study of Tagore book. Influence of European music as a whole on Tagore. Influence of European Music and provincial tune. Tagore's creative journey in song writing and musical compositions. History of Anthology of Tagore songs. Basic knowledge in Indian classical music with special emphasis in Dhrupad, Kheyal, Tappa, Thumri. Knowledge of notation and tal (Indian and Western).

Composition forms and their evolution:

Main forms for Rabindra Sangeet. Geetanjali and song offerings – a textual study. Biography of Tagore: The Music composer upto geetanjali era throughout Tagore's life. The music composer (second part) after geetanjali to 1941. Barsamangal, sarodotsav etc.

Aesthetic approach of Rabindranath Tagore through Rabindra Sangeet. Tagore's Philosophy of Music, Sahityer pathe, Sahitya, Sahityer Swarup. Tagore's vision of music in his early days. Concept of Tagore's musical philosophy as expressed in essays, poems, novels etc. Knowledge of Raga. Bengali Songs: Pre contemporary and Post Rabindranath era. Bramhasangeet and Patriotic songs of different author other than Rabindranath. Bramhasangeet: different author other than Tagore family. Bedgan, Maghotsav, Upasana Song, Songs of Tagore House, Hansirgan.

Music Instrument of India:

Popular instruments used in Rabindra Sangeet, i.e., Esraj, Guitar, key board, Sitar, Tanpura, Harmonium, Sarod, Violin, Mandira, Organ – Piano, Flute and its varieties, Pakhawaj, Tabla, Sri khol, Dhol, Mridangam, Jaltarang etc. Rabindra Sangeet: Experiments in Rhythms and Talas Application of Various talas & rhythms. Surantar and Chhandantar.

Unit – 10 :

Contribution of Scholars / Performer and their Textual Traditions:

Tagore's Geetinatya and Nrityanatya e.g. – Valmiki Prativa, Kalmrigaya, Mayar Khela, Chitrangada, Chandalika, Shyama, Taser Des, Shapmochan etc. and other Dramas full of various songs, i.e., like Prayaschitta, Visarjan, Muktadhara, Achalayatan, Raja, Raktakarabi, Phalguni, Basant, Sisutirtha, Rinsodh, Raja o Rani, Prakitir Pratisodh. Tapati etc. (All dramatic works and example Tagores musical creativity in Gitabitan – a textual study (Part I, II, III) and Swarabitan (Notation Books) 1- 66 and others. Bhanusingher Padabali, Ritunatya. History of Anthology of Tagore's songs.

Contribution of Scholar / Performer / Musicians

Pratibha Devi, Subinoy Roy, Nilima Sen, Indira Devi Chowdhurani, Maya Sen, Suchitra Mitra, Kanika Bandyopadhyay, Santidev Ghosh, Jyotirindranath Tagore, Debendranath Tagore, Sailajaranjan Majumdar, Anadi Dastidar, Kangalicharan Sen, Amiya Thakur, Bhimrao Sastri, Ases Bandyopadhyay, Girijasankar Chakraborty, Ramesh Chandra Bandyopadhyay, Rajeswari Dutta, Sankha Ghosh, Sudhir Chakraborty etc.

Gharana and Institutionalised system of Music:

An overall survey of Tagore's musical creativity, tonal and rhythmic varieties of Tagore's musical compositions including his own experimental variations. Periods and phases of Tagore's musical compositions. Periods and phases of Tagore's musical compositions (Chronological order may be maintained). Influence of Hindustani, Karnatak and Western music on Rabindra Sangeet, Compositions who influenced Rabindra Sangeet. Tagore Song used in films. Tagore songs:

Tunes adapted from Tappa, Thumri, Tarana and Bhajan with original songs.

The cultural atmosphere of Tagore's family (Pathuriaghata and Jorasanko, Kolkata).

Thematic Variations of Tagore's music: (Puja, Prem, Swadesh, Prakriti, Vichitra, Anusthanik) Festival songs of Rabindra Sangeet. Knowledge of Hindustani songs and Tagore's opinion on these songs.

National Anthem of India and Bangladesh. Rabindra Sangeet based on classical tune.

Code No: 26

SUBJECT : INFORMATION TECHNOLOGY

SYLLABUS

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 DATA BASE MANAGEMENT SYSTEM

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 Arguments, 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.

Python: Array in Python, Strings and Character, Function, List and Tuples, Dictionaries, Files, Working with Directories, Data Frame, data visualization, Python Packages

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

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.

UNIT – 4 : OPERATING SYSTEM AND SOFTWARE ENGINEERING

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.

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), Adaptive 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 Requirement 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 Testing.

UNIT – 5 : 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 – 6 : THEORY OF COMPUTATION AND COMPILERS

Theory of Computation: Formal Language, Non-Computational Problems, Diagonal Argument, Russell'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 – 7 : 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.

UNIT – 8 : ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING

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 Pragmatics.

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.

Machine learning : Introduction to machine learning – Supervised learning and linear regression – classification and logistic regression – decision tree and random forest, naive Basic support vector Machine

UNIT – 9 : COMPUTER GRAPHICS AND DIGITAL IMAGE PROCESSING

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.

Digital Image Processing: Basic steps in Digital Image Processing , Light and the Electromagnetic Spectrum-Image sensing and acquisition-Image sampling and quantization-Basic relationships between pixels-Linear and non-linear operations, Intensity Transformation and Spatial Filtering, spatial correlation and convolution . Smoothing spatial filters, Sharpening spatial filters.

Image restoration and reconstruction, Restoration Process, spatial filtering–Mean Filters-Order statistics filters, Adaptive filters, Image Compression, compression methods , Huffman coding-Arithmetic coding, LZW coding, Bit-Plane coding , Run-Length coding.

Image Segmentation, Point, Line and Edge Detection–Background–detection of isolated points–line detection–edge models–basic edge detection, Image Representation: Bounder (Border) Following–Chain Codes–Polygonal Approximations using Minimum Perimeter Polygons.

UNIT–10 : BIG DATA AND DATA ANALYTICS

Big Data: Description of Big Data, Industry examples of Big Data, Information, Creation through Analytics, Business Intelligence, Six Sigma Analytics – Sector of Analytics, Big Data Analytics –Architecture, Implementation methodology and Tool, Big Data Analytics – Architectures, Frame works and Tools, Big Data analytics and Methodology – Challenges.

HADOOP : History of Hadoop, Apache Hadoop, Analysing, Data with Unix tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets, The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives.

Map Reduce : Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features. Hadoop Eco System Pig, Hive, HiveQL, Hbase, Big SQL.

Visualization Techniques: Basic Visualization–Pie Chart–Bar Chart- Histograms- Line Chart- Box and Whisker Plot - Bubble Plot - Scatter Plot - ggplot2.

Statistical Analysis : Basic statistics- Descriptive statistics- Measures of Central Tendency – Mean – Median – Mode - Measures of Variability - Variance-Standard Deviation – Range - Rank. Simulation and Distributions - Normal Distribution - Binomial Distribution.

Code No: 27

SUBJECT : JOURNALISM AND MASS COMMUNICATION

SYLLABUS

UNIT – 1 :

Introduction to Journalism and Mass Communication

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

- 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.
- Development and social change. Issues and post-colonial conceptions.
- Deconstruction of dominant paradigm of communication and development. Responses and critique of dominant models.
- 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.
- Emergence of global civil societies, public sphere, global communication system–nation state-universal, national communication policies.
- 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

- 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.
- Writing for print, electronic and digital news media. Translation and transcreation.
- Editing and presentation techniques for print, television and digital media.
- Journalism as profession, reportage of contemporary issues, ethics of reporting.
- Critique of western news values, effect of new technology on global communication flows.
- Niche Reporting.

UNIT – 4 :

Advertising and Marketing Communication

- Definition, concept, functions, types, evolution of advertising, standards and ethics in advertising. Theories and models of communication in advertising.
- Brand management.
- Advertising management–agency-role, structure and function, client-agency relationship, media planning and budgeting.
- Advertising and creativity, language and translation.
- Advertising campaign and marketing.
- Advertising and marketing research.

UNIT – 5 :

Public Relations and Corporate Communication

- Public Relations and Corporate Communication–definition, concept and scope.
- Structure of PR in State, Public, Private and non-government sectors.
- Tools and techniques of PR and Corporate Communication.
- Crisis communication and crisis communication management.
- Ethics of Public Relations.
- International Public Relations, communication audit.

UNIT – 6 :

Media Laws and Ethics

- Concept of law and ethics in India and rest of the world.
- The Constitution of India, historical evolution, relevance.
- Concept of freedom of speech and expression in Indian Constitution.
- 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.
- 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.
- 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

- Definition, concept of media management. Grammar of electronic media.
- Communication design theories and practice.
- Media production techniques – print and electronic.
- Digital media production techniques.

- Economics and commerce of mass media in India.
- Principles and management in media industry post liberalisation.

UNIT – 8 :

ICT and Media

- ICT and media–definition, characteristics and role. Effect of computer mediated communication. Impact of ICT on mass media. Digitization.
- Social networking.
- Economics and commerce of web enabled media.
- Mobile adaption and new generation telephony by media, ethics and new media.
- ICT in education and development in India, online media and e-governance.
- Animation–concepts and techniques.

UNIT – 9 :

Film and Visual Communication

- Film and television theory.
- Film and identity in Indian film studies, leading film directors of India before and after Independence. Indian cinema in the 21st century.
- Approaches to analysis of Indian television.
- Visual Communication. Visual analysis.
- 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).
- 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

- Definition, concept, constructs and approaches to communication research process.
- 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.
- 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.
- 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).
- 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.
- Ethical considerations in communication, media and journalism research, writing research.

Code No: 28

SUBJECT: MALAYALAM

SYLLABUS

ഇതൾ ഒന്ന് (Unit 1)

മലയാളസാഹിത്യം- പ്രാരംഭം

(ഇരുപതാംനൂറ്റാണ്ടു വരെയുള്ള മലയാളസാഹിത്യത്തിന്റെ ചരിത്രവും സ്വഭാവവും അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. പാട്ടുപ്രസ്ഥാനം-നിർവചനം-വികാസപരിണാമങ്ങൾ-പ്രധാനപ്പെട്ട കൃതികൾ
2. മണിപ്രവാളം-നിർവചനം-വർഗീകരണം- വികാസപരിണാമങ്ങൾ-ആദ്യകാലമണിപ്രവാളകൃതികൾ- മദ്ധ്യകാലമണിപ്രവാളകൃതികൾ- ഇവ തമ്മിലുള്ള വ്യത്യാസം- ഈ പ്രസ്ഥാനത്തിൽപ്പെടുന്ന കൃതികൾ
3. ഇതരകാവ്യപ്രസ്ഥാനങ്ങൾ-ഗാഥ-കിളിപ്പാട്ട്-പാന-വഞ്ചിപ്പാട്ട്-പ്രധാനകൃതികൾ
4. ഗദ്യമാതൃകകൾ-ശാസനഭാഷ-ഭാഷാകൌടലീയം- അംബരീഷോപാഖ്യാനം-ബ്രഹ്മാണ്ഡപുരാണം-മിഷണറിഗദ്യം-മാപ്പിളമലയാളം
5. മഹാകാവ്യം- ഖണ്ഡകാവ്യം-മുക്തകം- വിവർത്തനങ്ങൾ
6. സാഹിത്യക്കളരികൾ-കേരളവർമ്മപ്രസ്ഥാനം-കൊടുങ്ങല്ലൂർക്കളരി-കാവ്യഭാഷാചിന്തയിൽ പ്രാസവാദവും പച്ചമലയാളരചനാവാദവും സൃഷ്ടിച്ച ചലനങ്ങൾ.

ഇതൾ രണ്ട് (UNIT2)

ഇരുപതാം നൂറ്റാണ്ടുമുതലുള്ള മലയാളകവിത

(മലയാളകവിതയുടെ ഇരുപതാംനൂറ്റാണ്ടിൽ ഇടങ്ങുന്ന ചരിത്രവും സ്വഭാവവും അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. കാല്പനികത-പ്രാരംഭവും വികാസപരിണാമങ്ങളും- പ്രധാനകൃതികൾ
2. കാല്പനികതയുടെ അപചയം- പ്രതികാല്പനികത-സാമൂഹികപ്രതിജ്ഞാബദ്ധതയും മലയാളകവിതയും-പ്രധാനകൃതികളും എഴുത്തുകാരും.
3. ആധുനികത- ആഖ്യാനത്തിലും പ്രമേയത്തിലും വരുത്തിയ മാറ്റങ്ങൾ-പ്രധാനകൃതികളും എഴുത്തുകാരും.
4. ആധുനികോത്തരകവിത- ദളിത്-സ്ത്രീ- പരിസ്ഥിതി- സൈബർ കവിതകൾ

5. മലയാളത്തിലെ വിവർത്തനകവിതകൾ

ഇതൾ മൂന്ന് (UNIT 3)

കഥാസാഹിത്യം

(മലയാളത്തിലെ ചെറുകഥ,നോവൽ എന്നീ സാഹിത്യജനുസ്സുകളെ അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. മലയാളചെറുകഥ- ഉത്ഭവവും വളർച്ചയും-രചനാസങ്കേതങ്ങൾ-പ്രസ്ഥാനങ്ങൾ-ആദ്യകാലകഥകൾ-നവോത്ഥാനകാലകഥകൾ-ആധുനികകാലം-ആധുനികോത്തരകാലം-ഭാവുകത്വപരിണാമവും മലയാളചെറുകഥയും-ചെറുകഥാവിവർത്തനങ്ങൾ

2. നോവൽ-ഉത്ഭവവും വളർച്ചയും-ആദ്യകാലം-നവോത്ഥാനകാലം-ആധുനികകാലം-ആധുനികോത്തരകാലം-ഭാവുകത്വപരിണാമവും നോവലും-നോവൽ വിവർത്തനങ്ങൾ

ഇതൾ നാല് (UNIT 4)

ദൃശ്യകലയും സാഹിത്യവും

(രംഗവേദിയും സാഹിത്യവും തമ്മിലുള്ള ബന്ധത്തെ മുൻനിർത്തിയുള്ളതും സാഹിത്യത്തെ സവിശേഷമായി പ്രതിനിധീകരിക്കുന്നതുമായ ചോദ്യങ്ങളാണ് ഈ ഭാഗം ലക്ഷ്യമാക്കുന്നത്)

1. ആട്ടക്കഥയും കഥകളിയും-ചരിത്രം-ആട്ടക്കഥാകൃത്തുക്കളും കൃതികളും-കഥകളി-രംഗാവതരണം- വേഷം-വാദ്യം-അഭിനയം-സംഗീതം-ആദ്യകാലസങ്കേതങ്ങൾ-സവിശേഷരംഗങ്ങൾ

2. തുള്ളൽ-ചരിത്രം-വിവിധയിനം തുള്ളലുകൾ-നമ്പ്യാരും തുള്ളൽക്കൃതികളും-പിൽക്കാല തുള്ളൽക്കൃതികൾ-വേഷം-വാദ്യം

3. മലയാളനാടകം -പ്രാരംഭം-കൂത്തും കൂടിയാട്ടവും-ആദ്യകാലനാടകങ്ങൾ-വിവർത്തനങ്ങൾ-അനുകരണങ്ങൾ-പ്രഹസനങ്ങൾ-സോദ്ദേശ്യനാടകങ്ങൾ-ചവിട്ടുനാടകം-പാഴ് സി നാടകവേദിയും ബാലെയും-സാമൂഹികനാടകം-പ്രശ്നനാടകം-പരീക്ഷണനാടകം-അസംബന്ധനാടകം-തനതുനാടകം-ദളിത് നാടകം-സ്ത്രീനാടകം-പരിസ്ഥിതിനാടകം-രംഗവേദിയുടെ ചരിത്രം-നാടകക്കളരികൾ-നാടകസമിതികൾ

4. തിരക്കഥയും സിനിമയും-ചരിത്രം-രചനാസങ്കേതങ്ങൾ – മലയാളത്തിലെ പ്രധാന തിരക്കഥകൾ-അനുകല്പനം-ചലച്ചിത്രഗാനങ്ങൾ-സിനിമയുടെ വിവിധവിഭാഗങ്ങൾ

ഇതൾ അഞ്ച് (UNIT 5)

നാടോടിവിജ്ഞാനീയം

(ഫോക് ലോർ നിർവചനം,സിദ്ധാന്തം,സമീപനം,വർഗീകരണം,പരിണാമം എന്നിവയും പുറമേ കലയുടെയും രംഗവേദിയുടെയും സാഹിത്യത്തിന്റെയും തനതുസംസ്കാരത്തെ അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. ഫോക് ലോർ നിർവചനം-സിദ്ധാന്തം-സമീപനം-പരിണാമം-നാടോടിക്കലാനിർവഹണം-അനുഷ്ഠാന-അനുഷ്ഠാനേതരനാടോടിക്കലാനിർവഹണങ്ങൾ

2. വാമൊഴിവഴക്കം- ശൈലി-പഴഞ്ചൊല്ല്-കടങ്കഥ-മുത്തശ്ശിക്കഥകൾ-പുരാവൃത്തങ്ങൾ-ഐതിഹ്യങ്ങൾ-നാടൻപാട്ടുകൾ

3. അനുഷ്ഠാന-അനുഷ്ഠാനേതരനാടകങ്ങൾ-പറണേറ്റ്-പടയണി-മുടിയേറ്റ്-ദാരികവധം-രുധിരക്കോലം-തിറ-ഗദ്ദിക-ചിമ്മാനക്കളി-കോതാമൂരിയാട്ടം-തെയ്യം-വ്രതക്കോലം-പൊറാട്ടുകൾ

ഇതൾ ആറ് (UNIT 6)

മലയാളനിരൂപണം

(മലയാളനിരൂപണത്തിന്റെ ഉല്പത്തിവികാസം, സ്വഭാവം എന്നിവയെ അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. പുസ്തകാഭിപ്രായം-നിരൂപണം-വിമർശനം-ഉപന്യാസം എന്നിവയുടെ പ്രാരംഭഘട്ടം-പത്രങ്ങളും മാസികകളും നൽകിയ സംഭാവന

2. നിരൂപണത്തിന്റെ ആദ്യഘട്ടം-സാഹിത്യപോഷണത്തിനും പരിഷ്കരണത്തിനും മലയാളനിരൂപണം നൽകിയ സംഭാവനകൾ-ആദ്യകാലനിരൂപണത്തിന്റെ സ്വഭാവം-ആദ്യകാലനിരൂപകർ-പൌരസ്ത്യനിരൂപണവുമായുള്ള ബന്ധം

3. പാശ്ചാത്യനിരൂപണസിദ്ധാന്തങ്ങളുടെ കടന്നുവരവ്-ചെറുകഥ-നോവൽ തുടങ്ങിയ സാഹിത്യജനുസ്സുകളെക്കുറിച്ചുള്ള ധാരണ നൽകുന്നതിൽ നിരൂപണം വഹിച്ച പങ്ക്

4. പ്രമേയവും രൂപവും തമ്മിലുള്ള ബന്ധത്തെക്കുറിച്ച് മലയാളനിരൂപണത്തിലുണ്ടായ ചർച്ച- സാഹിത്യത്തിന്റെ പ്രതിജ്ഞാബദ്ധതയെപ്പറ്റിയുള്ള ചർച്ച-പാരമ്പര്യസാഹിത്യബോധവും വർത്തമാനകാലസാഹിത്യവും തമ്മിലുള്ള താരതമ്യം.

5. ആധുനികത- ആധുനികഭാവുകത്വം രൂപപ്പെട്ടുത്തിയതിൽ നിരൂപണത്തിനുള്ള പങ്ക്- ആധുനികാനന്തരസാഹിത്യപ്രസ്ഥാനത്തിന്റെ കടന്നു വരവ്-നിരൂപണത്തിന്റെ വർത്തമാനകാലം- ദളിത്-സ്ത്രീ-പരിസ്ഥിതിവിമർശനങ്ങൾ,

ജനപ്രിയസാഹിത്യപഠനം- സംസ്കാരപഠനം- തർജ്ജമാപഠനം- സാഹിത്യചരിത്രവിജ്ഞാനീയം

ഇതൾ ഏഴ് (UNIT 7)

മറ്റ് സാഹിത്യവിഭാഗങ്ങൾ

(താഴെക്കൊടുത്തിരിക്കുന്ന മറ്റ് സാഹിത്യവിഭാഗങ്ങളുടെ സ്വഭാവവും മലയാളസാഹിത്യത്തിൽ ഇവയുടെ സ്ഥാനവും അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങൾ ഉദ്ദേശ്യം)

1. ജീവചരിത്രം-ആത്മകഥ-യാത്രാവിവരണം—സർവകലാശാലയിലെ ഗവേഷണചരിത്രം-വിജ്ഞാനകോശം-നിഘണ്ടു-സൈബർസാഹിത്യം-കാരിക്കേച്ചർ-താരതമ്യസാഹിത്യപഠനം-വിവർത്തനപഠനം

ഇതൾ എട്ട് (UNIT 8)

ഭാഷാശാസ്ത്രവും വ്യാകരണവും

(ഭാഷാശാസ്ത്രം, വ്യാകരണം എന്നീ പഠനമേഖലകൾ അടിസ്ഥാനമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. പ്രാചീനഭാരതത്തിലെ ഭാഷാപഠനരീതികൾ- പ്രയുക്തഭാഷാശാസ്ത്രം- ഭാഷാകക്ഷ്യകൾ- ഭാഷാഗോത്രങ്ങൾ- സ്വനവിജ്ഞാനം-രൂപവിജ്ഞാനം-വാക്യവിജ്ഞാനം- അർത്ഥവിജ്ഞാനം- ഭാഷാഭേദവിജ്ഞാനം - സാമൂഹികഭാഷാശാസ്ത്രം- പരിസ്ഥിതിഭാഷാശാസ്ത്രം-വംശീയഭാഷാശാസ്ത്രം-കമ്പ്യൂട്ടേഷണൽ ലിംഗ്വിസ്റ്റിക്സ്- ഡൈഷണികഭാഷാശാസ്ത്രം

2. മലയാളഭാഷോല്പത്തിസിദ്ധാന്തങ്ങൾ-ദ്രാവിഡഭാഷകൾ-തമിഴും മലയാളവും തമ്മിലുള്ള സാജാത്യവൈജാത്യങ്ങൾ-കക്ഷ്യാവിഭജനം- നാമങ്ങളുടെയും ക്രിയകളുടെയും കാര്യത്തിൽ മലയാളത്തിന് സംസ്കൃതത്തിൽ നിന്നുള്ള വ്യത്യാസങ്ങൾ-മലയാളവ്യാകരണഗ്രന്ഥങ്ങൾ- സ്വരങ്ങൾ-വ്യഞ്ജനങ്ങൾ-നാമരൂപം ലിംഗം-വചനം-വിഭക്തി-വിഭക്ത്യാഭാസം-തദ്ധിതം- ക്രിയാരൂപം-പൂർണ്ണക്രിയ-അപൂർണ്ണക്രിയ- കാലം-പ്രകാരം- പ്രയോഗം-പ്രകൃതി-നിഷേധം-അനുപ്രയോഗം-ഭേദകം-സന്ധി-സമാസം

ഇതൾ ഒമ്പത് (UNIT 9)

സാഹിത്യസിദ്ധാന്തങ്ങളും സൌന്ദര്യശാസ്ത്രവും

(സാഹിത്യസിദ്ധാന്തങ്ങളെയും സൌന്ദര്യസങ്കല്പങ്ങളെയും ആധാരമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം. പ്രധാന സൈദ്ധാന്തികർ, ഗ്രന്ഥങ്ങൾ, സങ്കല്പനങ്ങൾ എന്നിവയിൽ നിന്നുള്ള ചോദ്യങ്ങളായിരിക്കണം.)

1. പായിരം-പൊരുപ്പായിരം തുടങ്ങി നന്നൂലിൽ പറയുന്ന കാവ്യസങ്കൽപ്പങ്ങൾ-തൊൽക്കാപ്പിയത്തിലെ പൊരുളതികാരം-കാവ്യവിഭജനം-തിണസങ്കല്പം-മെയ്പ്പാട്-ഉവമ-തൊടൈ-വണ്ണം

2. കവി-ഭാവുകൻ-കാവ്യഹേതുക്കൾ-കാവ്യനിർവചനം-കാവ്യപ്രയോജനം-ധ്വനി-രസം-അലങ്കാരം- രീതി-ഗുണം-വക്രോക്തി-അനുമാനം-ഔചിത്യം-പ്രധാനപ്പെട്ട വൃത്തങ്ങളും അലങ്കാരങ്ങളും

3. ക്ലാസ്സിസിസം-നിയോക്ലാസ്സിസിസം-റൊമാന്റിസിസം-നാച്വറലിസം-സിംബലിസം-ഇംപ്രഷണിസം-റിയലിസം-സോഷ്യലിസ്റ്റ് റിയലിസം-മാർക്സിസം-സർറിയലിസം-എക്സ്പ്രഷണിസം- എക്സിസ്റ്റൻഷ്യലിസം-സൂക്ച്വറലിസം- പോസ്റ്റ് സൂക്ച്വറലിസം-മോഡേണിസം- മനോവിജ്ഞാനീയം-പോസ്റ്റ്മോഡേണിസം-അപനിർമ്മാണം-കോളനീയാനന്തരവാദം-സ്ത്രീവാദം- ദളിത് വാദം-പരിസ്ഥിതിവിജ്ഞാനീയം-ഇതര സാഹിത്യസമീപനങ്ങൾ

ഇതൾ പത്ത് (UNIT 10)

കേരളസംസ്കാരം

(കേരളത്തിന്റെ സാംസ്കാരികചരിത്രത്തിന് പ്രാമുഖ്യം നൽകിക്കൊണ്ട് സാമൂഹികവും മതപരവും രാഷ്ട്രീയവുമായ ഇടപെടലുകളെ ആസ്പദമാക്കിയുള്ള ചോദ്യങ്ങളാണ് ഉദ്ദേശ്യം)

1. സാംസ്കാരികചരിത്രനിർമ്മിതിയുടെ ഉപാദാനങ്ങൾ-ഭൂമിശാസ്ത്രവും അധിവാസമേഖലകളും-ഗോത്രസംസ്കൃതി

2. പ്രാചീനരാഷ്ട്രീയസംസ്കാരം- സംഘകാലം-കുലശേഖരകാലം-നാട്ടുരാജ്യങ്ങൾ-വിദേശാധിപത്യം-സ്വാതന്ത്ര്യസമരം-ഭരണനവീകരണം-ഐക്യകേരളപ്പിറവി - ജനാധിപത്യഭരണം

3. സാമൂഹികസംസ്കാരം-കൃഷി-ഭക്ഷണം-പാർപ്പിടം-വസ്ത്രം-ദായക്രമം-വിനോദങ്ങൾ-ജാതിവ്യവസ്ഥ-സാമ്പത്തികഘടന-തൊഴിൽസംസ്കൃതി-തൊഴിലാളിപ്രസ്ഥാനങ്ങൾ-പൊതുവിദ്യാഭ്യാസത്തിന്റെ വ്യാപനം-വിവിധവിജ്ഞാനമേഖലകളും കേരളസംസ്കാരവും-കലകൾ-കേരളം ഇരുപത്തൊന്നാം നൂറ്റാണ്ടിൽ-ആഗോളീകരണവും കേരളസംസ്കാരവും-സാംസ്കാരികസ്ഥാപനങ്ങളും പ്രസ്ഥാനങ്ങളും-മാതൃഭാഷാപരിപോഷണയത്നങ്ങൾ-സാംസ്കാരികരംഗത്തെ അംഗീകാരങ്ങളും പുരസ്കാരങ്ങളും.

4. മതങ്ങളുടെ സംഭാവന-ഹിന്ദുമതം-ജൈനമതം-ക്രിസ്തുമതം-ഇസ്ലാംമതം-യഹൂദമതം - മതനവോത്ഥാനപ്രസ്ഥാനങ്ങളും നായകരും-കേരളസംസ്കാരത്തിന്റെ മതേതരസ്വഭാവം

5 മാധ്യമസംസ്കാരം-അച്ചടി-പ്രസാധനം-പാഠപുസ്തകനിർമ്മാണം-യാത്രാസംവിധാനം-ആശയവിനിമയരീതികൾ-തപാൽ-പത്രങ്ങളും മാസികകളും-റേഡിയോ, ടെലിവിഷൻ-നവമാധ്യമങ്ങൾ

Code No : 29

SUBJECT : MARINE BIOLOGY

SYLLABUS

UNIT- 1

Introduction to marine environment–Origin of Ocean – Uniqueness–Classification -major group of organisms–General adaptations of organisms; Pelagic, Benthic zones and hydrothermal vents, cold seep communities and their adaptations; sea floor features–submarine canyons- mid ocean ridges – trenches–island arcs and basins.

Physical properties of sea water–temperature distribution – pressure – density –viscosity–surface tension–conductivity; Heat Budget – fluxes – insolation – infrared -latent heat; Light–UV radiation – acoustics – Currents–geotrophic currents -Oceanic circulations – vorticity–deep circulation–Eckman spiral–Langmuir circulation–monsoon and trade winds–Upwelling; Tropical Ocean stratification –ElNino – ENSO – Waves–theories of waves–internal and standing waves – Tides -formation of swells–tidal currents–effect in coastal areas–importance of tide table -tidal and wave energy – OTEC–short term and long term sea level variations –tectonics – Tsunamis–storm surges–cyclones and impacts; Recent developments–modern challenges in oceanography–satellite oceanography–Automated ocean observatory; Marine zoogeography with reference to Arctic – Antartic–Indian Oceans

UNIT- 2

Introduction–Ocean as chemical system–origin of salt–differences between freshwater and sea water; Chemical properties of Ocean water–major and minor constituents–ionic composition–major and minor elements–trace metals – chlorinity–salinity of seawater–methods of measurements; Distribution of oxygen –carbondioxide – nitrogen–hydrogen sulphide – methane–humic substances; Role of inorganic nutrients in the fertility of the sea; Nitrogen – phosphorus–silicon in the sea – distribution-cycling – regeneration–N:P ratio; Wealth of the ocean – minerals –salt – gluconite – petroleum – phosphorite–manganese nodules–economy of extraction – desalination–dissolved organic matters.

UNIT- 3

Plankton – classification–phytoplankton–zooplankton – composition–mode of life -nekton–benthos–interrelationship–methods of collection – identification–factors influencing primary production–vertical migration–structural and physiological adaptations of plankton and ecology; Harmful Algal Blooms (HAB)–Red tide phenomena and their effects; Primary–secondary and tertiary production–methods for measuring the productivity–factors affecting productivity–CO2 sequestration–productivity in different oceans; Marine Effect of the physical and chemical factors on marine organisms.

UNIT- 4

Marine microbes and viruses – Types–Microbial associations–Ecological roles–Pathogenic microorganisms in finfish and shellfish–impact to human beings; Pathogens in sea foods-spoilage during processing and preservation; faecal and total coliform microbes; microbial technology – fermenter–batch and continuous culture-bench top-kinetics of product recovery; Microbial products-primary and secondary metabolites – antibodies–enzymes.

Bioactive marine natural products–introduction to marine natural products–anti tumor–tumor promoting–anti inflammatory–analgesic–anti viral agents–antibiotic–cytotoxic–antimicrobial compounds. Algal product–Single cell protein–hydrocolloids–agarose–carrageen–alginates–enzymes–sources – applications; Marine lipids–sources – applications. DNA sequence–structural analyses–DNA sequence alignment–phylogeny–basic logical alignment tool–3D, molecular visualizer–drug designing.

UNIT–5

Marine Ecosystems–concepts–principal components–food chains–trophic structure–food web–ecological pyramids–energy flow–evolution and management–system ecology and modelling; Animal association–mutualism – commensalism–symbiosis – parasitism-competition and succession-dispersal and settlement; Population ecology–growth–density variations–concept of carrying capacity; Dispersal–prey-predator relationship–density dependent–density independent factors; Seagrasses: Distribution-types-morphological-anatomical and physiological adaptations-ecological role - uses; Seaweeds - distribution-types-ecological role-uses; Saltmarshes – distribution - adaptations - ecological role - uses.

UNIT–6

Intertidal zone–effect of environmental condition-adaptations on intertidal organisms; Sandy shore–Environmental conditions-organisms–adaptation of organisms-food and feeding-interstitial fauna-coastal sand dunes-types; Muddy shore- Environmental conditions-organisms and adaptations-zonation of muddy shore organisms-food and feeding; Rocky shore-organisms-zonation pattern-adaptation to wave action, temperature and their effect-food and feeding.

Corals-types-theories of coral reefs – distribution-importance of corals-biology and ecology of corals-organism associated with corals-species interaction; Estuary-types-classification – physic–chemical conditions–estuarine organisms-adaptations- ecological role and economic importance; Mangroves-types-ecology of mangroves–physiological and anatomical adaptations-ecological role-economic importance–uses; Lagoon-environmental conditions, organisms and adaptations- importance.

UNIT- 7

Marine Pollution: Major pollutants – sources–transport -monitoring methods – bioindicators–bioaccumulation–biomagnification-mussel watch–GESAMP–sewage discharge-impact on marine environment-eutrophication; Heavy metal pollution-sources-distribution-fate-toxicity–Minamata–itaiitai diseases; Oil pollution-sources-fate-biodegradation-impact of oil on organisms-treatment techniques; Thermal pollution-sources-waste heat disposal-impact of biocides-chlorine-ecological impacts; Pesticide pollution–impacts with special reference to marine fishes, birds and mammals; Radioactive pollution-sources-biological effects; Biofouling-problems-control measures-antifouling paints and environmental pollution; Use of analytical instruments–AAS–ICP –HPLC- GC.

UNIT – 8

Classification–life history and phylogenetic relationship of Protozoa and Sponges; Coelenterate – polymorphism-life history–Polychaete–classification–morphology–reproduction and adaptive radiation; Functional morphology–development–nemertinea–entoprocta–ectoprocta–phoronida– pogonophora; Chaetognatha–classification – morphology-anatomy; Brachiopoda–classification–morphology–palaeontology and evolution; Crustacea–classification–comparative morphology–moulting–larval forms–evolution and palaeontology; Mollusca–classification–general characters–bivalves–gastropods – cephalopods; Echinodermata–water vascular system–larvae–their comparative morphology; Prochordata–classification–comparative morphology–reproduction–early development–larval metamorphosis.

UNIT – 9

Classification of fin and shell fishes with special reference to species of commercial importance; Pelagic–demersal–oceanic–deep-sea resources; Potential and present level of exploitation; Food and feeding habits; Reproductive system of fishes–maturation and spawning–relative condition factor- fecundity; Respiratory- Circulatory–systems of fishes; Fish population dynamics–fish stock assessment–Maximum Sustainable Yield (MSY); Age and growth of fishes- estimation of growth–length–weight relationships; Fishing aids–echo-sounder–SONAR–GPS–remote sensing; Fishing craft and gears–fresh fish handling at onboard and landing centers; Fisheries forecasting-fishing regulations–closed seasons and protected areas; Aquatic mammals- classification–adaptation–evolution of cetaceans – sirenians; Aquatic adaptation–respiratory–circulatory mechanisms–comparative anatomy of skin derivatives; Embryology–with special reference to marine vertebrates–fish- bird- mammal.

UNIT- 10

Threats to Marine Environment: Short term and long term threats-over-exploitation of fishery resources-pollution-habitat destruction-degradation-land reclamation-invasive alien species-disease problem-climate change-ocean acidification; Threats to coral reefs: storms and waves-outbreak of crown-of-thorns-ElNino-ocean acidification-man made activities; Threats to Mangroves: Causes of mangrove degradation-destruction-urbanization-agriculture-aquaculture practices-over fishing-cutting for timbers-fuel- charcoal-prevention of freshwater and tidal flow-oil pollution-mining; Threats to Estuaries: Land reclamation-urbanization-sewage disposal-oil waste-over exploitations of resources.

Ocean conservation and Management: Role of national and international organizations in Ocean management-Law of sea -Geneva convention-UNCLOS-Antarctic treaty-sea bed treaty and importance; Biodiversity-conservation-endangered marine animals-marine Biosphere Reserves-marine parks-Marine Protected Areas (MPA); Marine fishing management policies-coastal management policies-convention on biological diversity (CBD)–IUCN-WTO-CITES-UNEP-IOC-CMS-WWF-IMO-ICES; Integrated coastal zone management coastal zone regulation 1991 and amendments in India-aquaculture bill.

Code No :30

SUBJECT : MATHEMATICS

SYLLABUS

UNIT – 1

Algebra

Permutations, Combinations, Applications of classical number theoretic properties, Groups, Counting Principles, Cayley's theorem, Permutation groups, Sylow's theorems, Direct Products, Polynomial Rings, Vector spaces, Inner Product Spaces, Orthonormal bases, Modules, Fields, Roots of polynomials, Elements of Galois theory, Splitting fields, Degrees of Splitting fields of polynomials, Solvable groups, Linear transformations, Matrix representation, Canonical forms, Determinants, Cayley Hamilton theorem and Applications, Hermitian, Unitary and Normal Transformations, Quadratic Forms, Finite fields, Wedderburn's Theorem on Finite division rings, Frobenius Theorem, Integral Quaternions and Four Square Theorem.

UNIT – 2

Real Analysis

Real number system as a complete ordered field, Sequences and series, convergence, limit supremum and limit Infinimum, Euclidean space, Accumulation points, Bolzano Weierstrass theorem, Heine-Borel theorem, Metric spaces, Compactness, Connectedness, Continuity, Uniform continuity, Differentiability, Mean value theorem for derivatives, Sequences and series of functions, Uniform convergence and continuity, Cauchy condition for Uniform convergence, Riemann-Steiltjes sums and integrals, Riemann sums and integrals, Improper Integrals, Monotonic functions, types of discontinuity, Functions of bounded variation, Measure and Integration, Lebesgue measure, Lebesgue integral, Functions of several variables, Directional derivative, Partial derivative, derivative as a linear transformation, Inverse and Implicit function theorems.

UNIT – 3

Complex Analysis

Algebra of complex numbers, transcendental functions such as exponential, trigonometric and hyperbolic functions, Analytic functions, Cauchy-Riemann equations, Contour integral, Cauchy's theorem, Cauchy's integral formula, Residues and Poles, Calculus of residues, Applications of Residues, Liouville's theorem, Maximum modulus principle, Rouche's theorem, Schwarz lemma, Open mapping theorem, Power series, Taylor series, Laurent series, Conformal mappings, Mobius transformations and simple applications of complex integration.

UNIT – 4

Topology

Topological spaces, Basis for a Topology, subbasis, Order topology, Product topology, Subspace topology, Closed sets, Limit points, Hausdorff spaces, Continuous functions, Homeomorphisms, Metric Topology, Convergence of functions, Uniform convergence, Connected spaces, Compactness, Countability axioms, Separation axioms and Normal spaces.

Functional Analysis

Normed linear Spaces, Banach Spaces, Continuous linear transformations, Hahn Banach theorem, Open mapping theorem, Closed graph theorem, Conjugate of an operator, Hilbert spaces, Orthogonality, Orthonormal bases, Conjugate space of a Hilbert space, Adjoint of an operator, Self-adjoint operators, Normal operators, Unitary operators, Projections, Holders and Minkowski inequalities, Spectral theorem for operators on a finite dimensional Hilbert space, Banach Algebra, Regular and singular elements, Topological divisors of zero, Spectrum and spectral radius.

UNIT – 5

Ordinary Differential Equations

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs, General theory of homogenous and non-homogeneous linear ODEs, Variation of parameters, Sturm-Liouville boundary value problem and Green's function.

Application- Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

UNIT – 6

Partial Differential Equations

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs, Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations, Applications of Laplace and Fourier Transforms.

UNIT – 7

Classical Mechanics

Equation of motions, Constraints, Generalized coordinates, Holonomic Systems, Non-Holonomic Systems, Virtual Work, D' Alembert's Principle, Lagrange's equations, Hamilton's canonical equations, Hamilton's Principle and Principle of least action, Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis and theory of small oscillations.

Calculus of Variations

Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema, Variational methods for boundary value problems in ordinary and partial differential equations.

UNIT – 8

Differential Geometry

Curves in spaces, Serret- Frenet formulas, Locus of center of curvature, Spherical curvature, Intrinsic equation, Helices, Spherical indicatrix surfaces, Envelope, Edge of regression, Developable surfaces associated to a curve, First and Second fundamental forms, Lines of curvature, Gaussian curvature, Euler's theorem, Dupin's Indicatrix, Surface of revolution, Conjugate systems, Asymptotic lines, Isometric lines and Geodesics.

Linear Integral Equations

Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels, Characteristic numbers and eigenfunctions and resolvent kernel.

UNIT – 9

Operations Research

Linear programming, Revised simplex method, Duality problems, Degeneracy procedure, Integer programming, Non-linear programming, Convex programming, Dynamic programming, Game theory, Queuing theory, Single server and Multi server models, Erlang service distributions, Mathematical theory of inventory control, Optimal inventory policies in Deterministic models, Storage models, Replacement theory, Markovian decision models in replacement theory, Reliability, Failure rates, System reliability and Network analysis.

UNIT – 10

Mathematical Statistics

Probability Theory, Bayes theorem, Random variables and distribution functions (univariate and multivariate), expectation and moments, Independent random variables, marginal and conditional distributions, Characteristic functions, Probability inequalities(Tchebyshef and Markov), Simple, partial and multiple correlation, Regression Analysis, rank correlation, Weak laws of large numbers, Central Limit theorem, Discrete and continuous sampling distributions, standard errors, Methods of estimation, properties of estimators, confidence intervals, Tests of hypotheses, likelihood ratio tests, Analysis of discrete data and chi-square test of goodness of fit, Large sample tests, Simple nonparametric tests for one and two sample problems, test for independence of attributes, confidence intervals and Analysis of variance.

Code No : 31

SUBJECT : MATHEMATICS EDUCATION

SYLLABUS

Unit – 1 Algebra

Permutations, Combinations, Applications of classical number theoretic properties, Groups, Counting Principles, Polynomial Rings, Vector spaces, Inner Product Spaces, Orthonormal bases , Fields, Splitting fields, Solvable groups, Linear transformations, Determinants, Cayley Hamilton theorem and Applications, Finite fields.

Unit – 2 Real and Complex Analysis

Real number system, Sequences and series, convergence, Metric spaces, Compactness, Connectedness, Continuity, Differentiability, Sequences and series of functions, Uniform convergence and continuity, Riemann–Stieltjes sums and integrals, Improper Integrals, Measure and Integration.

Algebra of complex numbers, Analytic functions, Cauchy-Riemann equations, Cauchy's theorem, Cauchy's integral formula, Residues and Poles, Calculus of residues, Applications of Residues, Power series, Taylor series, Laurent series.

Unit –3 Topology and Functional Analysis

Topological spaces, Basis for a Topology, Order topology, Product topology, Subspace topology, Closed sets, Limit points, Hausdorff spaces, Continuous functions, Homeomorphisms, Metric Topology, Connected spaces, Compactness, Countability axioms, Separation axioms and Normal spaces.

Normed linear Spaces, Banach Spaces, Continuous linear transformations, Hahn Banach theorem, Open mapping theorem, Closed graph theorem, Conjugate of an operator, Hilbert spaces, Orthogonality, Orthonormal bases, Normal operators, Unitary operators, Projections, Banach Algebra.

Unit – 4 Ordinary and Partial Differential Equations

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs, General theory of homogeneous linear ODEs, Variation of parameters.

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs, Classification of second order PDEs, Method of separation of variables for Laplace, heat and wave equations.

Unit – 5 Differential Geometry and Operations Research

Curves in spaces, Serret–Frenet formulas, Locus of center of curvature, Spherical curvature, Intrinsic equation, Helices, Spherical indicatrix surfaces, Envelope, Edge of regression, Developable surfaces associated to a curve, First and Second fundamental forms, Lines of curvature.

Linear programming, Revised simplex method, Duality problems, Degeneracy procedure, Integer programming, Non-linear programming, Convex programming, Game theory, Queuing theory, Single server and Multi server models, Network analysis.

Unit 6–Foundations of Education

Philosophical Perspectives: Idealism, Naturalism, Pragmatism, Progressivism, Existentialism, Humanism, Realism, Eclecticism – Philosophers and their contributions: Western Philosophers: Rousseau, Froebel, Maria Montessori, Pestalozzi, Bertrand Russell, John Dewey – Indian Philosophers: Mahatma Gandhi, Rabindranath Tagore, Swami Vivekananda, J.Krishnamurti, Aurobindo – Development of Indian Education during Pre-Independence, Post-Independence, Modern era–Important Education Committees – Recommendations of National Education Policies, National Curriculum Frameworks.

Sociological Perspectives: Concepts of Special and Inclusive Education, Women Education, Population Education, Vocational Education, Environmental Education for sustainable development-UN SDG goals, Human Rights: UN Declaration of Human Rights, Peace and Value Education – Indian Constitution: Articles and Amendments related to Education–Culture and Communication in Education – Social issues: Measures and Reforms – Social Structure,

Socialization process – Social stratification – Indigenous Value systems – History and Culture of Tamil Nadu: Social Equality, Language, Culture and Politics.

Unit 7 Educational Psychology

Educational Psychology – Cognitive, Humanistic, Behavioural and Transpersonal school of thoughts – Role of heredity and environment – Dimensions of Development: Physical, Cognitive, Psycho-Social, Moral, Behavioural, Language – Theories of Development: Piaget, Bruner, Kohlberg, Erickson, Vygotsky, Noam Chomsky, Watson– Developmental tasks – Sensation and Perception–Factors of learning: Attention, Interest, Aspiration, Motivation and its types, Motivational Theories: Maslow, McDougall's, McClelland – Learning, Factors of Learning, Theories: Trial & Error, Operant and Classical Conditioning, Insight and Gestalt – Intelligence: Theories – Single-Factor, Two-Factor, Triarchic, Group and Multi-factor theory, Guilford's Structure of Intellect, Gardner's Multiple Intelligence theory, Factor Personality: Type and Trait theories – Personality Assessment methods and techniques – Educational Implications of Learning, Intelligence and Personality theories – Mental Health, Adjustment and Defense mechanisms – Concepts of Guidance and Counselling.

Unit 8 Pedagogical approaches

Nature, Scope, Aims and Objectives, Values of Teaching the subject, Inter-disciplinary aspects, Taxonomy of Educational Objectives: Bloom's, Anderson's, RCEM, NCERT –Micro-teaching: Skills and Components, Micro Cycle, Link Lesson–Planning of the lesson: Curricular Plan, Unit Plan and Lesson Plan, General and Specific Instructional objectives, Action verbs – Methods of Teaching: Traditional and Modern Methods – Techniques of Teaching: Small and Large Group Techniques – Models of Teaching: Concept attainment, Advanced Organizers, Inquiry Training, Information Processing, Personalized Model – Resources for Teaching-Learning: Text Books, Laboratory, Library, E-resources and Field-trips – Flander's Classroom Interaction Analysis – Dale's Cone of Experience – Educational Technology and ICT Resources in Teaching-Learning: Blended Learning, Simulation, Augmented Reality, Virtual Learning – Digital Resources – Assessment and Evaluation: Types of Tests, Steps in construction of an achievement test – Continuous and Comprehensive Evaluation – Analysis and Interpretation of test scores.

Unit 9–Curriculum Components and Teacher Education

Curriculum – Principles, Bases of Curriculum: Philosophical, Psychological and Sociological, Criteria of selection of content – Types: Subject, Learner, Community and Activity centred curriculum – Concepts of core and hidden curriculum – Curriculum Organization: Articulation, Balance and Continuity – Approaches: Concentric, Spiral, Topical, Logical, Vertical and Horizontal – Curricular Materials – Role of NCERT and SCERT in curriculum planning – Stakeholders contribution and participation in the curricular, co-curricular and extra-curricular activities – Curriculum Evaluation and Theories: Tyler's model, Hilda Taba model, Beauchamp's model, D.K.Wheeler's model, Virgil V. Herrick model.

Teacher Education – National Council for Teacher Education: Functions–Teacher Education systems and Programmes: Pre-service and In-service – Integrated Teacher Education Programmes–Concept of Teaching Profession; Changing roles and responsibilities – Continuous Professional development and Professional ethics–National Professional Standards for Teachers – Teacher Appraisal and accountability – Significance of Teachers In-service education and training–Research and innovations in Teacher education, NAAC's Assessment and Accreditation process – Autonomy in Education: Institutional, Administrative and Teacher autonomy –Teacher Eligibility Tests –Concepts of Andragogy – Life-long and continuing education.

Unit 10 Research Methodology and Statistics

Research – Types of Research: Basic, Applied and Action Research, Sources of Selecting Research Problem, Importance of Review of Literature, Hypothesis, Variables, Sampling Techniques: Probability and Non-Probability techniques, Steps in writing research proposal and research report – Academic and Research Writing – Experimental Research Designs: Pre-Experimental, True and Quasi Designs – Factors affecting internal and external validity of experimental research, Quantitative, Qualitative and Mixed Research Methods–Research Tools: Likert and Thurstone, Personality, Interest and Intelligence test, Item and Factor analysis – Characteristics of Research tools – Statistical Analysis: Descriptive and Inferential Analysis, Hypothesis testing: Type I and Type II errors, Level of Significance, Graphical Representation of Data – Issues related to plagiarism–Research Ethics and Integrity.

Code No : 32

SUBJECT: MICROBIOLOGY

SYLLABUS

Unit. 1. General Microbiology and Microbial Diversity

History and Recent developments in Microbiology, Spontaneous generation vs. Biogenesis. Contributions of Anton Von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming. Paul Ehrlich, Elie Metchnikoff, Edward Jenner. Germ theory of disease. Microscopy–light, dark field, fluorescence, phase contrast, scanning, transmission and Atomic Force. Five kingdom and three kingdom classification systems. Classification of bacteria according to Bergey's Manual of systematic bacteriology. General characteristics of Acellular microorganisms–Viruses, Viroids, Prions and Cellular microorganisms–Structure of Archaebacteria, Bacteria, Algae, Fungi and Protozoa. Structural organization and functions of eukaryotic intracellular organelles. Staining methods. Antimicrobial chemotherapy–General characteristics of antimicrobial drugs, determining the level of antimicrobial activities, Antibacterial drugs, Drug resistance.

Unit. 2. Microbial Physiology and Metabolism

Pure culture techniques and preservation of microorganisms. Sterilization and disinfection methods. Growth and nutrition–Growth curve, batch, continuous and synchronous cultures. Carbohydrate catabolism–Pentose phosphate pathway, ED Pathway, Kreb's cycle, Energy yield in glycolysis and aerobic respiration, Anaerobic respiration, Lactic acid fermentation, Alcohol fermentation. Lipid Metabolism–Oxidation of lipids, biosynthesis of fatty acids, triglycerides, phospholipids and sterols. Protein and amino acid catabolism–Oxidation of inorganic molecules – Photophosphorylation, Biochemical pathways of energy use–Photosynthetic fixation of CO_2 – Biosynthesis of peptidoglycan, Biosynthesis of lipids, Biosynthesis of amino acids and its interconversions–Metabolism of nucleotides and vitamins.

Unit. 3. Bacteriology

General properties of pathogenic bacteria, methods of identification, virulence factors. Normal microbial flora of human body. Morphology, classification, cultural characteristics, pathogenicity, diagnosis, treatment and control of human bacterial diseases caused by – *Staphylococci*, *Streptococci*, *Neisseriae*, *Mycobacterium, Haemophilus, Salmonella, Shigella, Escherichia coli, Klebsiella, Vibrio, Proteus, Spirochaetes, Rickettsiae, Chlamydiae, Mycoplasmas, Ureplasmas*, *Pseudomonas, Bacillus, Corynebacterium, Helicobacter, Erysipelothrix, Clostridium, Listeria, Brucella* and *Yersinia*. Zoonotic diseases and their control – Hospital acquired infections – Hospital infection control committee – functions–Hospital waste disposal.

Unit. 4. Virology

General properties of viruses–structure, cultivation, pathogenesis and diagnosis of viruses – Classification of viruses. Control of viral diseases–Viral vaccines and antiviral agents. DNA viruses- Adeno, Herpes, Pox, Papova and Hepatitis viruses. RNA viruses–Picorna, Orthomyxo, Paramyxo, Toga and arthropod borne viruses, Retro, Rota, Rhabdo–Emerging viruses- Chikungunya, Ebola, Bird flu, swine flu (H1N1, H1N2 and H3N2), Zika, Corona, Dengue and equine encephalitis, Oncogenic viruses and Slow viruses. Bacteriophages – structure and life cycle of ϕ, X174, M13, Mu, T4, λ, Bacteriophage typing.

Unit. 5. Parasitology & Mycology

Taxonomy, Characteristics and diagnosis of pathogenic fungi, Anti-fungal drugs. Morphology, pathogenicity, laboratory diagnosis and control of Superficial mycoses–*Malassezia, Piedra,* Cutaneous mycoses – *Trichophyton, Epidermophyton* and *Microsporum* , Subcutaneous mycoses–*Madurella, Sporothrix* and *Phialophora.* Systemic mycoses – *Blastomyces, Coccidioides, Cryptococcus* and *Histoplasma*; Oppurtunistic mycoses – *Aspergillus, Candida, Pneumocystis,* and *Microsporidium*. Parasitic infections – Classification, Morphology, Cultivation, Pathogenic mechanisms, transmission and methods of diagnosis of parasitic infections, Antiprotozoal drugs. Protozoans – *Entamoeba, Giardia, Trichomonas Toxoplasma, Leishmania, Trypanosoma, Balantidium and Plasmodium,* Parasitic infections in AIDS patients – *Cryptosporidiosis* and *Isosporiasis.* Helminthes- Cestodes-*Taenia solium*, *Taenia saginata* & *Echinococcus*. Trematodes – *Fasciola hepatica*- Schistosomes- *Schistosoma haematobium*, *Schistosoma mansonii*, *Schistosoma japonicum* – Nematodes- *Ascaris*, *Ankylostoma*, *Trichuris*, *Trichinella*, *Enterobius* and *Wuchereria.*

Unit. 6. Molecular Biology

Conformation of nucleic acids: DNA (A, B, Z forms), RNA, t-RNA, rRNA, mRNA and micro-RNA. Conformation of proteins Stability of proteins and nucleic acids. DNA replication, DNA damage and repair mechanism and recombination, extra chromosomal replicons, homologous and site-specific recombination. 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 and polyadenylation, structure and functions of different types of RNA, RNA transport. Protein synthesis and processing–Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, aminoacyl tRNA synthetase and translational proof reading, translational inhibitors, Post translational modification of proteins. Control of gene expression at transcription and translation level.

Unit. 7. Microbial Genetics and Genomics

Mendelian principles, Concept of gene and allele, Extensions of Mendelian principles, linkage and crossing over, sex linkage, sex limited and sex influenced characters, Organization of genes and chromosomes, Transformation–mechanism of natural competence, types, Conjugation–mechanism, Hfr and F' strains, Transduction–Generalized and specialized transduction, Gene mapping methods, Extra chromosomal inheritance, Transposable elements–Uses of transposons and transposition, Plasmids- Types of plasmids and its replication, Mutations and mutagenesis, types–Physical and chemical mutagens; Molecular basis of mutation, uses of mutations, Ames test. Phage Genetics–Features of T4 genetics, Genetic basis of lytic *versus* lysogenic switch of phage lambda.

Unit.8. Immunology

Concept of Innate and Adaptive immunity; Cells and organs of immune system, Antigens Characteristics, Haptens, Epitopes, T-dependent and T-independent antigens, Adjuvants, Antibodies- Structure, Types, Functions and Properties of antibodies; Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); Monoclonal and polyclonal antibodies. Major Histocompatibility Complex–Organization of MHC, Structure and Functions of MHC I & II molecules, Antigen processing and presentation, Complement System–Components of the Complement system; Activation pathways–Classical, Alternative and Lectin pathway, Biological consequences of complement Activation, Primary and Secondary Immune Response, Hypersensitivity and its types, Autoimmunity, Immunodeficiency diseases, Tumor Immunology. Vaccines, Vaccination schedule, Serological Techniques–Precipitation, Agglutination, neutralization, Immunodiffusion, Immuno electrophoresis, ELISA, ELISPOT, Western blotting, Immuno fluoresence, Flow cytometry, Immunoelectron microscopy.

Unit. 9. Food and Industrial Microbiology

Sources of contamination of foods, Extrinsic and intrinsic factors , Principles and methods of food preservation, Food borne illness–Bacterial and non-bacterial. Spoilage of fruits, vegetables, meat, poultry, fish and sea foods. Preservation and spoilage of milk and milk products, Milk borne diseases. Fermented foods–Production of Bread, Yogurt and Cheese. Probiotics and Prebiotics, Single Cell Protein (SCP) production–Mushroom production. Detection of food borne pathogens, Food sanitation – Food control agencies and their regulations. Isolation, preservation and improvement of industrially important microorganisms. Raw materials and media design for fermentation processes, Sterilization, Development of inoculum for industrial fermentations, Types of fermentation–Batch, continuous, dual or multiple, surface, submerged, aerobic and anaerobic. Fermenter–Design, instrumentation and control, Types of fermenters; Recovery and purification of fermentation products. Production of primary metabolites- Alcohols, Beverages, Amino acids and Organic acids. Production of secondary metabolites: Antibiotics, Vitamins, Steroids, Enzymes, Biopolymers.

Unit. 10. Soil and Agricultural Microbiology

Characteristics and classification of soils, soil structure, soil microorganisms, Interaction between microorganisms–mutualism, commensalism, ammensalism, synergism, parasitism, predation, competition, interaction of microbes with plants and animals, Rhizosphere, phyllosphere and mycorrhizae. Mechanism of symbiotic and asymbiotic nitrogen fixation -Biogeochemical cycles: carbon, nitrogen, phosphorus, sulfur–Biofertilizers–Soil enzymes–Soil borne plant pathogens.

Plant pathogens and classification of plant diseases, Principles of plant infection and defense mechanisms, Plant disease management of the following plant diseases–mosaic disease of tobacco, bunchy top of banana, leaf roll of potato, bacterial blight of paddy, angular leaf spot of cotton, late blight of potato, damping off of tobacco, downy mildew of bajra, powdery mildew of cucurbits, head smut of sorghum, leaf rust of coffee, blight of maize, leaf spot of paddy, grassy shoot of sugar cane and root knot of mulberry.

Code No: 33

SUBJECT: PHYSICAL EDUCATION

SYLLABUS

Unit – 1 :

Physical education and adapted physical education, their objectives Philosophies of education as applied to physical education

Development of Physical education in Greece, Rome, Sweden, Russia England, Denmark, Germany, USA, Australia and China.

Growth and development of physical education in India:

Recreation–its principles, characteristics and importance. Modern trends in recreation. Indoor and outdoor recreational programmes. Recreational programmes for various categories of people.

Wellness–its importance, benefits and challenges. Development and maintenance of wellness.

Teaching Aptitude – nature, objectives, characteristics of teaching, learner characteristics and teaching methods.

Social aspects of sports–sports as a socializing agency, social values, sports leadership, sports as cultural heritage and social aspects of competition.

Ancient & Modern Olympics games, Asian and Commonwealth games.

Structure and functions of international and national bodies controlling various games and sports.

Prominent honours and awards in games and sports.

Exercise physiology its scope and importance in the field of physical education and sports.

Cardio respiratory adaptations to long and short term physical activities.

Unit – 2 :

Muscle–its types, characteristics and functions. Microscopic structure of muscle fibre. Sliding filament theory of muscular contraction. Types of muscle fibres and sports performance.

Muscular adaptations to exercise.

Neuro-muscular junction and transmission of nerve impulse, kinesthetic Sense organs and neural control of motor skills.

Bio-chemical aspects of exercise–Metabolism of food products. Aerobic and anaerobic systems during rest and exercise. Direct and indirect methods of measuring energy cost of exercise.

Recovery process–Physiological aspects of fatigue. Restoration of energy stores. Recovery oxygen. Nutritional aspects of performance.

Environmental influence on human physiology under exercise.

Women in sports- trainability. Physiological gender differences and special problems of women athletes.

Aging–Physiological consequences, life style management and healthful aging. Physiological responses of various therapeutic modalities and rehabilitation.

Physiological aspects of various Ergogenic aids. Massage manipulations and their physiological responses.

Unit – 3 :

Kinesiology and biomechanics. Modern trends in biomechanics. Planes and Axes of human body.

Joints and their movements.

Muscle attachments–Origin, insertion, action and leverage of the principal muscles used in sports.

Motion: its laws and their application in sports. Projectile and principles of projections

Linear and angular kinematics and kinetics.

Friction, Spin, impact and elasticity.

Air and water dynamics.

Mechanical advantage and applications of Levers in sports. Posture and its deformities with their corrective exercises.

Kinesiological, Muscular and mechanical analyses of fundamental movements: Mechanical analyses of major sports skills

Unit – 4 :

Sports psychology- its importance in the field of physical education and sports. Motivation in sports- types, theories and dynamics.

Psychological factors affecting sports performance–Emotions, Anxiety aggression, stress, self confidence, concentration , mental practice and goal setting.

Personality- Theories of personality, measurement of personality.

Group dynamics, Group cohesion and leadership in sports.

Cognitive process–memory and thinking. Principles of Motor skill learning. Transfer of training and its types with its implication in sports.

Long and short term psychological preparation for performance / competition.

Psychological skill training for activation and relaxation

Spectators and sports performance.

Unit – 5 :

Development of teacher education for physical education in India. Comparative study of professional preparation in physical education of India with those of USA, Russia, Germany, Australia and UK.

Professional and other courses of physical education in India. Role of Government agencies monitoring professional courses in physical education.

Qualities, qualifications and responsibilities of physical education personnel at primary, secondary and higher education levels. Scope of physical education personnel in the promotion of health, fitness and wellness.

Recent Government policies for promoting physical education and sports in India.

Hierarchy of organizational set-up in physical education at schools, colleges and university level.

Role of public & private sectors in the promotion of physical education and sports in the country.

Curriculum development- Concepts and principles of curriculum planning. Subject matter for different levels of education–primary, secondary and higher education.

Curriculum design and content- importance, selection and classification of subject matter with reference to age, sex and differently abled pupils. Integrated programme for boys and girls.

Teaching aids– Time-table, Concepts, credit system for various subject courses- theory and practical, Impact of technology in physical education and sports.

Curriculum evaluation: Concepts and purpose; procedure and appraisal.

Unit – 6 :

Health- its objectives and spectrum. Health education, its importance and principles . Role of genetics and environment in achieving health. Health-related physical fitness.

Community health programme–Health appraisal & health instructions. International and national health promoting government & private agencies.

School Health programme and personal hygiene.

Communicable diseases: causes, symptoms, prevention through other means and Immunization. Psychosomatic disorders/ sedentary life style diseases : causes, symptoms and prevention.

Obesity related health problems. Body weight control and its significance on health. Role of exercise, dieting and combination of exercise & dieting on weight control.

First-aid- objectives and principles. First-aid for Shock, poisoning, burns, drowning, bleeding, electric shock and common sports injuries.

Pollution- Air, water, sound and radiation. Effects of pollution on health, Preventive and safety measures from pollution.

Nutrition- Balanced diet and its components. Nutritional Deficiencies. Understanding of malnutrition and nutritional supplements.

Effects of smoking, alcohol, & drugs on health; prevention and rehabilitation.

Unit – 7 :

Sports training- its characteristics and principles. Training load, its features, principles and adaptation process. Means and methods of executing training load. Overload, its Causes, symptoms and remedial measures.

Strength- its characteristics, types of strength, factors determining strength and strength development.

Endurance- its characteristics, types of endurance, factors determining endurance and endurance development.

Speed- its characteristics, types of Speed, factors determining Speed and speed development.

Flexibility-its characteristics, types of flexibility, factors determining flexibility and flexibility development.

Coordinative abilities- its characteristics, types of coordinative abilities, factors determining coordinative abilities and development of coordinative abilities.

Technique and skill- its characteristics and importance. Different stages of technique development and technique training. Tactics and strategy.

Planning- its importance and principles. Types of planning.

Periodization–its importance, objectives and types of periodization. Concept of different periods–Preparatory, competition and transitional. Types of Competition:

Talent identification- process and procedure.

Unit – 8 :

Research in physical education- its importance and classification. Ethical issues in research.

Methods of research- Descriptive, historical and experimental. Experimental research designs.

Identification and formulation of research problem. Types of research hypotheses and their formulation. Hypotheses testing.

Tools of research- Questionnaires, opinionnaires, interviews and observation.

Sources and steps of literature search- library, research data bases, internet- search engines, online journals. Note taking and critical reading.

Sampling Techniques – Probability and non probability. Data, its types and collecting measures.

Normal probability curve and grading scales.

Statistical processes, their importance and uses in research.

Application of parametric and non parametric statistical techniques in research.

Computer applications- statistical packages for data analyses- SPSS, e-mail, search engines and Microsoft office.

Preparation of research proposal, report, abstract, paper for publication and paper for presentation.

Unit – 9 :

Test, measurement and evaluation– their types and importance in physical education and sports. Principles and processes of evaluation in physical education.

Criteria of selecting an appropriate test and administration of testing programme.

Types of tests and construction of standard knowledge and skill tests.

Tests for fitness–Physical fitness, motor fitness, motor ability and motor educability. Health related fitness tests.

Test for fitness components–strength, endurance, speed, flexibility and coordinative abilities.

Sports skill tests- Badminton, Basketball, Football, Hockey, Tennis, and Volleyball.

Anthropometric Measurements–land marks and measurement of various body segments, height, sitting-height, weight, diameters, circumferences, skin folds, body mass index, ponderal index.

Somato type and Posture evaluating techniques.

Testing of physiological phenomenons–Blood pressure, breathing frequency vital capacity, heart rate, pulse rate, body temperature and body composition.

Tests for psychological variables–Anxiety, aggression, team cohesion, achievement motivation, mental-toughness, and self-efficacy.

Unit – 10 :

Management–its principles and theories. Scope of management in physical education and sports.

Guiding principles for organizing physical education & sports programmes in institutions.

Personnel management–objectives and principles. Self-appraisal, communication skills and time management. Essential skills of administration.

Financial management–objectives, purposes, principles and scope. Planning and preparation of budget. Mechanics of purchase and auditing.

Supervision– objectives, principles and importance of supervision. Techniques of supervision.

Duties and responsibilities of a supervisor.

Facility management–planning, procuring and maintenance of facilities–indoor and outdoor facilities. Planning and management of sports infrastructure. Management of records.

Role of sports manager–interpersonal, informational and decision making. Managerial skills – technical, human and conceptual. Qualities and qualification of sports manager. Event management–its principles, planning, check list, rehearsal, itinerary, execution, reporting and follow-up procedures of an event.

Public relation- principles of public relations in physical education and sports. Mass Media - communication and publicity, qualifications of Public relation officer.

Code No : 34

SUBJECT : PHYSICAL SCIENCE EDUCATION

SYLLABUS

Unit 1

Electromagnetic Theory

Coulomb law – Gauss law – Poisson's equation – Laplace equation and solution to boundry value problem – Electrostatics of dielectric media – Molecular polarisability and its application – Vector – Scalar potential – B and H in a magnetic material – Maxwell's equations and their significance – Poynting theorem.

Unit 2

Classical Mechanics

Generalised co-ordinates – D'Alembert's principle, Lagrangian equation of motion – Hamiltonian equation – Conservative and non-conservative systems–Hamilton equation, cyclic variables, principle of least action – Theory of small oscillations – Normal co-ordinates and normal modes–Linear Triatomi molecule–Rigid bodies -Moments and products of inertia-Euler's angle–Euler's equation of motion – Symmetric Properties.

Unit 3

Thermal Properties

Thermal Properties of solids Laws of Thermodynamics – Maxwell's relations and their applications – Phase transitions – Production and measurement of low temperatures –Einstein and Debye theory of specific heats of solid–Thermodynamic equations of state – closed and open systems – partial molal quantities – chemical potential with temperature and pressure – third law of thermodynamics–Fugacity – methods of determination – standard states for gases, liquids – solids and solutions – mean activity co-efficiency of electrolytes–Maxwell's distribution of molecular velocities – derivation of expression for average, most probable and root mean square velocities — Heat capacities of solids – Einstein and Debye Models Low temperature – Negative absolute temperature.

Unit 4

Periodic properties

Atomic radius – ionic radius, ionization potential, electron affinity and electro negativity – Their significance in chemical bonding–VB theory, MO theory – applications – Comparison of VB and MO theories – VSEPR theory – Bond order – Bond energy – Bond length Bond polarity – Partial ionic character of bonds – The concept of multi-centre bond – Electron deficient compounds – Hydrogen bond – Its influences. Non aqueous solvents – A general study of typical reactions in non aqueous media – comparison with reactions in aqueous media.

Unit 5

Organic Reaction Mechanisms

General methods of investigating reaction mechanisms – Kinetic and non-kinetic methods – different types of reaction intermediates. Aliphatic nucleophilic substituion SN1, SN2 and SNi reactions – substitution at vinylic and benzylic carbon – stereo chemistry of nucleophilic reaction – solvents and substituent effects – Nucleophilicity Neighboring group participation. Addition to double and triple bonds – Mechanism Hydration – Hydroboration – Hydroxylation – epoxidation. Elimination reactions E1, E2, E1cB Mechanism – Orientation effects in elimination reactions – stereo chemistry of elimination reactors–dehydration of alcohols – dehydro halogenation – cope elimination.

Unit 6

Foundations of Education

Philosophical Perspectives: Idealism, Naturalism, Pragmatism, Progressivism, Existentialism, Humanism, Realism, Eclecticism – Philosophers and their contributions: Western Philosophers: Rousseau, Froebel, Maria Montessori, Pestalozzi, Bertrand Russell, John Dewey – Indian Philosophers: Mahatma Gandhi, Rabindranath Tagore, Swami Vivekananda, J.Krishnamurti, Aurobindo – Development of Indian Education during Pre-Independence, Post-Independence, Modern era–Important Education Committees – Recommendations of National Education Policies, National Curriculum Frameworks.

Sociological Perspectives: Concepts of Special and Inclusive Education, Women Education, Population Education, Vocational Education, Environmental Education for sustainable development-UN SDG goals, Human Rights: UN Declaration of Human Rights, Peace and Value Education – Indian Constitution: Articles and Amendments related to Education–Culture and Communication in Education – Social issues: Measures and Reforms – Social Structure, Socialization process – Social stratification – Indigenous Value systems – History and Culture of Tamil Nadu: Social Equality, Language, Culture and Politics.

Unit 7

Educational Psychology

Educational Psychology – Cognitive, Humanistic, Behavioural and Transpersonal school of thoughts – Role of heredity and environment – Dimensions of Development: Physical, Cognitive, Psycho-Social, Moral, Behavioural, Language – Theories of Development: Piaget, Bruner, Kohlberg, Erickson, Vygotsky, Noam Chomsky, Watson–Developmental tasks – Sensation and Perception–Factors of learning: Attention, Interest, Aspiration, Motivation and its types, Motivational Theories: Maslow, McDougall's, McClelland – Learning, Factors of Learning, Theories: Trial & Error, Operant and Classical Conditioning, Insight and Gestalt – Intelligence: Theories – Single-Factor, Two-Factor, Triarchic, Group and Multi-factor theory, Guilford's Structure of Intellect, Gardner's Multiple Intelligence theory, Factor Personality: Type and Trait theories – Personality Assessment methods and techniques – Educational Implications of Learning, Intelligence and Personality theories – Mental Health, Adjustment and Defense mechanisms – Concepts of Guidance and Counselling.

Unit 8

Pedagogical approaches

Nature, Scope, Aims and Objectives, Values of Teaching the subject, Inter-disciplinary aspects, Taxonomy of Educational Objectives: Bloom's, Anderson's, RCEM, NCERT –Micro-teaching: Skills and Components, Micro Cycle, Link Lesson–Planning of the lesson: Curricular Plan, Unit Plan and Lesson Plan, General and Specific Instructional objectives, Action verbs – Methods of Teaching: Traditional and Modern Methods – Techniques of Teaching: Small and Large Group Techniques – Models of Teaching: Concept attainment, Advanced Organizers, Inquiry Training, Information Processing, Personalized Model – Resources for Teaching-Learning: Text Books, Laboratory, Library, E-resources and Field-trips – Flander's Classroom Interaction Analysis – Dale's Cone of Experience – Educational Technology and ICT Resources in Teaching-Learning: Blended Learning, Simulation, Augmented Reality, Virtual Learning – Digital Resources – Assessment and Evaluation: Types of Tests, Steps in construction of an achievement test – Continuous and Comprehensive Evaluation – Analysis and Interpretation of test scores.

Unit 9

Curriculum Components and Teacher Education

Curriculum – Principles, Bases of Curriculum: Philosophical, Psychological and Sociological, Criteria of selection of content – Types: Subject, Learner, Community and Activity centred curriculum – Concepts of core and hidden curriculum – Curriculum Organization: Articulation, Balance and Continuity – Approaches: Concentric, Spiral, Topical, Logical, Vertical and Horizontal – Curricular Materials – Role of NCERT and SCERT in curriculum

planning – Stakeholders contribution and participation in the curricular, co-curricular and extra-curricular activities – Curriculum Evaluation and Theories: Tyler's model, Hilda Taba model, Beauchamp's model, D.K.Wheeler's model, Virgil V. Herrick model.

Teacher Education – National Council for Teacher Education: Functions–Teacher Education systems and Programmes: Pre-service and In-service – Integrated Teacher Education Programmes–Concept of Teaching Profession;–Changing roles and responsibilities – Continuous Professional development and Professional ethics–National Professional Standards for Teachers – Teacher Appraisal and accountability – Significance of Teachers In-service education and training–Research and innovations in Teacher education, NAAC's Assessment and Accreditation process – Autonomy in Education: Institutional, Administrative and Teacher autonomy –Teacher Eligibility Tests –Concepts of Andragogy – Life-long and continuing education.

Unit 10

Research Methodology and Statistics

Research – Types of Research: Basic, Applied and Action Research, Sources of Selecting Research Problem, Importance of Review of Literature, Hypothesis, Variables, Sampling Techniques: Probability and Non-Probability techniques, Steps in writing research proposal and research report – Academic and Research Writing – Experimental Research Designs: Pre-Experimental, True and Quasi Designs – Factors affecting internal and external validity of experimental research, Quantitative, Qualitative and Mixed Research Methods–Research Tools: Likert and Thurstone, Personality, Interest and Intelligence test, Item and Factor analysis – Characteristics of Research tools – Statistical Analysis: Descriptive and Inferential Analysis, Hypothesis testing: Type I and Type II errors, Level of Significance, Graphical Representation of Data – Issues related to plagiarism–Research Ethics and Integrity.

Code No:35

SUBJECT : PHYSICS

SYLLABUS

UNIT I

Mathematical Methods of Physics

Dimensional analysis. Vector algebra and vector calculus-Gauss divergence theorem, Greens theorem, Stokes theorem. Linear algebra, matrices, Cayley- Hamilton Theorem. Eigen values and eigen vectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel, Laguerre and Legendre functions). Partial differential equations (Laplace, wave and heat equations in two and three dimensions). Elements of computational techniques: root of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, Solution of first order differential equation using Runge-Kutta method. Fourier series, Fourier and Laplace transforms. Elements of complex analysis, analytic functions; Taylor & Laurent series; poles, residues and evaluation of integrals. Elementary probability theory, random variables, binomial, Poisson and normal distributions. Equation of continuity–Application to hydrodynamics, equation of heat flow. Finite difference methods. Tensors. Introductory group theory: SU(2), O(3).

UNIT 2

Classical Mechanics

Newton's laws. Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions–scattering in laboratory and Centre of mass frames. Rigid body dynamics-Symmetrical top and Fast and sleeping top–moment of inertia tensor. Non-inertial frames and pseudoforces. Variational principle. Generalized coordinates. D'Alembert's principle and Lagrangian equations of motion–Hamiltonian formalism and equations of motion–Conservation laws and cyclic coordinates–Liouville's theorem. Periodic motion: small oscillations, normal modes. Special theory of relativity- Lorentz transformations, relativistic kinematics and mass–energy equivalence- Invariance of Maxwell's equations–Relativistic Lagrangian and Hamiltonian for a free particle. Canonical transformations–Poisson brackets – Hamilton–Jacobi theory–action-angle variables. Canonical transformations- Poisson brackets – Hamilton–Jacobi theory–action-angle variables.

UNIT 3

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 the fields at interfaces–Poynting's theorem – Lorentz invariance of Maxwell's equation.Scalar and vector potentials, gauge invariance. Electromagnetic waves in free space–Dynamics of charged particles in static and uniform electromagnetic fields.

Dielectrics and conductors. Radiation–from moving charges and dipoles and retarded potentials. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields. Dispersion relations in plasma. Transmission lines and wave guides

UNIT 4

Quantum Mechanics

Wave-particle duality. Schrödinger equation (time-dependent and time-independent). Eigenvalue problems (particle in a box, harmonic oscillator, etc.). Tunneling through a barrier. Wave-function in coordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac notation for state vectors. Motion in a central potential: orbital angular momentum, angular momentum algebra, spin, addition of angular momenta; Hydrogen atom. Stern-Gerlach experiment. Time–independent perturbation theory and applications. Variational method. Time dependent perturbation theory and Fermi's golden rule, selection rules. Identical particles, Pauli exclusion principle, spin-statistics connection.

Spin-orbit coupling, fine structure. WKB approximation. Elementary theory of scattering: partial waves, Born approximation. Relativistic quantum mechanics: Klein-Gordon and Dirac equations. Semi-classical theory of radiation.

UNIT 5

Electronics and Experimental Methods

Semiconductor devices (diodes, junctions, transistors, field effect devices, homo- and hetero-junction devices), device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications Digital techniques and applications (registers, counters, comparators and similar circuits). A/D and D/A converters. Microprocessor and micro controller basics. Linear and nonlinear curve fitting, chi-square test.

UNIT 6

Transducers (temperature, pressure/vacuum, magnetic fields, 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. High frequency devices (including generators and detectors). Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting.

UNIT 7

Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro- and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Blackbody radiation and Planck's distribution law First- and second-order phase transitions. Diamagnetism, paramagnetism, and ferromagnetism. Ising model. Bose-Einstein condensation. Diffusion equation. Random walk and Brownian motion. Introduction to nonequilibrium processes

UNIT 8

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. Electron motion in a periodic potential, band theory of solids: metals, insulators and semiconductors. Superconductivity: type-I and type-II superconductors. Josephson junctions. Superfluidity. Defects and dislocations. Ordered phases of matter: translational and orientational order, kinds of liquid crystalline order. Quasi crystals.

UNIT 9

Atomic & Molecular Physics

Quantum states of an electron in an atom. Electron spin. Spectrum of helium and alkali atom. Relativistic corrections for energy levels of hydrogen atom, hyperfine structure and isotopic shift, width of spectrum lines, LS & JJ couplings. Zeeman, Paschen-Bach & Stark effects. Electron spin resonance. Nuclear magnetic resonance, chemical shift. Frank-Condon principle. Born-Oppenheimer approximation. Electronic, rotational, vibrational and Raman spectra of diatomic molecules, selection rules. Lasers: spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, population inversion, rate equation. Modes of resonators and coherence length.

UNIT 10

Nuclear and Particle Physics

Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semi- empirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge-symmetry of nuclear forces. 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. Fission and fusion. Nuclear reactions, reaction mechanism, compound nuclei and direct reactions.

Classification of fundamental forces. Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.). Gellmann-Nishijima formula. Quark model, baryons and mesons. C, P, and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction. Relativistic kinematics.

Code No: 36

SUBJECT: POLITICAL SCIENCE

SYLLABUS

Unit–1:

Political Theory, Political Thought, Indian Political Thought

Nature and Scope of Political Science, Approaches to the Study of Political Science, Theories of Origin and Functions of State, Sovereignty, Liberty, Equality, Justice. Rights, Democracy, Power, Citizenship, Liberalism, Conservatism, Socialism, Marxism, Feminism, Ecologism, Communitarianism, Fascism, Multiculturalism, Post Modernism.

Unit–2:

Confucius, Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Hegel, Mary Wollstonecraft, John Stuart Mill, Karl Marx, Gramsci, Hannah Arendt, Mao Zedong, John Rawls, Dharamshastra, Kautilya, Aggannasutta, Barani, Kabir, Pandita Ramabai, Bal Gangadhar Tilak, Swami Vivekanand, Rabindranath Tagore, M.K Gandhi, Sri Aurobindo, Periyar E. V. Ramasamy, Muhammad Iqbal, M.N.Roy, V D Savarkar, Dr. B.R.Ambedkar, J L Nehru, Ram Manohar Lohia, Jaya Prakash Narayan, Deendayal Upadhyaya.

Unit–3:

Comparative Political Analysis

Approaches: Institutional, Political Culture, Political Economy and New Institutionalism; Comparative Methods.

Colonialism and Decolonization: Forms of Colonialism, Anti-Colonial Struggles and Decolonization.

Nationalism: European and Non-European.

State Theory: Debate Over the Nature of State in Capitalist and Socialist Societies; Post-Colonial State; Welfare State; Globalization and Nations-States.

Unit–4:

Political Regimes: Democratic (Electoral, Liberal, Majoritarian and Participatory) and Non-Democratic Regimes (Patrimonialism, Bureaucratic Authoritarianism, Military Dictatorship, Totalitarianism, And Fascist). Constitutions and Constitutionalism: Forms of Constitutions, Rule of Law, Judicial Independence and Liberal Constitutionalism; Emergency Powers and Crisis of Constitutionalism.

Democratization: Democratic Transition and Consolidation.

Development: Underdevelopment, Dependency, Modernization, World Systems Theory, Development and Democracy.

Structures of Power: Ruling Class, Power Elites, Democratic Elitism

Actor and Processes: Electoral Systems, Political Parties and Party System, Interest Groups, Social Movements, New Social Movements, Non-Governmental Organisations (NGOs) and Civil Society Campaigns; Revolutions.

Unit–5 :

International Relations

Approaches to the Study of International Relations: Idealism, Realism, Structural Marxism, Neoliberalism, Neorealism, Social Constructivism, Critical International Theory, Feminism, Postmodernism.

Concepts: State, State System and Non-State Actors, Power, Sovereignty, Security: Traditional and Non–Traditional. Conflict and Peace: Changing Nature of Warfare; Weapons of Mass Destruction; Deterrence; Conflict Resolution, Conflict Transformation.

United Nations: Aims, Objectives, Structure and Evaluation of the Working of UN; Peace and Development Perspectives; Humanitarian Intervention. International Law; International Criminal Court. Political Economy of IR; Globalisation; Global Governance and Bretton Woods System, North-South Dialogue, WTO, G-20, BRICS. Regional Organisations: European Union, African Union, Shanghai Cooperation Organisation, ASEAN. SAARC

Contemporary Challenges: International Terrorism, Climate Change and Environmental Concerns, Human Rights, Migration and Refugees; Poverty and Development; Role of Religion, Culture and Identity Politics.

Unit–6 :

India's Foreign Policy

Perspectives on India's Foreign Policy: India's Identity as Postcolonial, Development, Rising Power and as Emerging Political Economy Continuity and Change in India's Foreign Policy: Principles and Determinants; Non-Alignment Movement: Historical Background and Relevance of Non Aligned Movement; India's Nuclear Policy.

India's Relations with Major Powers: USA, USSR/Russia, People's Republic of China.

India's Engagement with Multipolar World: India's Relations with European Union, BRICS, ASEAN, Shanghai Cooperation Organisation, African Union, Southern African Development Community, Gulf Cooperation Council.

India's Relations with Neighbourhood: SAARC, Gujral Doctrine, Look East / Act East, Look West. Soft Power of India.

India's Negotiation Strategies in International Regimes: The United Nations, World Trade Organisation, International Monetary Fund, Intergovernmental Panel on Climate Change.

Contemporary Challenges: Maritime Security, Energy Security, Environmental Security, Migrants and Refugees, Water Resources, International Terrorism, Cyber Security.

Unit – 7 :

Political Institutions in India

Making of the Indian Constitution: Colonialism Heritage and the Contribution Indian National Movement to the Making of the Indian Constitution.

Constituent Assembly: Composition, Ideological Moorings, Constitutional Debates Philosophy of the Constitution: Preamble, Fundamental Rights, Directive Principles of State Policy.

Constitutionalism in India: Democracy, Social Change, National Unity, Checks and Balances, Basic Structure Debate, Constitutional Amendments Union Executive: President, Prime Minister and Council of Ministers.

Union Parliament: Structure, Role and Functioning, Parliamentary Committees Judiciary: Supreme Court, High Court, Judicial Review, Judicial Activism, Judicial Reform.

Executive and Legislature in the States: Governor, Chief Minister, State Legislature Federalism in India: Strong Centre Framework, Asymmetrical Federal Provisions and Adaption, Role of Intergovernmental Coordination Mechanisms, Inter-State Council, Green Federalism, Emerging Trends.

Electoral Process and Election Commission of India: Conduct of Elections, Rules, Electoral Reforms.

Local Government Institutions: Functioning and Reforms.

Constitutional and Statutory Bodies: Comptroller and Auditor General, National Commission For Scheduled Castes, National Commission For Scheduled Tribes, National Commission For Human Rights, National Commission For Women, National Commission For Minorities.

Unit – 8 :

Political Processes in India

State, Economy and Development: Nature of Indian State, Development Planning Model, New Economic Policy, Growth and Human Development.

Process of Globalisation: Social and Economic Implications. Identity Politics: Religion, Tribe, Caste, Region, Language. Social Movements: Dalit, Tribal, Women, Farmers, Labour

Civil Society Groups: Non-Party Social Formations, Non-Governmental Organisations, Social Action Groups.

Regionalisation of Indian Politics: Reorganisation of Indian States, States as Political and Economic Units, Sub-State Regions, Regional Disparities, Demand for New States

Gender and Politics in India: Issues of Equality and Representation, Women Reservation

Ideology and Social Basis of Political Parties: National Parties, State Parties. Electoral Politics: Participation, Contestation, Representation, Emerging Trends.

Unit – 9 :

Public Administration

Public Administration: Meaning and Evolution; Public and Private Administration Approaches: System Theory, Decision Making, Ecological Approach Public Administration Theories and Concepts: Scientific Management Theory, Rational Choice Theory, New Public Administration, Development Administration, Comparative Public Administration, New Public Management, Changing Nature of Public Administration in the Era of Liberalisation and Globalisation

Theories and Principles of Organization: Scientific Management Theory, Bureaucratic Theory, Human Relations Theory.

Managing The Organization: Theories of Leadership and Motivation. Organisational Communication: Theories and Principles, Chester Bernard Principles of Communication, Information Management in the Organization.

Managing Conflict in the Organization: Mary Parker Follett Management by Objectives–Peter Drucker.

Unit – 10 :

Governance and Public Policy in India

Governance, Good Governance and Democratic Governance, Role of State, Civil Society and Individuals.

Accountability and Control: Institutional Mechanism For Checks And Balances, Legislative Control Over Executive, Administrative and Budgetary Control, Control Through Parliamentary Committees, Judicial Control Over Legislature And Executive, Administrative Culture, Corruption And Administrative Reforms Institutional Mechanisms for Good Governance: Right to Information, Consumer Protection Act, Citizen Charter; Grievance Redress System: Ombudsman, Lokpal, Lokayukta

Grassroots Governance: Panchayati Raj Institutions and their Functioning Planning and Development: Decentralized Planning, Planning For Development, Sustainable Development, Participatory Development, E-Governance; NITI Aayog Public Policy as an Instrument of Socio-Economic Development: Public Policies With Special Reference to Housing, Health, Drinking Water, Food Security, MNREGA, NHRM, RTE

Monitoring and Evaluation of Public Policy; Mechanisms of Making Governance Process Accountable: Jansunwai, Social Audit.

Code No.37

SUBJECT : PSYCHOLOGY

SYLLABUS

UNIT – 1 :

Emergence of Psychology

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

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

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

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, Survey [Interview, Questionnaires], Experimental, Quasi experimental, Field studies, Cross-Cultural Studies, Phenomenology, Grounded theory, Focus groups, Narratives, Case studies, Ethnography.

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.

Correlational Analysis: Correlation [Product Moment, Rank Order],Partial correlation, multiple correlation.

Special Correlation Methods: Biserial, Point biserial, tetrachoric, phi coefficient.

Regression: Simple linear regression, Multiple regression.

Factor analysis: Assumptions, Methods, Rotation and Interpretation.

Experimental Designs: ANOVA [One-way, Factorial], Randomized Block Designs, Repeated Measures Design, Latin Square, Cohort studies, Time series, MANOVA, ANCOVA. Single- subject designs.

UNIT – 3 :

Psychological testing

Types of tests, Test construction: Item writing, item analysis, Test standardization: Reliability, validity and Norms, Areas of testing: Intelligence, creativity, neuropsychological tests, aptitude, Personality assessment, interest inventories, Attitude scales – Semantic differential, Staples, Likert scale. Computer-based psychological testing, Applications of psychological testing in various settings: Clinical, Organizational and business, Education, Counseling, Military Career guidance.

UNIT – 4 :

Biological basis of behavior

Sensory systems: General and specific sensations, receptors and processes.

Neurons: Structure, functions, types, neural impulse, synaptic transmission, Neurotransmitters.

The Central and Peripheral Nervous Systems – Structure and functions, Neuro plasticity.

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

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

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

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

UNIT – 5 :

Attention, Perception, Learning, Memory and Forgetting

Attention: Forms of attention, Models of attention.

Perception: Approaches to the Study of Perception: Gestalt and physiological approaches. Perceptual Organization: Gestalt, Figure and Ground, Law of Organization Perceptual Constancy: Size, Shape, and Color; Illusions.

Perception of Form, Depth and Movement Role of motivation and learning in perception.

Signal detection theory: Assumptions and applications.

Subliminal perception and related factors, information processing approach to perception, culture and perception, perceptual styles, Pattern recognition, Ecological perspective on perception.

Learning Process.

Fundamental theories: Thorndike, Guthrie, Hull.

Classical Conditioning: Procedure, phenomena and related issues, Instrumental learning.

Phenomena, Paradigms and theoretical issues; Reinforcement: Basic variables and schedules; Behaviour modification and its applications.

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

Recent trends in learning: Neuro physiology of learning Memory and Forgetting.

Memory processes: Encoding, Storage, Retrieval.

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

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

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.

Metacognition: Metacognitive knowledge and Metacognitive regulation.

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

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

UNIT – 7 :

Personality, Motivation, emotion, stress and coping

Determinants of personality: Biological and socio-cultural.

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

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

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

Approaches to the study of motivation: Psychoanalytical, Ethological, S-R Cognitive, Humanistic Exploratory behavior and curiosity Zuckerman's Sensation seeking Achievement, Affiliation and Power Motivational Competence Self-regulation Flow Emotions: Physiological correlates Theories of emotions: James-Lange, Canon-Bard, Schachter and Singer, Lazarus, Lindsley. Emotion regulation Conflicts: Sources and types Stress and Coping: Concept, Models, Type A, B, C, D behaviors, Stress management strategies [Biofeedback, Music therapy, Breathing exercises, Progressive Muscular Relaxation, Guided Imagery, Mindfulness, Meditation, Yogasana, Stress Inoculation Training].

UNIT – 8 :

Social Psychology

Nature, scope and history of social psychology.

Traditional theoretical perspectives: Field theory, Cognitive Dissonance, Sociobiology, Psychodynamic Approaches, Social Cognition.

Social perception [Communication, Attributions]; attitude and its change within cultural context; prosocial behavior.

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

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

UNIT – 9 :

Human Development and Interventions

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

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

Psychopathology: Concept, Mental Status Examination, Classification, Causes

Psychotherapies: Psychoanalysis, Person-centered, Gestalt, Existential, Acceptance Commitment Therapy, Behavior therapy, REBT, CBT, MBCT, Play therapy, Positive psychotherapy, Transactional Analysis, Dialectic behavior therapy, Art therapy, Performing Art therapy, Family therapy.

Applications of theories of motivation and learning in School Factors in educational achievement.

Teacher effectiveness.

Guidance in schools: Needs, organizational set up and techniques Counselling: Process, skills, and techniques.

UNIT – 10 :

Emerging Areas

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

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

Wellbeing and self-growth: Types of well being [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], Psycho neuro immunology [Cancer, HIV / AIDS].

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

Code No: 38

SUBJECT : PUBLIC ADMINISTRATION

SYLLABUS

Unit-1 :

Introduction to Public Administration: Public Administration- Meaning, Nature, Scope & Significance; Evolution and Present Status of the Discipline; Politics- Administration Dichotomy; Globalization and Public Administration; Paradigm shift from Government to Governance.

Principles of Organization: Division of work; Hierarchy; Coordination; Unity of Command; Span of Control; Authority, Power and Responsibility; Delegation, Centralization and Decentralization; Line, Staff and Auxiliary Agencies; Leadership and Supervision; Decision-making and Communication.

Meaning, Nature and Scope of Personnel Administration: Classification, Recruitment, Training, Promotion, Compensation and service conditions, Discipline, Civil Service Neutrality, Anonymity and Commitment, Professional Associations and Unionism.

Unit-2 :

Administrative Thought: Approaches to the study of Public Administration: Oriental–Kautilya; Classical – F W Taylor, Henri Fayol, Max Weber, Luther Gulick and Lyndall Urwick ; Human Relations–Elton Mayo, Mary Parker Follett; Behaviouralism–Chester Barnard, Herbert Simon; Motivation – Abraham Maslow, Fredrick Herzberg, Douglas McGregor; Organizational Humanism – Chris Argyris, Rensis Likert; Writers on Administration: Dwight Waldo, Ferrel Heady, Robert Golembiewski and Peter Drucker; Minnobrook Perspective, New Public Service and Post Modernism.

Unit-3:

Indian Administration: Evolution–Ancient, Mughal and British Periods; Constitutional Framework: Parliamentary and Federal Features.

Union Government: President; Prime Minister & Council of Ministers; Cabinet Committees; Central Secretariat; Cabinet Secretariat; and Prime Minister Office. Election Commission and Electoral Reforms, Union State Relations.

Accountability: Legislative; Executive; and Judicial.

Citizen Grievance Redressal Mechanism: Lok Pal; Lok Ayukta; Central Vigilance Commission and Regulatory Authorities. Issue Areas: Politician and Civil Servant relations, Generalists and Specialists debate and Combating Corruption.

Civil Services: Classification – All India Services, Central Services and State Services; Recruitment Agencies – Union Public Service Commission, State Public Service Commissions and other Commissions and Boards: Capacity Building of Civil Servants and Civil Service Reforms.

Planning: Planning Commission, National Development Council, NITI Aayog, State Planning Commissions / Boards and Planning Departments.

Judiciary: Indian Constitution and Independence of Judiciary: Supreme Court; High Courts; Judicial Review and Public Interest Litigation and Judicial Reforms. Police Administration and Reforms. E- Governance Initiatives in Indian administration.

Unit-4:

State & Local Administration: Constitutional Framework of State Administration – State Legislature; Governor – Role and Functions; Chief Minister – Powers and Functions; Council of Ministers; Role and Functions of Chief Secretary; State Secretariat ; Directorates and Commissionerate; District Administration – Concept and Evolution, District Collector–Power, Functions and Changing role; Autonomous District Councils–Structure, Powers and Functions, District Rural Development Agency; Evolution of Local Governance in India.

Local Governance: 73rd & 74th Constitutional Amendment Acts: State Election Commission; State Finance Commission; District Planning Committee; Rural Governance–Gram Sabha, Gram Panchayats, Panchayat

Samitis and Zila Parishads, Finance in PRIs, Personnel administration at local level; Policies and Programmes of Rural Development – MGNREGA.

Growth of Urbanization, Urban Governance–Structure, Composition, Functions of Municipal Corporations, Municipal Councils, Nagar Panchayats and Metropolitan Governance–Sources of Finance; Personnel Administration. Reforms in Urban Governance–Solid Waste Management, Smart and AMRUT cities.

Unit-5:

Comparative and Development Administration: Comparative Public Administration: Concept, Nature, Scope and Significance of Comparative Public Administration; Public Administration and its Environment. Approaches and Methods to the study of Comparative Administration: Institutional, Behavioural, Structural-Functional, Ecological and Systems Approaches.Fred Riggs's Typology of Societies and Features; Problems of Comparative Research; Comparative Studies – Influence of Globalization; Salient Features of the administrative systems of UK, USA, France and Japan.

Development Administration: Development and its Dimensions. Development and Modernization; Approaches to Development–Sustainable Development and Anti-Development; Sustainable Development Goals (SDGs).

Development Administration: Concept, Nature, Scope, Objectives, Features and Significance; Ecology of Development Administration, Contribution of Fred Riggs, Dwight Waldo and Edward Widener; Role of Bureaucracy in Development. Globalization and Development Administration; Emergence of Non-State actors in Development Administration; Public-Private Partnerships; Corporate Social Responsibility, Human Development Indicators and Social Audit.

Unit-6:

Economic and Financial Administration: Economic Policies–Mixed Economy, Liberalization, Privatization and Globalization (LPG); New Economic Policy (NEP); Industrial Policy since Independence; Government in Business–Public Enterprises- Concept, Growth and Forms of Public Enterprises; Management, Problem of Accountability and Autonomy; Disinvestment Policies.

Financial Administration: Public Finance – Revenue and Expenditure: Nature, Scope and Significance of Financial Administration; Budget – Meaning, Purpose and Significance; Budgetary Process – preparation, enactment and execution; Types of Budget – PPBS, Performance Budget, Zero-Based Budget and Gender Budget; Fiscal Responsibility and Budget Management Act (FRBMA) and Sunset legislation. Fiscal Federalism – Union-State Financial Relations, Finance Commission. Financial Control- Legislature and Executive; Parliamentary Committees and Comptroller and Auditor General of India. Taxation policies – Principles of Taxation –Progressive and Proportional taxation – Reforms in Taxation policies.

Unit-7:

Social Welfare Administration: Concept of Social Welfare, Social Justice and Social Change; Concept of Equity and Inclusiveness in Social Justice; Concept of Affirmative action-Reservations; Institutional arrangement for Social Welfare & Social Justice Administration; NGOs, Civil Societies and Voluntary Agencies; Policies, Programmes and Institutional Framework for the Protection and Welfare of SCs/ STs / OBCs/ Women/ Children, Aged, Differently-abled (Divyang) and Minorities Commissions – Women, SC/ST, Minority- Role and Functions.

Disaster Management–Nature and Types of Disaster; Institutional Arrangements for Disaster Management; Role of State and Non-State actors.

Unit-8:

Public Policy: Nature, Scope and Importance of Public Policy; Evolution of Public Policy and Policy Sciences; Public Policy and Public Administration. Approaches to Public Policy – Process Approach, Logical Positivism, Phenomenological Approach, Participatory and Normative Approaches.

Theories and Models of Policy Making – Harold Lasswell, Charles Lindblom, Yehezkel Dror.

Institutions of Policy Making–Legislature, Executive and Judiciary. Types of Policy Analysis–Empirical, Normative, Retrospective and Prospective, Prescriptive and Descriptive. Policy Implementation, Outcomes and Evaluation.

Constraints on Public Policy – Socio-economic, Political, Institutional and Cultural. Role of Media, Public Opinion, Civil Society and Pressure Groups on Policy Making.

Unit-9:

Governance and Good Governance: Ancient Discourse – Kautilya, Plato and Aristotle on Good Governance; Elements and Forms of Good Governance; Theories and Concepts of Governance – World Bank and UNDP; State, Market and Civil Society, Public Choice Theory, New Public Management, Public Value Theory, Governance as Theory, Governance and Public Governance.

Networking and Collaborative Governance, Business Process Re-engineering, ICT and Governance – e-Government and e-Governance, e-Readiness and Digital Divide.

Accountability, Openness and Transparency; Gender and Governance.

Citizen and Governance: Civil Society – Role and Limitations, Citizen Participation, Right to Information – RTI Act and Administrative Reforms, National Information Commission, Citizen Charter – Concept, Objectives and Significance.

Ethics and Public Accountability in Governance: Rule of Law and Administrative Law, Delegated Legislation and Administrative Adjudication. Ethical Foundations of Governance: Constitutional Values, Family, Society and Education.

Unit-10:

Research Methodology: Social Science Research–Meaning and Significance; Distinction between Methodology and Method; Facts and Values in Research; Role of Research in Theory-Building; Scientific Method; Objectivity in Social Research; Types of Research; Identification of Research Problem; Hypotheses and Null–Hypotheses; Validation of Hypothesis; Research Design; Methods of Data Collection–Primary and Secondary sources- (Observation; Questionnaire and Interview, Use of Library and Internet); Sampling and Sampling Techniques; Scales of Measurement; Analysis of Data and Use of Computers in Social Science Research- SPSS; Citation patterns and Ethics of Research; Bibliography; Report Writing.

Code No: 39

SUBJECT: SANSKRIT
SYLLABUS

Unit - 1

Vedic Literature

(a) General Introduction of Vedic Literature:

- Main theories regarding the Vedās : Maxmüller; A.Weber; Jacobi ; Balgangadhar Tilak; M.Winternitz ; Indian traditional views.
- Saṁhitā Literature
- Dialogue Hymns: Purūrava-ūrvaśī; Yama-yamī; Saramā-Paṇi ; Viśvāmitra-Nadī
- Brāhmaṇa-Literature
- Āraṇyaka Literature
- Vedāṅgas: Śikṣā; Kalpa; Vyākaraṇa; Nirukta; Chandas; Jyotiṣa

Unit – 2

(b) Specific Study of Vedic Literature:

- Study of the following hymns:
    - Ṛgveda : Agni (1.1); Varuṇa (1.25); Sūrya (1.125); Indra (2.12); Uṣas (3.61); Parjanya (5.83); Kitava (10.34); Jñāna (10.71); Puruṣa (10.90); Hiraṇyagarbha (10.121); Vāk (10.125); Nāsadīya (10.129);
    - Śuklayajurveda : Śivasaṅkalpa , Chapter-34 (1-6)
    - Prajāpati-Chapter-23 (1-5)
    - Atharvaveda : Rāṣṭrābhivardhanam (1.29); Kāla (10.53); Prithivī (12.1)
- Brāhmaṇa Literature
    - Subject-matter; Vidhi and its types; Agnihotra; Agniṣṭoma; Darśapūrṇamāsa ; Yajña; Pañcamahāyajña; Akhyāna (Śunahśepa , Vāṅmanas)
- Upaniṣad Literature:
    - Subject-matter and main concepts with special reference to the following Upaniṣads ;
    - Īśa; Kaṭha; Kena; Bṛhadāraṇyaka ; Taittirīya; Śvetāśvatara

- Vedic Grammar**;** Nirukta and Vedic interpretation
- Ṛkprātiśākhya : Definitions of Samānākṣara ; Sandhyakṣara; Aghoṣa; Soṣman; Svarabhakti ; Yama ; Rakta; Saṁyoga; Pragṛhya ; Riphita
- Nirukta (Chapters-I & 2)
- Four-fold division of Padas-Concept of Nāma; Concept of Ākhyāta ; Meaning of Upasargas; Categories of Nipātas.
- Purposes of the study of Nirukta
- Principles of Etymology
- Etymology of the following words:

  Ācārya; Vīra; Hrada; Go; Samudra; Vṛtra; Āditya; Uṣas; Megha; Vāk; Udak; Nadī; Aśva; Agni; Jātavedas; Vaiśvānara; Nighaṇṭu

  Nirukta (Chapter-7; Daivatakāṇḍa)
  Vedic Accent- Udātta, Anudātta and Svarita

Unit - 3

(c) Darśana:

- General Introduction of major schools of Darśana with special reference to the following:

  Pramāṇamīmāmsā ; Tattvamīmāmsā ; Ācāramīmāmsā (Cārvāka , Jaina, Bauddha) Nyāya, Sāṁkhya, Yoga, Nyāya, Vaiśeṣika, mīmāmsā

Unit - 4

(d) Darśana Literature: Special Study:

- Īśvarakṛṣna : Sāṁkhyakārikā - Satkāryavāda, Puruṣasvarūpa, Prakṛtisvarūpa, Srṣṭikrama, Pratyayasarga, Kaivalya.
- Sadānanda : Vedāntasāra - Anubandha-catuṣṭaya, Ajñāna, Adhyāropa-Apavāda, Lingaśarīrotpatti, Pañcīkaraṇa, Vivarta, Jīvanmukti
- Annambhaṭṭa, Tarkasaṁgraha / Keśavamiśra; Tarkabhāṣā : Padārtha; Kāraṇa; Pramāṇa; (Pratyakṣa; Anumāna; Upamāna; Śabda), Prāmāṇyavāda, Prameya .
- Laugākṣibhāskara ; Arthasaṁgraha.
- Patañjali ; Yogasūtra - (Vyāsabhāṣya) : Cittabhūmi, Cittavṛttis ; Concept of Īśvara; Yogāṅgas; Samādhi ; Kaivalya
- Bādarāyaṇa ; Brahmasūtra 1.1 (Śānkarabhāṣya)
- Viśvanāthapañcānana ; Nyāyasiddhāntamuktāvalī (Anumāna Khaṇḍa)
- Sarvadarśana-Saṁgraha ; Jainism ; Buddhism

Unit - 5

(e) Grammar and Linguistics:

- General Introduction of the following grammarians:

  Pāṇini , Kātyāyana , Patañjali , Bhartṛhari , Vāmanajayāditya , Bhaṭṭojidīkṣita , Nāgeśabhaṭṭa , Kaiyyaṭa , Jainendra , Śākaṭāyana ,

Hemacandrasūri , Sārasvatavyākaraṇakāra.
Pāṇinīya Śikṣā.
Linguistics:
Definition of Language, Geneological and Morphological classification of Languages, Speech Mechanism and classification of sounds: Stops, Fricatives, Semi-Vowels and vowels (with special reference to Sanskrit sounds).
Phonetic Laws (Grimm, Grassman, Verner). Directions of semantic change and reasons of change. Definition of Vākya and its types
General introduction of Indo-European family of Languages
Difference between Vedic Sanskrit and Classical Sanskrit
Difference between Bhāṣā and Vāk
Difference between language and dialect

Unit –6

(f) Specific Study of Grammar

- Definition : Saṁhitā, Saṁyoga Guṇa, Vṛddhi, Prātipadika, Nadī , Ghi, Upadhā, Apṛkta, Gati, Pada, Vibhāṣā , Savarṇa, Ṭi, Pragṛhya, Sarvanāmasthāna, Bha , Sarvanāma, Niṣṭhā .
- Sandhi - Ac sandhi, Hal sandhi, Visarga sandhi (according to laghusiddhāntakaumudī)
- Subanta – Ajanta - Rāma , Sarva (in all genders) , Viśvapā, Hari , Tri (in all genders) , Sakhi , Sudhī , Guru , Pitṛ , Gau , Ramā , Mati , Nadī , Dhenu , Mātṛ , Jñāna , Vāri , Madhu .
- Halanta - Lih , Viśvapā, Catur (in all genders) , Idam, Kim, Tad (in all genders), Rājan , Maghavan , Pathin , Vidvas , Asmad , Yuṣmad .
- Samāsa - Avyayībhāva , Tatpuruṣa , Bahuvrīhi , Dvandva (according to laghusiddhāntakaumudī)
- Taddhita - Apatyārthaka and Matvarthīya (According to Siddāntakaumudī),
- Tiṅanta - Bhū (to be), Edh (to grow), Ad (to eat), As (to be), Hu (to oblate), Div (to play/gamble), Ṣuñ (to extract), Tud (to pierce), Tan (to spread), Kṛ (to do), Rudh (to obstruct), Krīñ (to buy), Cur (to steal).
- Prayayānta - Nijanta, Sannanta , Yaṅanta , Yaṅluganta , Nāmadhātu.
- Kṛdanta - Tavya / Tavyat , Anīyar, Yat, Ṇyat, Kyap , Śatṛ , Śānac , Ktvā , Kta , Ktavatu , Tumun , Ṇamul .
- Strīpratyaya - According to Laghusiddhāntakaumudī.
- Kāraka Prakaraṇa - According to Siddhāntakaumudī .
- Parasmaipada and Ātmanepada Vidhāna - According to Siddāntakaumudī .

- Mahābhāṣya (Paśpaśāhnika)- Definition of Śabda, Relation between Śabda and Artha, Purposes of the study of grammar, Definition of Vyākaraṇa, Result of the proper use of word , Method of grammar .
- Vākyapadīyam (Brahmakāṇḍa) - Nature of Sphoṭa, Nature of Śabda-Brahma, Powers of Śabda-Brahma, Relation between Sphoṭa and Dhvani , Relation between Śabda and Artha, Types of Dhvani, Levels of Language.

Unit – 7

Sanskrit Literature, Poetics and Prosody

(a) General Introduction of the following:

- Bhāsa, Aśvaghośa, Kālidāsa, Śūdraka, Viśākhadatta, Bhāravi, Māgha, Harṣa, Bāṇabhaṭṭa, Daṇḍin, Bhavabhūti, Bhaṭṭanārāyaṇa, Bhilhaṇa, Shrīharṣa, Ambikādatta vyāsa, Panditā Kṣamārao, Dr. V. Raghavan, Shridhar Bhaskar Varnekar
- Schools of Sanskrit Poetics – Rasa, Alaṅkāra, Rīti, Dhwani, Vakrokti, Aucitya,
- Western Poetics – Aristotle, Longinus, Croche

Unit - 8

(b) Specific study of the following

- Poetry: Buddhacaritam (First Canto), Raghuvaṁśam (First Canto), Kirātārjunīyam (First Canto), Śiśupālavadham (First Canto), Naiṣadhīyacaritam (First Canto)
- Drama: Svapnavāsavadattām, Abhijñānaśākuntalam, Mṛcchakaṭikam, Uttararāmacaritam, Mudrārākṣasam, Uttararāmacaritam, Ratnāvalī
- Prose: Daśakumāracaritam (viii Ucchvāsa), Harṣacaritam (V Ucchvāsa), Kādambarī (Śukanāsopadeśa)
- Campū Kāvya - Nala Campū (I Ucchvāsa)
- Sāhityadarpaṇaḥ:

  Definition of Kāvya, Refutation of other definitions of Kāvya, Śabdaśakti - Saṅketagraha; Abhidhā; Lakṣanā; Vyañjanā, Kāvyabheda (Chapter Fourth), Śravyakāvya (prose poetry and mix)
- Kāvyaprakaśa –

  Kāvyalakṣaṇam, Kāvyaprayojanam, Kāvyahetu, Kāvyabheda, Śabdaśakti, Abhihitānvayavāda, Anvitābhidhānavāda, concept of Rasa, discussion of Rasasūtra, Rasadoṣa, Kāvyaguṇa, Vyañjanāvṛtti (Fifth Chapter)
- Alaṅkāras –

  Vakrokti; Anuprāsa, Yamaka, Śleṣa, Upamā, Rūpaka, Utprekṣā, Samāsokti, Apahnuti, Nidarśanā, Arthāntaranyāsa, Dṛṣṭānta, Vibhāvanā, Viśeṣokti, Svabhāvokti, Virodhābhāsa, Saṅkara, Samsṛṣṭi

- Dhvanyāloka (I Udyota)
- Vakroktijīvitam (I Unmeṣa)
- Bharata – Nāṭyaśāstram (First and Sixth Chapter)
- Daśarūpakam (First and Third Prakāśa)
- Chandas –

  Āryā, Anuṣṭup, Indravajrā, Upendravajrā, Vasantatilakā, Upajāti, Vaṁśastha, Drutavilambita, Śālinī, Mālinī, Śikhariṇī, Mandākrāntā, Hariṇī, Śārdūlavikrīḍita, Sragdharā

Unit - 9

Purāṇetihāsa, Dharmaśāstra and Epigraphy

(a) General introduction of the following:

- Rāmāyaṇa –

  Subject matter, age, society in the Rāmāyaṇa, Rāmāyaṇa as a source of later Sanskrit works and literal value of the Rāmāyaṇa, legends in the Rāmāyaṇa

- Mahābhārata –

  Subject matter, age, society in the Mahābhārata, Mahābhārata as a source of later Sanskrit works and literal value of the Mahābhārata, legends in the Mahābhārata

- Purāṇa –

  Definition of Purāṇa, maha Purāṇa and Upa Purāṇas, Purāṇic cosmology and Purāṇic legends

- General introduction of main Smṛtis.
- General introduction Kauṭilīya Arthaśāstra
- Paleography –

  History of the decipherment of Brāhmī script, Theories of the origin of Brāhmī Script

- Inscriptions - General introduction

Unit - 10

(b) Specific study of the following

- Kauṭilīya Arthaśāstra (First – Vinayādhikarana)
- Manusmṛti (I, II and VII Adhyāyas)
- Yājñavalkyasmṛti (Vyavahārādhyāya only)
- Paleography and Inscriptions –
    - Brāhmī Script of Mauryan and Gupta periods
    - Inscription of Ashoka – Major Rock Edicts, Major Pillar Edicts
    - Post – Mauryan inscriptions –

      Sāranātha Buddhist Image
      Inscription of Kaniṣka's regal – year, 3,
      Girnār

      Rock Inscriptions of Rudradāman,

      Hāthīgumphā inscription of Khāravela

    - Gupta and Post-Gupta inscriptions –
      Allahabad Pillar Inscriptions of
      Samudragupta, Mandasor Pillar
      Inscription of Yaśodharman,
      Banskherā Copper Plate Inscription
      of Harṣa, Aihole Stone Inscription
      of Pulakeśīn I

Code No:40

SUBJECT: SOCIAL WORK

SYLLABUS

Unit – 1 :

Nature and Development of Social Work

- **Social Work:** Definition, Scope, Principles, Nature, Goals and Process
- **Historical Development:** Development of Professional Social Work across the world (U.K., U.S.A., and India)
- **Social Reform and Professional Social Work:** Contribution of Social Reformers in 19th and 20th Century in the development of Professional Social Work in India.
- **Social Work as a Profession in India:** Values, Competencies and Code of Ethics for the Social Work Practitioners.
- **Theories:** Theories for Social Work Practice.
- **Changing Context of Social Work Practice :** Emerging Perspectives, Trends and Challenges of Social Work for Practice.
- **Social Work Practice in various settings:** (Family, Child and Youth welfare, Industry, Older Persons, Persons with Disabilities, Environment, Women and Welfare, Healthcare and Disaster Management.) Society, Human Behavior and Communities.

Unit – 2 :

- **Sociological Concepts :** Social Structure, Social Institutions and Social Groups, Socialization, Social Control and Social Change.
- **Approaches to the study of Society:** Functionalist, Conflict/ Dialectical , Structuralism and Post Modernism.
- **Social System and Stratification:** Major Social Systems (Family and Religion), Social Stratification: Marxist, Functionalist and Weberian approach.
- **Human Behavior:** Normal and Abnormal Behaviour Determinants and Life span perspective of Human Development, Development Tasks and Hazardsduring Pre Natal Period, Infancy, Babyhood, Childhood, Puberty, Adolescence and Adulthood.
- **Theories of Personality :** Psycho Analytic Theory of Personality, Behavioral theories and Humanistic theories.
- **Social Psychology:** Social Perception, Attitude formation, Change and Measurement, Communication and Theories of Collective Behaviour.
- **Type of Communities:** Rural, Urban, Tribal and Virtual Communities and various Vulnerable Groups/ sections viz. Women, Child, Aged, Dalits etc; Caste and Class – Their Characteristics.

Unit – 3 :

Social Work with Individuals and Groups

- **Basic Social Case Work Concepts:** Social Roles, Social Functioning, Need Assessment, Adaptation, Social environment, Person-in-Environment Fit, Principles and Components.
- **Approaches to Social Case Work Practice:** Diagnostic and Functional Approach, Problem Solving, Task Centered and Radical Approach.
- **Process and Techniques of Social Case Work:** Phases of Case Work Intervention, Techniques of Case Work Intervention, Principles of Interviewing and Case Work Recording.
- **Social Group Work:** Definition, Characteristics, Functions and Group Structure, Classification of Groups and making of Social Groups, Issues of Identity, Diversity and Marginalization.
- **Social Group Work Process and Group Dynamics:** Principles, Determinants, Indicators and Outcomes, Decision making and Problem Solving Process, Theories of Leadership, Roles and Responsibilities of Group Leaders.

- **Group Development:** Stages of Group Work, Techniques and Skills in Group Work, Group Climate, Communication in Groups, Use of Programme Media and Group Work Recording, Monitoring and Evaluation.
- **Practice Sites of Social Case Work and Social Group Work:** Client Groups and various settings (Children, Correctional, Health, Women, Persons with Disabilities, Older Persons, Oppressed Groups, Religious Minorities, Persons who are Gay & Lesbian and other Socially and Economically Disadvantaged Groups).

Unit – 4 :

Social Work with Communities and Social Action

- **Community Organization:** Concept, Definition, Scope and Historical Perspective in India, UK, and USA, The Role of Community-Based Organizations, Human Capital & Social Capital.
- **Process of Community Organization:** Steps in Community Organization, Methods, Principles, Skills, Assumptions, Record Maintaince, Involving NGOs in Community Organization.
- **Approaches in Community Organization Practice:** Models, Strategies, The role of Community Based Organizations, Leadership Development and Leaders, Building Partnerships and coalitions.
- **Social Action and Social Movements:** Concept, History, Social Action as a Method of Social Work.
- **Models of Social Action:** Conscientisation model of Paulo Freire, Role of ideology, Saul Alinsky as a radical community organizer, Liberation Theology.
- **Social Movements:** Origin, Nature, Types of Movements, Theories of Movement and new Social Movements.
- **Social Movements, Social Action and Social Change:** Movement Analysis: Ideology, Structure, Leadership, Process and Outcomes, Analysis of ideology and approach of (Gandhi, Martin Luther King Jr. and Frantz Fanon)

Unit – 5 :

Research in Social Work: Quantitative and Qualitative Approaches

i. Quantitative Research

- **Basics of Social Science Research:** Meaning of Research, Social Science and Social Work Research: Meaning, Nature and Scope.
- **Steps in Social Science Research:** Identifications and Formulations of Research Problem, Literature Review, Objectives and Hypothesis Formulation, Research Design, Sample Design, Sources, Methods and Tools of Data Collection, Processing and Analysis of Data and Writing Research Reports including Presentations and Styles of References, Citing and Paraphrasing.
- **Basic Statistical concepts:** Process of statistical Enquiry and dealing with Descriptive and Inferential Statistical Methods, Parametric and Non- parametric Tests.

ii. Qualitative Research

- **Qualitative Research:** Meaning, Basic tenets of Qualitative Research, Difference between Quantitative and Qualitative Approach to Research in social Work.
- **Designing Qualitative Research:** Steps, Methods of Qualitative Research (Field study, Case Study, Focus Group Discussions, Narratives, Observation and Theoretic Research)
- **Managing Qualitative Data:** Procedures and Techniques of Analyzing Qualitative Data and Report Writing.
- **Mixed Method Research:** Components of Mixed Methods, Procedures of Combining Quantitative and Qualitative research.

Unit – 6 :

Administration, Welfare and Development Services

- **Social Welfare Administration:** Meaning, History, Principles, Nature and Type of Organizations.
- **Types of Administration:** Distinction between Social Welfare Administration, Public administration and Social Security administrations.
- **Registration of Welfare Agencies:** Laws relating to Societies, Trust and Non–Profit organizations, Challenges

- **Structure of Social Welfare Administration:** Service Providers, Administrative structures (Government and Non-Government), Organization and Management of Institutional Welfare Services.
- **Components of Administration:** Planning, Coordination, Staff Recruitment, Training and Development, Recording and Documentation, Budgeting, Monitoring and Evaluation, Networking and Maintaining Public Relations.
- **Strategies and Mechanisms of Administration:** Role of Social Workers in Decision Making Process, Communication, Role Description and Functioning, Sustainability of Programmes.
- **Fund raising and Resource Mobilization:** Grant-in-aid (Principles and Procedures), Resource Mobilization, Financial Administration and Social Marketing – Process and Models.

Unit – 7 :

Social Policy, Planning and Social Development

- **Social Policy:** Concept, Goals, Scope, Context and Models of Social Policy and applicability in Indian context.
- **Historical Development:** Evolution and Historical perspective of various Policies, Implementation of Social Policies especially for Marginalized and Vulnerable sections of the society.
- **Process of Policy Formulation:** Determinants and Steps, Approaches to Social Policy formulation, Impact of changing Political Scenerio in a country.
- **Social Planning:** Concept, Objectives, Scope, Models, Inter-relationship between Social and Economic Planning, Social Planning in India.
- **Five Year Plans:** Changes in Social Planning with Five Years Plans in India, Social Planning and Social Change, Factors leading to development of planning in India. Roles and functions of Niti Aayog.
- **Social Development:** Positive and Negative Dimensions of Social Development; Concept, Models and Theories, Historical and Social Context of Development in India,
- **Sustainable Development:** Concept, Strategies, Critical issues, Salient Features of Social Development. Approaches to Social Development; Similarities and Differences. Strategic Development Goals, Human Development Index and Indicators for Policies and Programmes.

Unit – 8 :

Indian Constitution, Social Justice, Human Rights and Social Work Practice

- **Indian Constitution:** Characteristics, Features, Preamble, Directive Principles of State Policy and Articles.
- **Social Justice:** Concept, Definition, Historical Development, Dimensions, Manifestations and Social Justice as a Core value of Social Work Profession.
- **Social Justice and Leadership:** Community Building, Personal and Community Empowerment, Social Justice and Technology, Promoting a Plan and Vision for Change, Reflections and Connection, Social Reconstructions, Paradigms, Policies, Privileges, Implications of Social Justice for Policy Formulation.
- **Instrument of Social Justice:** Constitutional Base and Indian Legal System, Legal and Public Advocacy, Role of Civil Society as a Pressure group, Statutory bodies.
- **History of Human Rights:** Concept and Historical Context of Human Rights, Human Rights Declarations, Treaties and Conventions, Human Rights and Protection Systems, Human Rights in the Indian Context.
- **Human Rights and Social Work:** Code of Ethics of Social work and Protection of Human Rights, Human Rights perspective in Social Work Practice, Ethnic sensitive practice, Feminist Practice, Social Work with Diverse Groups.
- **Violation of Human Rights and Social work practice:** Social Work with the Victims of Human Rights Violations and Human Rights Activism. Role of UNHCR, National Human Rights Commission and International Human Rights Agencies.

Unit – 9 :

Areas of Social Work Practice I

(Health Care Social Work Practice, Social Work with Older Persons and Persons with Disabilities, Gender, Labour Welfare, Industrial Relations, Personnel Management and Human Resource Management)

- **Medical Social Work and Psychiatric Social Work:** Concept, Evolution, Roles, Functions / Responsibilities of Medical Social Workers and Psychiatric Social Workers.
- **Mental Health and Disease:** Normal and abnormal behaviour, Epidemiology, Etiology, Types, Clinical Manifestation and Management of Schizophrenia, Mood Disorders, Neurotic Disorders, stress related Disorders, Somatoform Disorders, Child and Adolescent Mental Health Problems, Legislations related to Mental Health.
- **Theories of Aging and Vulnerability:** Psychological and Sociological Theories of Aging, Psychological, Social, Physical needs and problems of Older Persons. Rights of Older Persons against Neglect, Abuse, Violence and Abandonment and Social Work Interventions.
- **Persons with Disabilities:** Models of Disability, Disability Movement – Historical Perspective, National and International Milestones from Welfare to Right based Approach, Legislative Measures and Social Work Interventions.
- **Gender and Development:** Expressions of Gender Disparity in Education, Health, Property, Employment and Livelihood, Decision Making, Feminization of Poverty and Manifestations of Gender based Violence. Constitutional & Legislative Safeguards and Social work Interventions.
- **Labour Welfare & Human Resource Management (HRM):** Historical background of Industrial Development as a sub-system of society, Concept of Labour Welfare, Nature, Objectives, Principles, Theories, Principles of labour welfare, Labour Legislations, Human Reosurce management : Concept, Scope, Evolution, Theories, Models, Sub-systems, Human Resources Development (HRD)–Performance Management System, Types, Six Sigma, ISO, Total Quality Management, Corporate Social Responsibility(CSR)–Concept, Issues, Practices, Models, Components, Approaches and Corporate Governance.
- **Personnel Management and Industrial Relations:** Concept, Definition, Objectives, Scope, Functions, Determinants and Reflectors of Industrial Relations, Models of Industrial Relations, Globalization and Industry, International Labour Organization(ILO) Role, Functions; Collective Bargaining, Job Analysis, Manpower Planning, Organization Behaviour and Organization Development Interventions.

Unit – 10 :

Areas of Social Work Practice II

(Social Defence and Correctional Services, Social Work with Families and Children, Environment and Social Work, Social Work and Disaster Management)

- **Social Defence:** Concept, Philosophy and Changing Dimensions, Children in Need of Care and Protection, Juveniles in Conflict with law, Street and Working Children and Young Offenders, Probation and Parole. Emerging issues in Social Defence.
- **Legislation and Criminal Justice System:** Juvenile Justice (Care and Protection of Children) Act, 2000, Immoral Traffic prevention Act 1986, Probation of Offenders Act, 1958, Beggary Prevention Act, Narcotic Drugs and Psychotropic Substance Act 1986, Prison Act, and Criminal Justice System.
- **Social Work with Families:** Functions, Developmental Stages and Family patterns, Family Dynamics and Theoretical Models of Family Functioning (Circumflex model, Mc Master Model and Structural Model) and Social Work Interventions.
- **Child Development:** Concept, Philosophy and Historical context, State of Children in India–Demographic Profile, Education, and Protection.
- **Policies & Programmes for Children:** Constitutional provisions, National Policy on Children, International perspective and UN convention an rights of children, Programmes and Legislative Measures related to Female Feticide, Adoption, Foster Care, Guardianship and Child Marriage and Social Work Interventions.
- **Environment and Social Work:** Causes and Consequences, Differential impact on Women, Poor, Marginalised Groups and Indigenous Populations. Environment in the Human Rights Perspective. Environmental Movements and social work interventions in the management, protection and promotion of the environment.
- **Social Work and Disaster Management:** Disaster related concept and Definitions: Hazard, Risk, Vulnerability and Disaster, different forms of natural & manmade disasters. Impact of Disaster and Disaster Management Initiatives, Pre and Post Disaster Interventions.

Code No : 41

SUBJECT : SOCIOLOGY
SYLLABUS

Unit -1 :

Sociological Theory

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

Unit - 2 :

Research Methodology and Methods

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

Unit -3 :

Basic Concepts and Institutions

1. Sociological Concepts
   - Social Structure
   - Culture
   - Network
   - Status and Role
   - Identity
   - Community
   - Diaspora
   - Values, Norms and Rules
   - Personhood, Habitus and Agency
   - Bureaucracy, Power and Authority

2. Social Institutions

- Marriage, Family and Kinship
- Economy
- Polity
- Religion
- Education
- Law and Customs

3. Social Stratification

- Social Difference, Hierarchy, Inequality and Marginalization
- Caste and Class
- Gender, Sexuality and Disability
- Race, Tribe and Ethnicity

4.Social Change and Processes

- Evolution and Diffusion
- Modernization and Development
- Social Transformations and Globalization
- Social Mobility

Unit – 4 :

Rural and Urban Transformations

1. Rural and Peasant Society

- Caste-Tribe Settlements
- Agrarian Social Structure and Emergent Class Relations
- Land Ownership and Agrarian Relations
- Decline of Agrarian Economy, De-Peasantization and Migration
- Agrarian Unrest and Peasant Movements
- Changing Inter-Community Relations and Violence

2. Urban Society

- Urbanism, Urbanity and Urbanization
- Towns, Cities and Mega-Cities
- Industry, Service and Business
- Neighbourhood, Slums and Ethnic Enclaves
- Middle Class and Gated Communities
- Urban Movements and Violence

Unit – 5 :

State, Politics and Development

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

Unit – 6 :

Economy and Society

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

Unit - 7:

Environment and Society

- Social and Cultural Ecology: Diverse Forms
- Technological Change, Agriculture and Biodiversity
- Indigenous Knowledge Systems and Ethno-Medicine
- Gender and Environment
- Forest Policies, Adivasis and Exclusion
- Ecological Degradation and Migration
- Development, Displacement and Rehabilitation
- Water and Social Exclusion
- Disasters and Community Responses
- Environmental Pollution, Public Health and Disability
- Climate Change and International Policies
- Environmental Movements

Unit - 8:

Family, Marriage and Kinship

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

Unit - 9 :

Science, Technology and Society

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

- Technology and Emerging Political Processes
- State Policy, Digital Divide and Inclusion
- Technology and Changing Family Relations
- Technology and Changing Health Systems
- Food and Technology
- Cyber Crime

Unit - 10 :

Culture and Symbolic Transformations

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

Code No : 42

SUBJECT : STATISTICS

SYLLABUS

Unit 1

Real Analysis: Set theory, Bolzano Weierstrass theorem, Sequences and Series, Convergence, Sequences and Series of functions, Uniform Continuity, Differentiability, Riemann sums and Riemann Integral.

Linear Algebra: Vector Spaces, Subspaces, Linear Dependence, Basis, Dimension, Algebra of Linear Transformations, Algebra of Matrices, Rank and Determinant of Matrices, Linear Equations, Eigenvalues, Eigenvectors, Cayley-Hamilton theorem. Change of basis, Canonical forms, Diagonal forms, Triangular forms, Jordan forms. Inner Product Spaces, Orthonormal basis. Quadratic forms, Reduction and Classification of Quadratic forms.

Measure Theory: Measurable spaces, Extension of measure, Signed measure, Jordan-Hahn decomposition theorems. Lebesgue measure, Metric Spaces, Convergence, Continuity, Compactness, Connectedness, Monotone Convergence theorem, Fatou's Lemma, Dominated Convergence theorem, Absolute Continuity of two measures, Radon-Nykodym theorem, Product measures, Fubini's theorem.

Unit 2

Probability Theory: Sample Space, Discrete Probability, Independent Events, Bayes theorem. Random Variables and Distribution functions (Univariate and Multivariate), Expectation and Moments, Independent Random Variables, Marginal and Conditional Distributions.

Generating functions and Law of Large Numbers, Characteristic functions. Probability Inequalities (Chebyshev, Markov, Jensen), Modes of Convergence, Weak and Strong Laws of Large Numbers, Central Limit theorems (i.i.d. case).

Unit 3

Estimation: Methods of estimation, Properties of estimators, Confidence Intervals, Cramer- Rao Inequality, Rao-Blackwell theorem, Completeness, Lehmann-Scheffe theorem, Bhattacharya and Chapman -Robins Inequalities.

Unit 4

Testing of Hypotheses: Most Powerful and Uniformly Most Powerful tests, Likelihood Ratio Test, Locally Most Powerful test, Analysis of discrete data, Chi-Square test for goodness of fit, Small and Large sample tests, Invariance tests.

Non-parametric inference: Simple Non-Parametric tests for one and two sample problems, Rank Correlation and test for Independence.

Unit 5

Correlation: Partial and Multiple Correlation Coefficients and related tests.

Regression: Gauss Markov Models, Estimability of Parameters, Best Linear Unbiased Estimators, Simple and Multiple Linear Regressions, Elementary Regression Diagnostics, General Linear Model, Logistic Regression.

Unit 6

Multivariate Analysis: Multivariate normal distribution, Wishart distribution and its properties, Hotelling's T^2 distribution, Mahalanobis D^2 statistic, Distribution of quadratic forms.

Data Reduction Techniques: Principal Component Analysis, Discriminant Analysis, Cluster Analysis, Canonical Correlation, Factor Analysis–EFA and CFA.

Unit 7

Design of Experiments: Analysis of Variance and Covariance, Fixed, Random and Mixed effects models, Randomized Block Designs, Latin-Square Designs, Mutually Orthogonal Latin-Squares and Youden Square Design. Connectedness and Orthogonality of Block Designs, Balanced Incomplete Block Design–Construction and Analysis. Partially Balanced Incomplete Block Design, 2^k and 3^k factorial experiments, Complete & Partial Confounding and construction, Fractional Factorial design–2^{n-k} .

Sampling Techniques–Simple random sampling, Stratified sampling and Systematic sampling, Probability Proportional to Size sampling, Cluster sampling, Multistage sampling, Ratio and Regression estimators, Horvitz–Thompson estimator.

Unit 8

Statistical Quality Control: Quality and Quality Improvement, Statistical Process Control, Control Charts for Attributes and Variables, Schewart Control charts, Operating-Characteristic Function, Process Capability analysis, Process capability ratios, Acceptance Sampling Plans, Dodge–Romig Sampling Plans – AOQL, ATI and LTPD – Continuous Sampling Plans by Attributes, CSP–1, CSP–2 and CSP–3, CUSUM Control Charts.

Reliability: Basics of Reliability–Quality and Reliability–Reliability Modelling. Concepts of Series and Parallel Systems.

Unit 9

Survival Analysis: Survival and Hazard functions, Types of Censoring. Kaplan-Meier Estimator, Cox PH model, Parametric Models.

Bayesian Inference: Bayes theorem, Conjugate, Improper and Jeffreys' Prior, Loss and Risk functions, Posterior Predictive Distribution, Bayesian Point and Interval Estimates.

Unit 10

Operations Research: Linear Programming Problems, Simplex and Dual Simplex methods, Sensitivity analysis, Integer Programing, Non-Linear Programming, Kuhn-Tucker Condition, Decision Tree and Bellman Principle of Optimality.

Queuing Theory: Elementary Queuing and Inventory Models, Steady-State solutions of Markovian Queuing Models, M/M/1 Model, M/M/1 with limited waiting space, Markov Chains with finite and countable state space, Classification of states, Limiting behaviour of n-step transition probabilities, Stationary distribution, Poisson and Birth-and-Death Processes.

Code No: 43

SUBJECT :TAMIL

SYLLABUS

பாடம்: தமிழ்

பாடத்திட்டம்

அலகு : 1

பழந்தமிழ் இலக்கியங்கள்

- *எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள்.*
- *பதினெண்கீழ்க்கணக்கு நூல்கள்.*

இவை குறித்துப் பொதுநிலை இலக்கிய வரலாற்றுத் தரவுகளாக காலம், தொகுப்புமுறை , ஆசிரியர் வரலாறு, முதன்மையான பாடுபொருள், அவற்றிற்கு உரையெழுதியோர், அவர்கள் முன்வைத்துள்ள பொதுக் குறிப்புகள் போன்றன கவனம்பெறும்.

அலகு : 2

காப்பியங்கள்

- *பெருங்காப்பியங்கள், சிறுகாப்பியங்கள்*
- *பிற்காலக்காப்பியங்கள் - கம்பராமாயணம், பெரியபுராணம், திருவிளையாடற்புராணம், வில்லிபாரதம், பெருங்கதை, நளவெண்பா, தேம்பாவணி, இரட்சணியயாத்திரிகம், சீறாப்புராணம் , இயேசுகாவியம், நாயகம் ஒரு காவியம், இராவணகாவியம்.*

அலகு : 3

பக்தி இலக்கியங்கள், சிற்றிலக்கியங்கள், தனிப்பாடல்கள், உரையாசிரியர்கள்

- *பன்னிரு திருமுறைகள்*
- *நாலாயிர திவ்வியபிரபந்தம்*
- *சித்தர் பாடல்கள், அருணகிரிநாதர், தாயுமானவர், வள்ளலார்*
- *குணங்குடி மஸ்தான் சாகிபு*
- *சிற்றிலக்கிய வகைகள்*
- *தனிப்பாடல் திரட்டு*
- ***இலக்கிய உரையாசிரியர்கள் :*** *அடியார்க்கு நல்லார், நச்சினார்க்கினியர், திருக்குறள் பழைய உரையாசிரியர்கள், நாதமுனி, சிவஞானமுனிவர், பண்டிதமுனி மு. கதிரேசனார், ஔவை சு. துரைசாமிப்பிள்ளை, பெருமழைப்புலவர் பொ. வே. சோமசுந்தரனார், பின்னத்தூர் நாராயணசாமி அய்யங்கார், வை.மு.கோபாலகிருஷ்ணாமாச்சார்யார், உ.வே.சாமிநாதய்யர், சி.வை. தாமோதரம்பிள்ளை, புலவர் குழந்தை, சிவக்கவிமணி சுப்ரமணிய முதலியார். கவி.கா.மு.ஷெரீப்*

அலகு : 4

இக்கால இலக்கியங்கள்

தேசிய இயக்கப்பின்னணியில் பாரதியார், கவிமணி தேசிகவிநாயகம்பிள்ளை, நாமக்கல் கவிஞர் வெ. இராமலிங்கம்பிள்ளை, சுத்தானந்த பாரதியார், திராவிட இயக்கப் பின்னணியில் பாரதிதாசன், முடியரசன், சுரதா - பொதுவுடைமை நோக்கில் தமிழ் ஒளி, தணிகைச் செல்வன், பரிணாமன்.

திரைப்படப் பாடலாசிரியர்கள்: பாபநாசம் சிவம், பட்டுக்கோட்டை கல்யாணசுந்தரம், உடுமலை நாராயணகவி, கவி. கா. மு. ஷெரிப், கண்ணதாசன், மருதகாசி, வாலி, வைரமுத்து, அறிவுமதி, நா. முத்துக்குமார், பா. விஜய், தாமரை.

அகவயத் தேடலைக் கவிதைகளாக்கிய போக்கு : ந. பிச்சமூர்த்தி, மயன், பசுவய்யா, அபி, அப்துல் ரகுமான், ஞானக்கூத்தன், பிரமிள், ஆத்மநாம், சுகுமாரன், தேவதேவன், தேவதச்சன், மனுஷ்யபுத்திரன், யவனிகா ஸ்ரீ ராம், என் . டி . ராஜ்குமார் - புறநிலையை விமர்சனப்போக்கு: நா. காமராசன், மு.மேத்தா , சிற்பி, மீரா, புவியரசு தமிழன்பன், தமிழ்நாடன், இன்குலாப், ஹெச்.ஜி. ரசூல் - மண்சார் கவிதைகள்: பழமலய், காலாப்ரியா, கல்யாண்ஜி, தமிழச்சி தங்கபாண்டியன் - பெண்ணிய வெளிபடுக்கவிகள்: இரா. மீனாட்சி, வைகைச்செல்வி, சல்மா, கனிமொழி, உமா மஹேஸ்வரி, சுகிர்தராணி, சக்திஜோதி, இளம்பிறை, புதிய மாதவி.

ஹைகூ,சென்ட்ரியூ, லிமரிக், லிமரைக்கூ, கஜல், போன்சாய் கவிதைகள்.

சிறுகதைகள்: வ.வே.சு. அய்யர், புதுமைப்பித்தன், மௌனி, லா. ச. ராமாமிர்தம், பி.எஸ். ராமையா, கு.அழகிரிசாமி, வல்லிக்கண்ணன், கு.பி.ராஜகோபாலன், விந்தன், அகிலன், வண்ணதாசன், ஆஸ்வகோஷ், ஜெயந்தன், மா. அரங்கநாதன், அம்பை, ஆர். சூடாமணி, கந்தர்வன், தமிழ்ச்செல்வன், பா.செயப்ரகாசம், பாவண்ணன், கோணங்கி, ஆகியோர் படைப்புகள்.

புதினங்கள்: மாயூரம் வேதநாயகம்பிள்ளை, இராஜம் அய்யர், அ.மாதவையா, கல்கி, மு.வரதராசன், க.நா.சுப்பிரமண்யன், ஆர்.சண்முகசுந்தரம், ஜெயகாந்தன், தி.ஜானகிராமன், கி.ராஜநாராயணன், சா.கந்தசாமி, சுந்தரராமசாமி, அசோகமித்திரன், ராஜம் கிருஷ்ணன், இந்திராபார்த்தசாரதி, ஆதவன், நீல. பத்மநாபன், எம்.வி. வெங்கட்ராம், நாஞ்சில் நாடன், தோப்பில் முகம்மது மீரான், திலகவதி, பிரபஞ்சன், பூமணி, பொன்னீலன், சு.சமுத்திரம், டி.செல்வராஜ், வண்ணநிலவன், மேலாண்மை பொன்னுசாமி, சிவகாமி, இமையம், தஞ்சை ப்பிரகாஷ், கீரனூர் ஜாகீர்ராஜா, ஜெயமோகன், எஸ். ராமகிருஷ்ணன், சாருநிவேதிதா, பாமா, சோ.தர்மன், ஜோ.டி.குரூஸ், ஆகியோர் படைப்புகள்- சாகித்தியஅகாடெமி, யுவபுரஸ்கார் விருதுகள் பெற்ற எழுத்தாளர்களின் படைப்புகள்.

அலகு : 5

நாடகங்கள் - மனோன்மணியம் சுந்தரம்பிள்ளை, சங்கரதாஸ் சுவாமிகள், பம்மல் சம்பந்த முதலியார், சி.என்.அண்ணாதுரை, கலைஞர் மு.கருணாநிதி, பி.எஸ்.ராமையா, ஆர்.எஸ்.மனோகர், சோ.ராமசாமி, கோமல் சுவாமிநாதன், மெரினா, அறந்தை நாராயணன், சுஜாதா. நவீனத்துவ நாடகப் பிரதிகள்: இந்திரா பார்த்தசாரதி, ஜெயந்தன். நவீன நாடக இயக்கங்கள்: கூத்துப்பட்டறை ந.முத்துசாமி, நிஜநாடக இயக்கம் மு.ராமசுவாமி, பரிக்ஷாஞாநி – சபாநாடகங்கள் - நாட்டார் கலைகளும் நவீன நாடக உருவாக்கமும் - சே.ராமானுஜம், இரா.இராசு, கே.ஏ.குணசேகரன், கருஞ்சுழி ஆறுமுகம், வேலு.சரவணன், ச. முருகபூபதி.

அயலகத் தமிழ் இலக்கியங்கள் - இலங்கை, மலேசியா, சிங்கப்பூர், புலம்பெயர்வு படைப்பாளர்களும் படைப்புகளும் உரைநடை வளர்ச்சியின் வகைகள், ஆளுமைகள்: மறைமலைஅடிகள், திரு.வி.க., மயிலைசீனி. வேங்கடசாமி, ரா.பி.சேதுப்பிள்ளை, வெ.சாமிநாதசர்மா, ஈ.வெ.ரா.

தன் வரலாறுகள்: வ.உ.சி. உ.வே.சா., திரு.வி.க., நாமக்கல் கவிஞர், நெ.து.சுந்தரவடிவேலு, கலைஞர் மு.கருணாநிதி, அப்துல் கலாம்.

பயண இலக்கியங்கள்: ஏ.கே.செட்டியார், சோமலெ, மீ.ப.சோமு, சி.சுப்பிரமணியம், மணியன்.

வாழ்க்கை வரலாறுகள்: வ.ரா. எழுதிய பாரதியார், தொ.மு.சி.ரகுநாதன் எழுதிய புதுமைப்பித்தன் வரலாறு, சுந்தா எழுதிய பொன்னியின் செல்வன், சிற்பியெழுதிய இராமானுசர் வரலாறு, பொன்னீலன் எழுதிய குன்றக்குடி அடிகளார்.

கடித இலக்கியங்கள்: மறைமலை அடிகள், வ.சுப.மாணிக்கம், சி.என். அண்ணாதுரை, மொழி பெயர்ப்புகள்: தமிழுக்கு மொழி பெயர்த்தவர்கள் - ஆண்ட்ரிக் ஆண்ட்ரிஸ், சுத்தானந்தபாரதி,

கா.ஸ்ரீ.ஸ்ரீ., த.நா, குமாரசாமி, த.நா.சேனாதிபதி, சி.ஏ.பாலன், சரஸ்வதி ராம்நாத், தி.ப.சித்திலங்கையா, அ.அ.மணவாளன், பி.எஸ். எஸ். சாஸ்திரி, மு.கு.ஜகந்நாதராஜா, நா.தர்மராஜ், நெல்லை வேலாயுதம், எத்திராஜலு, வெ.ஸ்ரீராம், மணவைமுஸ்தபா, தியாகு, பாவண்ணன், இந்திரன், ஆனந்தகுமார், சிற்பி, சுகுமாரன், புவியரசு, ரவிக்குமார், குளச்சல் யூசுப், சா.தேவதாஸ், எம்.எ. சுசிலா, ஜி.குப்புசாமி, அகிலன் எத்திராஜ்.

தமிழிலிருந்து பிறமொழிகளுக்கு: ஏ.கே.ராமானுஜன், கா.செல்லப்பன், கபில் சுவலபில், ம.லெ.தங்கப்பா, அ.தட்சிணாமூர்த்தி, ஜார்ஜ் எல்.ஹார்ட், லட்சுமிஹோம்ஸ்ட்ராம், ப.மருதநாயகம், வைதேகிஹெர்பர்ட், கே.எஸ். சுப்பிரமணியன், சரஸ்வதிராம்நாத், நாகரத்தினம் கிருஷ்ணா, க.வாசுதேவன்.

அலகு: 6

இலக்கணங்கள் :

எழுத்திலக்கணமும் கோட்பாடுகளும் - தொல்காப்பியம், நன்னூல், சொல்லிலக்கணமும் கோட்பாடுகளும் - தொல்காப்பியம், நன்னூல், பொருள் இலக்கணமும் கோட்பாடுகளும் - அகம்: (தொல்காப்பியம், இறையனார் களவியல், நம்பியகப்பொருள்) புறம்: (தொல்காப்பியம் - புறத்திணையியல், புறப்பொருள் வெண்பாமாலை) யாப்பிலக்கணமும் கோட்பாடும் - தொல்காப்பியச் செய்யுளியல், யாப்பருங்கலக்காரிகை, அணி இலக்கணமும் கோட்பாடும் – தொல்காப்பிய உவமையியல், தண்டியலங்காரம், பாட்டியல் இலக்கணம் - பன்னிருபாட்டியல், சிதம்பரப்பாட்டியல், வெண்பாப்பாட்டியல், பிரபந்ததீபிகை, பிரபந்தமரபியல்.

***அலகு:** 7*

இலக்கண உரையாசிரியர்கள், மொழி வரலாறு, நோக்கு நூல்கள் .

- *இலக்கண உரையாசிரியர்கள்: இளம்பூரணர், நச்சினார்க்கினியர், சேனாவரையர், பேராசிரியர், தெய்வச்சிலையார், கல்லாடர், மயிலைநாதர், சிவஞான முனிவர், ஆறுமுகநாவலர், சங்கரநமச்சிவாயர், விசாகப்பெருமாள் அய்யர், க.வெள்ளைவாரணர், ஆ.சிவலிங்கனார், பாவலரேறு ச.பாலசுந்தரனார் .*

- *மொழியியல் பார்வையோடு எழுதப்பெற்றுள்ள மொழி வரலாறு மற்றும் இலக்கண நூல்கள்: ராபர்ட் கால்டுவெல், தெ.பொ.மீனாட்சிசுந்தரன், வ.அய்.சுப்பிரமணியன், ச.அகத்தியலிங்கம், கு.பரமசிவம், முத்துச்சண்முகன், எம்.ஏ.நுஃமான், செ.வை.சண்முகம், பொற்கோ.*

- *நிகண்டுகள் – அகராதிகள், சொற்களஞ்சியங்கள், பொருட்களஞ்சியங்கள், அடைவுகள் (சொல், பொருள், தொடர்)*

அலகு: 8

இலக்கியத் திறனாய்வு

- *இலக்கியக்கலை, இலக்கியத்திறன், இலக்கியமரபு, இலக்கியத் திறனாய்வியல், திறனாய்வுக்கலை, இலக்கியக்கொள்கைகள், ஒப்பிலக்கியக்கொள்கைகள் போன்றவற்றை அறிமுகம் செய்த நூல்கள்.*

- ***திறனாய்வு முறைகள்:** ரசனை முறை, மதிப்பீட்டுமுறை, அழகியல் முறை, விளக்க முறை, பகுப்புமுறை, வரலாற்றுமுறை, உருவவியல், மனப்பதிவு முறை.*

- ***இலக்கிய இயக்கங்கள்:** செவ்வியல்வாதம், புனைவியல்வாதம், இயற்பண்பியல்வாதம், நடப்பியல் வாதம் - நடப்பியல் அல்லாத இலக்கிய இயக்கங்கள்: இருத்தலியல், குறியீட்டியல், மிகைதார்த்தவியல், படிமவியல், வெளிப்பாட்டியல், மனப்பதிவியல், குரூரவியல் ஆகியன.*

- *திறனாய்வு அணுகுமுறைகள்: சமுதாயவியல், மார்க்சியவியல், உளவியல், தொல்படிமவியல், மானிடவியல், உருவவியல், இனவரைவியல், அமைப்பியல், தலித்தியம், பெண்ணியம் ஆகியவற்றின் அடிப்படைகள்.*

- *கல்விப்புல ஆய்வு முறையியல் சார்ந்த இலக்கியத்திறனாய்வாளர்கள்: ஆ.முத்துசிவன், எஸ். வையாபுரிபிள்ளை, தெ.பொ.மீனாட்சி சுந்தரன், அ.ச.ஞானசம்பந்தன், மு.வரதராசன், வ.சுப. மாணிக்கம், க.ப.அறவாணன், தா.வே.வீராசாமி, ச.வேசுப்ரமணியன், எழில் முதல்வன், தமிழிண்ணல், பெ.மாதையன், குளோரியா சுந்தரமதி.*

- *கல்விப்புல ஆய்வு முறையியல்சாரா இலக்கியத்திறனாய்வாளர்கள்: வ.வே.சு.அய்யர், டி.கே.சி., க.நா.சுப்ரமணியன், தொ.மு.சி.ரகுநாதன், சி.சு.செல்லப்பா, வெங்கட்சாமினாதன், நா.வானமாமலை, கோவைஞானி, அ.மார்கஸ், தமிழவன், கோ.கேசவன், ராஜ்கௌதமன், ரவிக்குமார், தி.சு. நடராசன், க.கைலாசபதி, கா.சிவத்தம்பி, எம்.எ.நுஃமான், சி.கனகசாபாதி, க.பஞ்சாங்கம்*

அலகு: 9

தமிழக வரலாறு

- *தமிழகத்தின் வரலாற்றையும் பண்பாட்டையும் எழுதுவதற்குப் பயன்படும் அடிப்படை நூல்களையும் தரவுகளையும் அறிவது – தமிழ்நாட்டுப்பாட நூல் நிறுவனம் வெளிட்டுள்ள நூல்கள் அடிப்படை நூல்களாக அமையும். கே.கே பிள்ளை தமிழக வரலாறும் பண்பாடும், க. சுப்பிரமணியன், ந. சுப்பிரமணியன் ஆகியோரின் சங்ககால வரலாறுகள், மா.இராசமாணிக்கனார் - பல்லவர் வரலாறு, தி.வை. சதாசிவபண்டாரத்தார், பி.நீலகண்டசாஸ்திரி ஆகியோரின் சோழர்கால வரலாறு. சங்ககாலம் தொடங்கிச் சமகாலம் வரையிலான தமிழக வரலாற்றுப் பொதுப்பார்வை.*

அலகு: 10

தமிழக பண்பாடு

- *தொல்லியல், நாணயவியல், கல்வெட்டியல், தமிழர் இசை, கட்டடக்கலை, சுவடியியல்.*

- *நாட்டுப்புறவியல் – பாடல்கள், கதைகள், கதைபாடல்கள், சடங்குகள் – நாட்டார் நடனங்கள், நாடகங்கள் – வழிபாடுகள், திருவிழாக்கள், பெருங்கோயில் பண்பாடு, நகச்சார் பண்பாடு, உள்ளூர்ப்பண்பாடு, பண்பாட்டு நோக்கில் பண்டைய நகரங்களும் நவீன நகரங்களும் நாட்டுப்புற ஆய்வுகளும் ஆய்வாளர்களும் .*

- *செ.வைத்திலிங்கம் தமிழர் பண்பாட்டு வரலாறு – மயிலை சீனி வேங்கடசாமியின் தமிழர் வளர்த்த அழகுக்கலைகள் – அயல்நாட்டார் குறிப்புகள் .*

தமிழும் பிறதுறைகளும்

- *தமிழ் ஊடகங்கள் – நாளிதழ் மற்றும் பருவ இதழ்களான அச்சு ஊடகங்கள், மின் ஊடகங்கள், திரைப்படங்கள், வானொலி, தொலைக்காட்சி, கணினித்தமிழ்.*

- *இணையத்தமிழ் பயன்பாடு: இணைய வலைத்தளங்கள், வலைப்பூக்கள், முகநூல், கட்செவி போன்றன – பேச்சுத்தமிழ் இலக்கணம், மேடைகளில் தமிழ்ப் பயன்பாடும் சிக்கல்களும்.*

- *பிற அறிவுத்துறைகளில் தமிழ் வளர்ச்சி.*

Code No : 44

SUBJECT : TELUGU

SYLLABUS

యూనిట్ – **1** : సామాన్య భాషా విజ్ఞానం

భాష–దానిస్వభావం – భాషోత్పత్తి వాదాలు, భాషాశాస్త్రం–దాని వికాసం – ప్రాచ్య పాశ్చాత్య దేశాలలో భాషావిషయిక కృషి – భాషాశాస్త్ర వివిధ అధ్యయన పద్ధతులు (Different Schools of Linguistics)

భాషల వర్గీకరణ : భౌగోళిక, జన్యాత్మక, రూపాశ్రిత వర్గీకరణలు – ప్రపంచ భాషలలో ముఖ్య కుటుంబాలు.

ధ్వని విజ్ఞానం : అధ్యయన విధానాలు – ఉచ్చారణ, శ్రవణ, ధ్వని తరంగాలు, ఉచ్చారణావయవాలు – భాషాధ్వనుల వర్గీకరణ – ధ్వన్యాత్మకలిపి – అంతర్జాతీయ ధ్వనిశాస్త్రజ్ఞుల సంఘం వారి లిపి (IPA)

వర్ణ విజ్ఞానం : ధ్వని – వర్ణభేదం; వర్ణ నిర్ణయ విధానం – వర్ణ నిర్వచనం – ఉచ్చారణ విధానం – స్థానకరణ ప్రయత్నాలు

పదాంశ విజ్ఞానం (Morphology) : పదనిర్మాణం – పదం (అర్థం), పదాంశం (అర్థకం), సపదాంశం (సార్థకం) – అర్థ – అర్థక – సార్థకాల నిర్వచనం (Morph - Morpheme –Allomorph) అర్థకాలభేదాలు – గుర్తించే విధానం; పరిసరానుగుణంగా అర్థకాలలో కలిగే మార్పులు – వివిధ అర్థకాలు

వాక్యవిజ్ఞానం (Syntax) : వాక్యనిర్మాణం, పదనిర్మాణ – వాక్యనిర్మాణాల సంబంధం; వాటి పరిధి; వాక్యనిర్మాణ రీతులు– ఆధునిక వాక్య నిర్మాణాలు – భేదాలు.

ధ్వనిపరిణామం (Phonetic Change) : ధ్వనిపరిణామం – కారణాలు, రీతులు; ధ్వని సూత్రాలు – పరిమితులు (exceptions to Phonetic Law),

అర్థపరిణామం (Symantic Change) : అర్థపరిణామం – కారణాలు, రీతులుత

తులనాత్మక అధ్యయనం (Comparative Study) : భాషల తులనాత్మక పద్ధతి – మూలభాషా పునర్నిర్మాణం; తులనాత్మక అధ్యయనానికి దోహదంచేసే అంశాలు, పరిధి – అంతరంగిక పునర్నిర్మాణం

ప్రాతిదేయ విజ్ఞానం (Borrowing) : భాషల ఆదాన ప్రదానాల ప్రక్రియ – ఆదాన ప్రదాన రీతులు – కారణాలు – భౌగోళిక సాంస్కృతిక సాన్నిహిత్య కారణాలు

మాండలిక విజ్ఞానం (Dialectology) : మాండలికం అంటే ఏమిటి? – మాండలికాలు ఏర్పడటానికి హేతువులు – పరిధులు – మాండలిక భౌమిక శాస్త్రం – మాండలిక పదసేకరణ పద్ధతులు – భాషా ప్రామాణీకరణ సమస్యలు

యూనిట్ – 2 : తెలుగుభాష పరిణామం – వికాసం

భారతదేశంలోని భాషాకుటుంబాలు – ద్రావిడ శబ్ద వ్యుత్పత్తి, వ్యాప్తి – ద్రావిడ భాషల లక్షణాలు – ద్రావిడభాషల పరిగణనం – ద్రావిడ భాషల్లో తెలుగు స్థానం

కాల్డ్వెల్‌కు ముందు, తరువాత ద్రావిడ భాషల అధ్యయనం – ద్రావిడ భాషల ఉపకుటుంబాలు

మూలద్రావిడ వర్ణ పునర్నిర్మాణం : మూలద్రావిడ వర్ణాలు – ధాతువులు – ఉపసర్గలు

మూలద్రావిడ భాషలోని నామవాచకాలు – సర్వనామాలు – సంఖ్యావాచకాలు – లింగ బోధకత – విభక్తి – అకర్మక, సకర్మక క్రియలు – భూత భవిష్యత్ వర్తమాన క్రియలు – వాక్యము – వీటి పునర్నిర్మాణము

తెలుగు భాషాచరిత్ర : ఆంధ్రము – తెనుగు – తెలుగు పదాల వ్యుత్పత్తి, చరిత్ర – తెలుగు భాషా పరిణామం – (1) కీ.శ. 6వ శతాబ్ది వరకు, (2) క్రీ.శ. 600 నుండి క్రీ.శ. 1100 వరకు, (3) క్రీ.శ. 1100 నుండి క్రీ.శ. 1600 వరకు

తెలుగు భాషలో సంధి – చారిత్రక పరిణామం

అధునిక తెలుగు – మాండలిక భేదాలు : భాష – ప్రామాణీకరణ సమస్యలు

అధునిక భాషలో సంధి : స్వరవ్యంజన సంధులు

తెలుగు భాషాపద నిర్మాణం : ధాతువుల సహజస్వరూపం – ప్రత్యయాల ముందు జరిగే మార్పు; బహువచన నిర్మాణం – మార్పులు – చేర్పులు

సర్వనామ – సంఖ్యావాచక – విశేషణపద నిర్మాణరీతులు – విశేషణాలు, భేదాలు – విశేష్యాల ముందు జరిగే మార్పు

క్రియ : సకర్మకం – అకర్మకం, కాల – పురుష – వచన బోధక ప్రత్యయాల స్వరూపాలు – విధినిషేధక క్రియలు – సహాయక క్రియలు – శబ్దపల్లవ క్రియలు – క్రియా విశేషణాలు

వాక్యనిర్మాణం – పదబంధ నిర్మాణం – పదబంధ రీతులు – వాక్యభేదాలు

యూనిట్ – 3 : ప్రాచీన తెలుగు సాహిత్య అధ్యయనం – ప్రక్రియలు

సాహిత్యచరిత్ర – అధ్యయనపద్ధతులు – యుగవిభజన సమస్యలు – సాహిత్యచరిత్రకారులు – యుగవిభజన రీతులు

ప్రాఙ్నన్నయయుగ కవితా విశేషాలు – నన్నయ భారతరచనకు దారిచూపిన శాసనశైలీ విశేషాలు

కవిత్రయభారత రచనాకాలం నాటి సామాజిక, మత, రాజకీయ పరిస్థితులు

కవిత్రయం – వారి రచనలు – కవితా లక్షణాలు – అనువాద విధానం – తిక్కన హరిహరనాథతత్త్వం – సమకాలీన కవుల కావ్యాలు – వాటి విశేషాలు

శివకవుల విశిష్టత – మార్గదేశి సంప్రదాయాలు – వస్తుకవిత – జానుతెనుగు – కావ్య రచనా విశేషాలు

రంగనాథరామాయణ కర్తృత్వం – అవాల్మీకాంశాలు

కేతన – మంచన – మారన కృతులు

నాచన సోముని నవీనగుణసనాథత్వం – ఎఱ్ఱన సోమనల తులనాత్మక వివేచన

శ్రీనాథుని జీవిత చరిత్ర – కృతులు – వైవిధ్యం – కవితారీతులు – అనువాదరీతులు –చాటుపద్యాలు

పోతన కృతులు – భాగవతపురాణం – అనువాదశైలి – పోతన కవితా లక్షణాలు – ఆత్మీయత – భాగవతంలో ప్రతిఫలించిన భారతీయ సంస్కృతి – కళలు

మడికిసింగన – నిశ్శంకకొమ్మన – జక్కన – అనంతామాత్యుడు – గౌరన – కొలనుగోపదేవుడు – దూబగుంట నారాయణకవి – దగ్గుపల్లి దుగ్గన – వల్లభామాత్యుడు – పిల్లలమర్రి పినవీరన – నందిమల్లయ, ఘంటసింగనలు – పిడుపర్తి సోమన – వెలిగందల నారయ – ఏల్చూరి సింగన – కొఱవి గోపరాజు – మొల్ల మొదలైన వారి కృతులు – కవితారీతులు

శ్రీనాథయుగం కల్పించిన కావ్యస్పృహ – ప్రక్రియా వైవిధ్యం – ప్రజాజీవితాన్ని ప్రతిబింబించిన రచనల వైవిధ్యం

అష్టాదశ వర్ణనలు – ప్రాముఖ్యం – సాంస్కృతిక నేపథ్యం – ప్రబంధాలలో ప్రతిఫలించే సామాజిక, చారిత్రక స్థితిగతులు

తెలుగులో ప్రబంధ సాహిత్యం – ఆవిర్భావ వికాసాలు – సాంఘిక చారిత్రక సాంస్కృతిక నేపథ్యం

శ్రీకృష్ణదేవరాయల ఆస్థానం –అష్టదిగ్గజాలు – అష్టదిగ్గజాల సంప్రదాయ ప్రారంభ, వికాసాలు

అష్టదిగ్గజ కవుల రచనలు – వాటి వైశిష్ట్యం

క్షేత్రమాహాత్మ్య ప్రబంధాల ప్రత్యేక పరిశీలన – ఆవిర్భావ, వికాసాలు

ద్వ్యర్థి ప్రబంధాలు – ఆవిర్భావ, వికాసాలు

రాఘవపాండవీయం, హరిశ్చంద్రనలోపాఖ్యానం మొదలైనవి

వివిధ ప్రబంధాలు – కథాకథన నైపుణ్యం – పద్యరచన శిల్పం – రసావిష్కరణ

దక్షిణాంధ్రయుగ సాహిత్యలక్షణాలు – వైశిష్ట్యం

విజయరాఘవనాయకుడు – రఘునాథరాయలు – చేమకూరవేంకటకవి – ముద్దుపళని – రంగాజమ్మ – కృష్ణాజీ – సముఖం వేంకట కృష్ణప్పనాయకుడు – శేషం వేంకటకవి

యక్షగాన నాటక వికాసము

వేమన : పద్యం – మకుటం – పద్యంపై వేమన ముద్ర

కంకంటిపాపరాజు ఉత్తరరామాయణం, అచ్చతెనుగు కావ్యాలు

ప్రక్రియలు :

అంధ్ర సారస్వత క్రమాభివృద్ధిలో సాహితీ ప్రక్రియలు – వివేచన

పురాణ – ఇతిహాసాల ప్రత్యేక స్వభావాలు – కావ్య, ప్రబంధాల ప్రత్యేకతలు

సంకీర్తన – పదం – కృతి – వచనాలు – విన్నపాలు – రగడలు – యక్షగానం – ఆరంభ, వికాసాలు

హరికథ – ఉదాహరణ – శతక ప్రక్రియలు – ఆరంభ, వికాసాలు

దశరూపకాలు – నాటకం, పరిణామవికాసాలు

యూనిట్ – 4 : అధునిక తెలుగు సాహిత్య అధ్యయనం – ధోరణులు, ప్రక్రియలు

భారత జాతీయ చైతన్యాన్ని అధునిక కాలంలో ప్రభావితం చేసిన అంశాలు – సంఘసంస్కరణల ప్రభావం – జాతీయోద్యమ ప్రభావం – తెలుగు సాహిత్యంలో అధునికత – దాని లక్షణాలు

అధునికతకు ప్రారంభకుడుగా కందుకూరి – కందుకూరి రచనలు

భావకవిత్వం – భావకవితా శాఖలు – భావకవిత్వానికి సమాంతరంగా వచ్చిన ధోరణులు, సంఘసంస్కరణోద్యమ, జాతీయోద్యమ, నవ్యసంప్రదాయ, అనుభూతివాద సాహిత్యాలు

వివిధ ధోరణులు : అభ్యుదయ – దిగంబర – చేతనావర్త – విప్లవ – స్త్రీవాద – దళిత – వి.సి. – ముస్లిం మైనారిటీ – అధునికోత్తరవాద – ప్రపంచీకరణ వ్యతిరేక – ప్రాంతీయ వాద ధోరణులు

అధునిక తెలుగు సాహిత్యంలో వివిధ ప్రయోగాలు : ప్రతీకాత్మకత (Symbolism) వాస్తవికత (realism) అధివాస్తవికత (Surrealism), ఊహాత్మకత (Imagism) మొదలైనవి

అధునిక తెలుగు సాహిత్యంపై సామ్యవాద – హేతువాద – మానవతావాదాల ప్రభావం

వచనకవితా ఉద్యమం – ఆవిర్భావ వికాసాలు

మనోవిశ్లేషణ సిద్ధాంతం – చైతన్యప్రవంతి శిల్పం

అధునిక నాటక వికాసం

అధునిక సాహిత్య ప్రక్రియలు :

ప్రక్రియలు :

నాటిక – ఏకాంకిక – నవల – కథానిక – గల్పిక – యాత్రాచరిత్ర – స్వీయచరిత్ర – జీవితచరిత్ర – వ్యాసం – లేఖ – డైరి – మ్యూజింగ్స్ – పీఠిక

కవితా ప్రక్రియలు : ఖండకావ్యం – గేయం – గజల్ – రుబాయి మొదలైన గేయ ప్రక్రియలు – మినీకవిత – హైకూలు – నానీలు – ప్రపంచపదులు మొదలైనవి

యూనిట్ – 5 : జానపద గిరిజన విజ్ఞానం

జానపద విజ్ఞానం – నిర్వచనం – లక్షణాలు – వర్గీకరణ – ప్రయోజనాలు; జానపద అధ్యయన సిద్ధాంతాలు, పాశ్చాత్యుల జానపద విజ్ఞాన కృషి, తెలుగులో జానపద విజ్ఞానంపై కృషి చేసిన వారు

జానపదగేయాలు, కథాగేయాలు : గేయలక్షణాలు – కథాగేయలక్షణాలు – వర్గీకరణ

పౌరాణిక కథాగేయాలు – అద్భుతరస కథాగేయాలు – కరుణరస కథాగేయాలు మొదలైనవి

బాలగేయాలు – శ్రామికగేయాలు – శృంగారగేయాలు – పారమార్థిక గేయాలు – అద్భుతరస గేయాలు – హాస్యగేయాలు మొదలైనవి

జానపద కథాగేయాలు – లక్షణాలు – వర్గీకరణ

గద్యకథనాలు : పురాణాలు – ఐతిహ్యాలు – లక్షణాలు – పుట్టక – వ్యాప్తి

జానపదకథ, సామెత, పొడుపుకథల లక్షణాలు, వర్గీకరణ

వీరగాథా లక్షణాలు, తెలుగులోని వీరగాథలు

పలనాటి వీరచరిత్ర – కాటమరాజు కథ – రేనాటి సూర్యచంద్రులు – బొప్పిలి కథ – సర్వాయిపాపని కథ మొదలైనవి

జానపద కళారూపాలు : పుట్టుక – వికాసం – వర్గీకరణ

ఒగ్గుకథ – కోలాటాలు – చెక్కభజనలు – పగటివేషాలు – వీధిభాగవతాలు – బుర్రకథ – తోలుబొమ్మలాట – తప్పెటగుళ్ళు – థింసా – గొరవయ్యలు – కప్పలచావడి – బోనాలు మొదలైనవి

జానపద సాంఘికాచారాలు : జననం నుండి మరణం వరకు – ఉత్సవాలు – శకునాలు – నమ్మకాలు – పండుగలు మొదలైనవి

కులపురాణాలు : జానపద వృత్తిగాయకులు : ఆశ్రిత కులాలు

గిరిజన విజ్ఞానం : సంచార జాతులు – భాషా సాంస్కృతిక విశేషాలు – కళాసాహిత్యరూపాలు – వస్తు సంస్కృతి

తెలుగు విమర్శ – ఆవిర్భావ, వికాసాలు

భారతీయ అలంకారిక విమర్శ రీతులు :

భారతీయ అలంకార శాస్త్ర క్రమవికాసం (భామహుని మొదలుకొని జగన్నాధుని వరకు)

తెలుగువారి అలంకార శాస్త్ర రచనలు : కావ్యాలంకార చూడామణి – రసోల్లాసము – కావ్యాలంకార సంగ్రహము – చంద్రాలోకము – ఆంధ్రధ్వన్యాలోకము – మొదలైనవి

కావ్యశరీరం – కావ్యాత్మ – కావ్యజీవితం – కావ్యనిర్వచనాలు – కావ్యభేదాలు – నాయికా నాయకభేదాలు, సహృదయుడు

రసప్రస్థానం : రససిద్ధాంతం – రసనిర్వచనం – రససూత్ర వ్యాఖ్యానాలు – విభావ – అనుభావ – సాత్త్విక – సంచారీభావాలు – స్థాయి భావాలు – భేదాలు – రసనిష్ప – రససంఖ్య – ఏకరసవాదాలు (శృంగార – కరుణ – శాంతాలు) రసవైరము – రసదోషము – రససాంకర్యము – రసాభాసము

ఔచిత్యప్రస్థానము : నిర్వచనం, భేదాలు – ఔచిత్యవిచార చర్చ – ఔచిత్యభేదాలు

అలంకారప్రస్థానం : ప్రవర్తకులు – అలంకార సంఖ్యాపరిగణనం – శబ్దార్థోభయాలంకారాలు

రీతి ప్రస్థానం : ప్రవర్తకులు – రీతుల నిర్వచనాలు – ప్రాశస్త్యం – రీతుల భేదాలు

ధ్వనిప్రస్థానం : ధ్వని – నిర్వచనం – శబ్దశక్తి – అభిధ – లక్షణ – వ్యంజన భేదాలు, ధ్వన్యభావవాదాలు – గుణీభూతవ్యంగ్యభేదాలు

వక్రోక్తి ప్రస్థానం : స్వరూపం – భేదాలు – వర్ణవిన్యాసవక్రత – పదపూర్వవక్రత – పదపరార్థవక్రత – ప్రబంధవక్రత – ప్రకరణ వక్రత

ఆధునిక విమర్శ – వికాసం

ఆధునిక విమర్శ పద్ధతులు : గ్రంథపరిష్కార – అలంకారిక – కావ్యకళాసౌందర్య – ప్రాగ్రూప – చారిత్రక – సాంఘిక – మనోవిశ్లేషణాత్మక – కవిజీవిత – మార్క్సిస్టు – ఆధునికోత్తర – ప్రక్రియ – తులనాత్మక – వలసవాదానంతర మొదలైన సాహిత్య విమర్శన పద్ధతులు

తెలుగులో వివిధ విమర్శన గ్రంథాలు – విమర్శకులు

యూనిట్ – 7 : సంస్కృత సాహిత్య పరిచయం

భారతీయ సాంస్కృతిక భాషగా సంస్కృతం – సంస్కృత భాషా ప్రాముఖ్యం

వైదిక వాఙ్మయం : చతుర్వేదాలు – వేదభాష్యకారులు – ఉపనిషత్తులు – వేదాంగాలు – వాటి పరిచయం

సంస్కృత వాఙ్మయ విభాగాలు : పురాణ – ఇతిహాస – కావ్య – లఘుకావ్య – నాటక – ఉపదేశాత్మక – శతక – గద్య – సూత్ర రచనలు

సంస్కృత వ్యాకరణ నిఘంటు కర్తలు : పాణిని, వరరుచి, పతంజలి, యాస్కులు మొదలైనవి

ప్రముఖ కవులు – కావ్యాలు : వాల్మీకి – వ్యాస – కాళిదాస – శ్రీహర్ష – మాఘ – భారవి – భర్తృహరి – కల్హణులు

ప్రముఖ నాటకాలు : ప్రతిమ – నాగానన్ద – అభిజ్ఞానశాకున్తల – ఉత్తరరామచరిత – మృచ్ఛకటిక – వేణీసంహార – ముద్రారాక్షసం మొదలైనవి

గద్యకావ్యాలు : కాదంబరి – దశకుమారచరిత్ర మొదలైనవి

కథాకావ్యాలు : పఞ్చతన్త్ర – విక్రమార్క చరిత్ర మొదలైనవి

యూనిట్ – 8 : తెలుగువారి చరిత్ర – సంస్కృతి

సమాజం – నాగరికత – సంస్కృతి నిర్వచనాలు

భారతీయ సంస్కృతి – తెలుగు సంస్కృతి;

ఆంధ్రదేశాన్ని పాలించిన ప్రముఖ రాజవంశాలు – సాంస్కృతిక వికాసానికి చేసిన సేవలు :శాతవాహనుల పూర్వయుగం – శాతవాహనులు – ఇక్ష్వాకులు – పల్లవులు – బృహత్పలాయనులు – అనందగోత్రికులు – శాలంకాయనులు – విష్ణుకుండినులు – రేనాటి చోళులు – చాళుక్యులు – తూర్పు చాళుక్యులు – వేంగి చాళుక్యులు – కాకతీయులు – మునుసూరి, రేచర్ల రాజులు – కొండవీటి రెడ్లు – విజయనగర రాజులు – అంధ్రనాయకరాజులు – గోల్కొండ కుతుబ్‌షాహీలు – ఆసఫ్‌జాహీలు – అంధ్రలో పాశ్చాత్యులు – నిజాం వ్యతిరేక పోరాటం – అంధ్రప్రదేశ్ అవతరణ – తెలంగాణ రాష్ట్ర ఆవిర్భావం

తెలుగు ప్రాంతాలలో వివిధ మతాలు – సిద్ధాంతాలు – ప్రభావాలు – వైదిక – జైనం – బౌద్ధం – శైవం – వైష్ణవం – ఇస్లామ్ – క్రైస్తవం, ఆర్యసమాజ – బ్రహ్మసమాజాలు

తెలుగు సంస్కృతి వికాసకులుగా సాధువులు, యోగులు

సంస్కృతీ పరిపోషకాలుగా నాట్యం, సంగీతం, శిల్పం, ఇతర లలితకళలు – సాంస్కృతిక కేంద్రాలుగా దేవాలయాలు

తెలుగువారి ఆట పాటలు – పండుగలు పబ్బాలు – వాటి సాంస్కృతిక విలువలు

తెలుగు సంస్కృతి – స్త్రీలు

తెలుగు సంస్కృతి – పాశ్చాత్యనాగరికత ప్రభావం

భారతీయ సాంస్కృతిక వికాసానికి, పునరుజ్జీవనానికి తెలుగువారు చేసిన సేవ

యూనిట్ – **9** : బాలవ్యాకరణం – ఛందస్సు – అలంకారాలు

తెలుగు వ్యాకరణ సంప్రదాయం : తెలుగులో ప్రముఖ వ్యాకర్తలు – వారి వ్యాకరణ గ్రంథాల విశిష్టత

వ్యాకరణ పారిభాషిక పదాలు

బాలవ్యాకరణం : సంజ్ఞ – సంధి – తత్సమ – అచ్చిక – కారక – సమాస – తద్ధిత – క్రియ – కృదంత – ప్రకీర్ణక పరిచ్ఛేదాలు

బాలవ్యాకరణంపై వచ్చిన వ్యాఖ్యానాలు – బాలవ్యాకరణానికి పరిపూరకంగా ప్రౌఢవ్యాకరణం

ఛందస్సు :

గురులఘువులు – అక్షర మాత్రాగణాలు – సూర్య, ఇంద్ర, చంద్ర గణాలు

యతి – యతి భేదాలు, ప్రాస – ప్రాస భేదాలు, పద్యాలు – వృత్తాలు, జాతులు – ఉపజాతులు

వృత్తాలు : సమ విషమ వృత్తాలు : ఉత్పలమాల, చంపకమాల, తరలము, శార్దూలము, మత్తేభము, మత్తకోకిల, పంచచామరము, మాలిని, స్రగ్ధర, మహాస్రగ్ధర, కవిరాజవిరాజితము, ఇంద్రవజ్ర, ఉపేంద్రవజ్ర, మందాక్రాంత, శిఖరిణి, అనుష్టుప్పు, భుజంగ ప్రయాతము, వసంత తిలకం, లయగ్రాహి, తోటకము, విద్యున్మాల, మంగలమహాశ్రీ

జాతులు : కందం, ద్విపద, తరువోజ, ఉత్సాహము, మధ్యాక్కర, మహాక్కర, రగడలు

ఉపజాతులు : తేటగీతి, అటవెలది, మంజరీద్విపద, సీసం, సీసభేదాలు

యతులు : స్వరయతి, స్వర ప్రధాన యతి, ఐవళి, లుప్త విసర్గ స్వరయతి, ఐత్వ సామ్యయతి, గూఢ స్వరయతి, వృద్ధియతి, వర్ణయతి, బిందుయతి, 'ము' విభక్తియతి, ప్లుతయతి, అఖండయతి, నామాఖండ యతి, ప్లుతయుగ యతి, కాకుస్వరయతి, వరరరూప యతి, ప్రాదియతి, నిత్యసమానయతి, దేశ్యనిత్యసమానయతి, ప్రాసయతి, రాగమయతి.

ప్రాసలు : పూర్ణబిందు ప్రాసము, అర్ధబిందు ప్రాసము, సంయుక్తాక్షర ప్రాసము, సమప్రాసము, ఖండాఖండ ప్రాసము, అనునాసిక ప్రాసము, సుకరప్రాసము, దుష్కర ప్రాసము, ద్విప్రాసము, త్రిప్రాసము, చతుష్ప్రాసము, అనుప్రాసము, ఐప్రాసము, లఘుయకార ప్రాసము, అభేద ప్రాసము, శప్రాసము, ప్రాస వైరము, సంధిగత ప్రాసము, వర్గప్రాసము లేక స్వవర్గజ ప్రాసము, అంత్యప్రాసము

అలంకారాలు :

అలంకారము – నిర్వచనము – భావ వ్యక్తీకరణలో అలంకారాల పాత్ర

అలంకారము – భావచిత్రము – రసస్ఫూర్తికి చేసే దోహదం

శబ్దాలంకారాలు : వృత్త్యనుప్రాసము – ఛేకానుప్రాసము – లాటానుప్రాసము – యమకము – ముక్తపదగ్రస్తము – సింహావలోకన ముక్తపదగ్రస్తము – అంత్యానుప్రాసము

అర్థాలంకారాలు : ఉపమాలంకారం – రూపకం – ఉత్ప్రేక్ష – ఉల్లేఖం – అపహ్నుతి – అతిశయోక్తి – తుల్యయోగిత – సమాసోక్తి – అప్రస్తుత ప్రశంస – దీపకం – దృష్టాంతం – నిదర్శనం – వ్యతిరేకం – అనన్వయం – స్మరణ – భ్రాంతి – సందేహం – వ్యాజస్తుతి – వ్యాజనింద – అర్థాంతరన్యాసం – శ్లేష – పరికరాంకురం – సహోక్తి – వినోక్తి – ప్రతీపాలంకారాలు.

యూనిట్ – **10** : అనువాదం – పత్రిక, ప్రసారమాధ్యమాలు – రచన

అనువాదం – స్వరూప స్వభావాలు – నిర్వచనం – మూలభాష, లక్ష్యభాష – సమానార్థకం – లిప్యంతరీకరణం – ప్రతిలేఖనం – అనువాదకుని లక్షణాలు

అనువాదం – రకాలు : మూలవిధేయానువాదం – స్వేచ్ఛానువాదం – సాహిత్యానువాదం – సుడికారపు అనువాదం – ప్రత్యేకాభిప్రాయాల అనువాదం – యంత్రానువాదం – అనువర్తనం

అనువాద సమస్యలు : భౌగోళిక – భాష – సాంస్కృతిక సమస్యలు

తెలుగు ప్రాచీన కవుల అనువాద పద్ధతులు

నైడా – క్యాట్‌ఫర్డ్ మొదలయిన వారి అనువాదసూత్ర వివేచన

అనువాదం – ప్రయోజనం, వివిధ రంగాలలో అనువాదం

అనువాదం – వివిధప్రక్రియలు : పద్యానువాదం – గద్యానువాదం – పరిపాలన న్యాయ సంబంధమైన అనువాదాలు – శాస్త్రానువాదం, కథ, నవల, నాటకం మొదలైన ప్రక్రియల అనువాదాలు

పత్రికానువాదం – ప్రసార మాధ్యమాలకు చేసే అనువాదాలు – ప్రకటనల అనువాదాలు

పత్రికలు – ప్రసారమాధ్యమాలు – రచన :

సమాచార సేకరణ, చేరవేత పద్ధతులు – పత్రిక – పాత్రికేయత్వం – పాత్రికేయుడు

వార్త – నిర్వచనం – లక్షణాలు – వార్తాసేకరణ విధానాలు, వార్తా రచనలో పాటించవలసిన లక్షణాలు

విలేఖనం (రిపోర్టింగ్) – విలేఖరి (రిపోర్టర్) – లక్షణాలు – విధులు – రిపోర్టింగ్ పద్ధతులు – విలేఖరులలోని రకాలు

సంపాదకుడు – ఉపసంపాదకుడు – లక్షణాలు – విధులు

తెలుగు పత్రికల ఆవిర్భావ వికాసాలు – సుప్రసిద్ధ తెలుగు పత్రికలు – పత్రికా సంపాదకులు

ప్రసార సాధనాలుగా ఆకాశవాణి – దూరదర్శన్‌లు – వివిధ ఛానళ్ళు

ప్రపంచీకరణ నేపథ్యంలో ప్రింట్ మీడియా అస్తిత్వం – ఎలక్ట్రానిక్ మీడియా ప్రభావం

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Code No: 45

SUBJECT : TOURISM AND TRAVEL MANAGEMENT
SYLLABUS

Unit – 1:

Tourism Principles and Practices

Tourist / visitor / traveler / excursionist – Definitions and Differences, Early and Medieval Period of Travel, Renaissance and its Effects on Tourism, Birth of Mass Tourism, Grand Tour 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, Archaeological Survey of India, Ministry of Tourism, Culture, Railways, Civil Aviation of Government of India.

Earth's movement; Latitude, Longitude; Areas, Sub Areas and Sub Regions as per International Air Transport Organization (IATA), Traffic conference areas and Sub areas–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

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 places related to India's freedom struggle.

Unit – 2:

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, 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, Arakku, Darjeeling, Gangtok, Shillong, etc., Tourist potentialof 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.

Tourism in Tamil Nadu

TTDC- Enchanting Tamil Nadu–UNESCO World Heritage sites in Tamil Nadu –Archaeological Sites in Tamil Nadu: Adichanallur, Keezhadi, Arikamedu – Medical Tourism in Tamil Nadu: Chennai – Health capital of India – Art and architecture in Tamil Nadu – Naturewatch Eco tours: Courtallam, Valparai, Ooty, Yercaud, Kodaikanal, Mudumalai, Mundandurai,Pulicat – Souvenirs of Tamil Nadu – Handicrafts-Woodcraft, Musical Instruments, Jewellery, Tanjore paintings, silk and sungudi sarees, palmyra palms.

Unit-3:

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–IRCTC, Types of tours available in Indian Rail, Indrail pass, special schemes and packages available, palace on wheels, royal orient, fairy queen and toy trains. Travel circuits in India 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-4:

Travel Agency and Tour Operation Business

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, Accountabilityof lost baggage, Dangerous goods, Cargo rates ad valuation charges Automation and airport procedures, Tour Brochures–element and importance of brochure.

Unit – 5 :

Hospitality Management

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, ethicaland 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 hotelguests. Factors affecting the price of accommodation, important functions of Housekeeping Management, liaison with other departments, room supplies, Bed making and related types ofservice; 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 – 6 :

Tourism Marketing

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 imageformation process; unstructured image -Product development and packaging – Institutional Support & Public Private Partnership in Destination Marketing.

Unit – 7 :

Tourism planning

Role of Government 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, MonetaryPolicy–Repo Rate, Reverse Repo Rate, Cash Reserve Ratio(CRR).

Unit – 8:

Statistics and Tourism Research Methodology

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 – 9 :

Organisational Behaviour

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.

Unit – 10 :

Accounting and Financial Management

Basic Accounting Records and Books of Accounts, Double Entry System, Journal, Ledger, Trial Balance, Cash Book, Depreciation Accounting, Final Accounts with Adjustments. HotelAccounting, 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 investmentsin hotel, aviation & Tourism related sectors, Role of TFCI and other financial organizations. Elements of Contract Act – Breach of Contract – Performance of Contract – Indemnity & Guarantee – Bailment–Consumer Protection Act.

Code : 46

SUBJECT : URDU
SYLLABUS

UNIT - 1

تاریخ زبان اردو

۱۔ ہند آریائی کی مختصر تاریخ

۲۔ پراکرت، اپ بھرنش

۳۔ کھڑی بولی کے اوصاف

۴۔ اردو کی ابتدا کے بارے میں مختلف نظریات

(محمد حسین آزاد، محمود شیرانی، نصیر الدین ہاشمی، مسعود حسین خاں، سید سلیمان ندوی، شوکت سبزواری)

۵۔ اردو کا ابتدائی زمانہ

۶۔ اردو ساخت کے بنیادی عناصر

۷۔ دکنی اردو کی لسانی خصوصیات

(سب رس، قطب مشتری، قلی قطب شاہ، ولی، سراج اورنگ آبادی)

۸۔ اردو اور اس کی اہم بولیاں (Dialects)

۹۔ اردو کی لسانی انفرادیت

۱۰۔ اردو صوتیات / فونیمیات

۱۱۔ اردو مارفیمیات

۱۲۔ اردو نحویات

۱۳۔ اردو معنیات

☆☆☆

UNIT - 2

اردو کی شعری اصناف

۱۔ قصیدہ:

قصیدہ کا فن اور ارتقا

اردو کے اہم قصیدہ گو اور ان کے قصائد

مرزا محمد رفیع سوداؔ : ہو اجب کفر ثابت ہے وہ تمغائے مسلمانی، تضحیک روزگار

شیخ محمد ابراہیم ذوقؔ: زہے نشاط اگر کیجیے اسے تحریر، ہیں مری آنکھ میں اشکوں کے تماشا گوہر

۲۔ مثنوی:

مثنوی کا فن اور ارتقا

اردو کے اہم مثنوی نگار اور ان کی مثنویاں

نظامی بیدری: کدم راؤ پدم راؤ

ملا وجہی : قطب مشتری

ابن نشاطی: پھول بن

افضل جھنجھانوی: بکٹ کہانی

میر حسن: سحر البیان

دیا شنکر نسیم: گلزار نسیم

۳۔ مرثیہ:

مرثیے کا فن اور اس کا ارتقا

اردو کے اہم مرثیہ نگار اور ان کے مرثیے

مرزا ببر علی انیس : نمک خوان تکلم ہے فصاحت میری

مرزا سلامت علی دبیر: ضیغم ڈکارتا ہوا نکلا کچھار سے

مرزا غالب : مرثیہ عارف

جمیل مظہری : جنبش سے میرے خامۂ افسوں طراز کی

UNIT - 3

اردو غزل

۱۔ غزل کا فن اور ارتقا

۲۔ اردو کے اہم غزل گو شعرا اور ان کی شاعری

ولی: ''کلیات ولی'' (ردیف الف، ب اوری/ یے کی ابتدائی پانچ پانچ غزلیں)

میر: ''انتخاب میر'' از مولوی عبدالحق (ابتدائی بیس غزلیں)

غالب: ''دیوان غالب''، مطبوعہ غالب انسٹی ٹیوٹ (ردیف الف، ر، ن اوری/ یے کی ابتدائی پانچ پانچ غزلیں)

مومن: ''دیوان مومن'' (ردیف الف، اور یے کی ابتدائی پانچ پانچ غزلیں)

شاد عظیم آبادی: ''کلیات شاد''، بہار اردو اکادمی، پٹنہ (ردیف الف، ب اوری/ یے کی ابتدائی پانچ پانچ غزلیں)

حسرت موہانی: ''کلیات حسرت'' (ردیف الف، م اوری/ یے کی ابتدائی پانچ پانچ غزلیں)

فانی بدایونی: ''کلام فانی''، ناشر، مشورہ بک ڈپو، گاندھی نگر، دہلی (ابتدائی دس غزلیں)

جگر مرادآبادی: ''آتش گل'' کی ابتدائی دس غزلیں

اصغر گونڈوی: ''نشاط روح'' کی ابتدائی دس غزلیں

یگانہ چنگیزی: ''آیات وجدانی'' کی ابتدائی دس غزلیں

فراق گورکھپوری: ''گل نغمہ'' کی ابتدائی دس غزلیں

مجروح سلطان پوری: ''غزل'' کی ابتدائی پانچ غزلیں

کلیم عاجز: ''وہ جو شاعری کا سبب ہوا'' کی ابتدائی پانچ غزلیں

شہریار: ''اسم اعظم'' کی ابتدائی پانچ غزلیں

عرفان صدیقی: ''عشق نامہ'' کی ابتدائی پانچ غزلیں

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UNIT - 4

اردو نظم

۱۔ نظم کی صنفی شناخت

۲۔ اردو میں نظم نگاری کا آغاز وارتقا

۳۔ اردو کے اہم نظم نگار اور ان کی نظمیں:

نظیر اکبر آبادی:	مفلسی، آدمی نامہ، بنجارہ نامہ
محمد حسین آزاد:	شب قدر، صبح امید
الطاف حسین حالی:	نشاط امید، برکھارت، مناجات بیوہ
اسمٰعیل میرٹھی:	خدا کی صنعت، آثار سلف
اکبر الہ آبادی:	فرضی لطیفہ، برق کلیسا، دربار دہلی
برج نرائن چکبست:	رامائن کا آخری سین، خاک ہند، حب وطن
علامہ اقبال:	لالہ صحرائی، شعاع امید، ساقی نامہ، ذوق وشوق، لینن خدا کے حضور میں
جوش ملیح آبادی:	کسان، جنگل کی شہزادی، شکست زنداں کا خواب
میراجی:	کلرک کا نغمہ محبت، جاتری، سمندر کا بلاوا
فیض احمد فیض:	تنہائی، صبح آزادی، مجھ سے پہلی سی محبت ۔۔۔۔۔۔
اختر الایمان:	ایک لڑکا، پگ ڈنڈی، بازآمد
مخدوم محی الدین:	چاند تاروں کا بن، حویلی، انقلاب
ن م راشد:	حسن کوزہ گر (مکمل)
ساحر لدھیانوی:	چکلے، تاج محل، گریز
شفیق فاطمہ شعریٰ:	بازیابی، بازگشت

☆☆☆

UNIT - 5

اردو داستان اور ڈراما

۱۔ داستان کا فن اور روایت

۲۔ اردو کے اہم داستان گو اور داستانیں:

ملا وجہی :	سب رس
فضل علی خاں فضلی:	کربل کتھا
انشا اللہ خاں انشا:	رانی کیتکی کی کہانی
میر امن :	باغ و بہار
رجب علی بیگ سرور:	فسانہ عجائب
میر محمد تقی خیال:	بوستان خیال

۳۔ ڈرامے کا فن اور اس کا آغاز و ارتقا

۴۔ اردو کے اہم ڈراما نگار اور ان کے ڈرامے

امانت لکھنوی:	اندر سبھا
آغا حشر کاشمیری:	یہودی کی لڑکی
امتیاز علی تاج:	انار کلی
حبیب تنویر:	آگرہ بازار
محمد حسن:	ضحاک

☆☆☆

UNIT - 6

ناول اور افسانہ

۱۔ ناول کا فن اور اس کا آغاز وارتقا

۲۔ اردو کے اہم ناول نگار اور ان کے ناول:

پنڈت رتن ناتھ سرشار:	فسانہ آزاد
ڈپٹی نذیر احمد:	توبۃ النصوح
عبدالحلیم شرر:	فردوس بریں
مرزا ہادی رسوا:	امراؤ جان ادا
پریم چند:	گئودان
عصمت چغتائی:	ٹیڑھی لکیر
راجندر سنگھ بیدی:	ایک چادر میلی سی
قرۃ العین حیدر:	آگ کا دریا
شوکت صدیقی:	خدا کی بستی
عبداللہ حسین:	اداس نسلیں
انتظار حسین:	بستی
الیاس احمد گدی:	فائر ایریا

۳۔ افسانے کا فن اور اس کا آغاز وارتقا

۴۔ اردو کے اہم افسانہ نگار اور ان کے افسانے

پریم چند:	واردات (افسانوی مجموعہ)
سعادت حسن منٹو:	ٹھنڈا گوشت (افسانوی مجموعہ)
کرشن چندر:	ہم وحشی ہیں (افسانوی مجموعہ)
راجندر سنگھ بیدی:	اپنے دکھ مجھے دے دو (افسانوی مجموعہ)

عصمت چغتائی:	چوٹیں (افسانوی مجموعہ)
خواجہ احمد عباس:	ایک لڑکی (افسانوی مجموعہ)
قرۃ العین حیدر:	روشنی کی رفتار (افسانوی مجموعہ)
سہیل عظیم آبادی:	الاؤ (افسانوی مجموعہ)
جیلانی بانو:	راستہ بند ہے (افسانوی مجموعہ)
سریندر پرکاش:	بجوکا (افسانوی مجموعہ)
غیاث احمد گدی:	بابا لوگ (افسانوی مجموعہ)
اقبال مجید:	تماشا گھر (افسانوی مجموعہ)

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UNIT - 7

تنقید و تحقیق

۱۔ تنقید کی تعریف اور اس کی اہمیت

۲۔ تذکروں کی تنقیدی اہمیت

۳۔ مشرقی تصور تنقید:

عربی شعریات: سلام العجمی، ابن قتیبہ، قدامہ ابن جعفر، ابن رشیق، ابن خلدون، عبدالقاہر جرجانی

فارسی شعریات: امیر کیکاؤس ابن اسکندر ابن قابوس، رشید الدین وطواط، شمس قیس رازی، عروضی سمرقندی

سنسکرت شعریات: بھرت منی، ابھینو گپت، آنندوردھن، اچاریہ شنلک

۴۔ مغربی تصور نقد:

افلاطون، ارسطو، لان جائنس، آئی اے رچرڈس، میتھیو آرنلڈ، ٹی ایس ایلیٹ

۵۔ دبستان تنقید:

تاثراتی، مارکسی، جمالیاتی، نفسیاتی، سائنٹفک، متنی، ہیئتی، اسلوبیاتی

۶۔ اردو کے اہم ناقدین:

محمد حسین آزاد، حالی، امداد امام اثر، شبلی، احتشام حسین، کلیم الدین احمد، آل احمد سرور، محمد حسن، شمس الرحمن فاروقی، گوپی چند نارنگ، شکیل الرحمن، وزیر آغا، مجنوں گورکھپوری، شبیہ الحسن

۷۔ تحقیق کی اہمیت

۸۔ تحقیق اور تنقید کا باہمی رشتہ

۹۔ اصول تحقیق اور طریقہ کار

۱۰۔ اردو کے اہم محققین:

محی الدین قادری زور، قاضی عبدالودود، مولوی عبدالحق، امتیاز علی عرشی، رشید حسن خاں، گیان چند جین، جمیل جالبی

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UNIT - 8

غیر افسانوی نثر

۱۔ سوانح اور خودنوشت سوانح نگاری کا فن اور اس کا آغاز وارتقا

۲۔ اردو کے اہم سوانح نگار اور ان کے سوانح:

الطاف حسین حالی: حیات جاوید

علامہ شبلی نعمانی: الفاروق

۳۔ اردو کے اہم خودنوشت سوانح نگار:

اختر الایمان: اس آباد خرابے میں

آل احمد سرور: خواب باقی ہیں

مسعود حسین خاں: ورود مسعود

۴۔ اردو میں مکتوب نگاری کا فن اور اس کا آغاز وارتقا

۵۔ اردو کے اہم مکتوب نگار:

مرزا غالب: اردوئے معلی

مولانا ابوالکلام آزاد غبار خاطر

۶۔ اردو میں مضمون نگاری: آغاز وارتقا

۷۔ اردو کے اہم مضمون نگار: سرسید احمد خاں: مضامین سرسید

۸۔ اردو میں انشائیہ نگاری کا فن اور اس کا آغاز وارتقا

۹۔ اردو کے اہم انشائیہ نگار اور ان کے انشائیے:

سجاد حیدر یلدرم: مجھے میرے دوستوں سے بچاؤ

کنہیالال کپور: غالب جدید شعرا کی محفل میں، چینی شاعر

رشید احمد صدیقی: چارپائی، وکیل صاحب

پطرس بخاری: لاہور کا جغرافیہ، سائکل کی سواری

احمد جمال پاشا: کپور کا فن، شامت اعمال

مشتاق احمد یوسفی: جنون لطیفہ، گھر میں آنا مرغیوں کا

۱۰۔ اردو میں خاکہ نگاری کا فن اور اس کا آغاز وارتقا

۱۱۔ اردو کے اہم خاکہ نگار اور ان کے خاکے

مولوی عبدالحق: نام دیو مالی

رشید احمد صدیقی: کندن

فرحت اللہ بیگ: نذیر احمد کی کہانی: کچھ ان کی کچھ میری زبانی

۱۲۔ اردو میں سفرنامہ کا آغاز وارتقا

۱۳۔ اردو کے اہم سفرنامہ نگار اور ان کے سفرنامے:

سرسید احمد خاں: مسافران لندن

شبلی نعمانی: سفرنامہ روم ومصر وشام

ابن انشائ: ابن بطوطہ کے تعاقب میں

مجتبیٰ حسین: جاپان چلو جاپان چلو

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UNIT - 9

اردو کے ادبی دبستان، ادارے اور تحریکات ورجحانات

۱۔ دبستان دہلی

۲۔ دبستان لکھنو

۳۔ فورٹ ولیم کالج

۴۔ دلی کالج

۵۔ دارالترجمہ عثمانیہ

۶۔ اردو میں اصلاح زبان کی روایت

۷۔ اردو میں ایہام گوئی

۸۔ اردو ادب میں رومانی تحریک

۹۔ علی گڑھ تحریک

۱۰۔ ترقی پسند ادبی تحریک

۱۱۔ حلقہ ارباب ذوق

۱۲۔ جدیدیت

۱۳۔ مابعد جدیدیت

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UNIT - 10

اردو کی دیگر شعری اور نثری اصناف اور ہیئتیں

رباعی، قطعہ، شہرآشوب، ریختی، واسوخت، تضمین، مستزاد، مثلث، مربع مخمس،
مسدس، مثمط، مثمن، گیت، چہاربیت، ہائکو، ترائلے، ثلاثی
تبصرہ، رپورتاژ، پیروڈی

ترجمہ اور ذرائع ابلاغ:

ترجمہ: فن اور روایت
ریڈیو فیچر، اداریہ نگاری، کالم نگاری، منظرنامہ (اسکرپٹ رائٹنگ)، کمنٹری

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Code No:47

SUBJECT : VISUAL COMMUNICATION
SYLLABUS

Unit–1 :

Communication – Definition, Functions, Elements, Models, Types; Human Communication–Verbal and Non-verbal Communication; Barriers of Communication; Visual Communication, Types, Elements, Perception, Illusion, Gestalt's Theory, Gestalt's Principles.

Unit–2 :

Visual Analysis – Semiotics – Saussure, Peirce, Barthes; Psychoanalysis–Freud, Lacan, Jung; Feminism – Laura Mulvey; Marxism – Marx, Gramsci, Althusser; Post-modernism – Derrida, Baudrillard.

Unit–3 :

Drawing – Principal Elements; RGB, CMYK; Principles of Design and Composition; Iconology, Formalism; Painting Movements; Theories of Rasa; Indian Schools of Art; Design Software – Flash, Dreamweaver, Photoshop, Coreldraw; 2D Animation–Drawing and Painting Tools, Manipulating Objects.

Unit–4 :

3D Animation – Standard and Extended Primitives, Material Editor, Modifier, Modeling, Special Effect; Matte Extraction, Colour Correction, Rendering, Rotoscopy; VFX Basics, Editing – Types, Using AVID, FCP.

Unit–5 :

Photography – Types of Camera, Parts and Functions of Camera, Depth of Field, Aperture, Exposure, Focus, Rule of Third, Golden Mean; Videography – Types of Camera, Camera Shot, Angle, Movement; While Balance, Colour Temperature; Types of Lens, Aspect Ratio, Framing.

Unit–6 :

Editing Techniques – Continuity Editing, Montage, Rules of Editing; Radio and Television Production – Formats, Genres, Three Stages of Production; Podcasting; Scriptwriting – Story, Plot, Treatment, Three-Act Structure, Freytag's Pyramid, Basic Types of Stories.

Unit–7 :

Audiography – Nature of Sound, Frequency, Wavelength, Amplitude; Acoustic Materials, Echo, Noise Control; Types of Mics, Dubbing, Live Recording, Equalizer, Protocol; Advertising – Definition, Strategies, Unique Selling Proposition, Promotional Mix, Campaign.

Unit–8 :

Copywriting, Event Management, Public Relations; Media Laws and Ethics – Copyrights, Privacy, Slander; Right to Information Act, Prasar Bharati Act, Information Technology Act, Intellectual Property Rights; Censorship Laws, Cyber Laws.

Unit–9 :

Film Studies – History of Early Cinema – Lumiere Brothers, Edqin S Porter, George Melies, D W Griffith; German Expressionism, French Impressionism, Surrealism, Soviet Montage Cinema, Hollywood Studios, Italian Neo-realism, French New Wave.

Unit–10 :

Indian Cinema – Early Cinema, Mythologicals, Socials, New Wave, Hindi Cinema; Tamil Cinema – Major Directors, Prominent Films; Documentary; Film Techniques, Genres, Stylistics; Deep Focus Photography, Long Take, One-point Perspective.

Code No : 48

SUBJECT : WILDLIFE BIOLOGY
SYLLABUS

Unit 1

Animal diversity and taxonomy

Systems of classification - concepts of species and hierarchical taxa, biological nomenclature - levels of cellular organization - symmetry. Concept of five kingdom classification. Salient features of various invertebrate& vertebrate phylum and classification up to class with examples – invertebrate larval forms. Diversity of corals - types and formation of coral reefs. Parasitic adaptation in helminths. Social & beneficial insects - Indian butterflies and moths. Economic importance of molluscs. Affinities of hemichordates – evolution of chordates - retrogressive metamorphosis in Ascidia- evolution of aortic arches.

Unit 2

Ichthyology and Herpetology

Characteristics and classification of fishes, amphibians and reptiles up to orders with examples. Accessory respiratory organs – air breathing fishes - types of fins and function - migration of fishes. Parental care in fishes, amphibians and reptiles –economic importance of amphibians and reptiles – endemic amphibians and reptiles of Western Ghats. Poisonous and non-poisonous snakes. Skull types in reptiles. Threats and conservation of Chelonia. Crocodiles of India. Adaptive features of Chameleon.

Unit 3

Ornithology and Mammalogy

Characteristics and classification of birds and mammals up to orders with examples. Flight adaptations, economic importance, feet and beak modifications, migration and feather types in birds. Flightless birds. Avian hazards in airports. Endemic birds and mammals of Western Ghats – Endangered mammals of India. Dentition, adaptive radiation, threats and economic importance of mammals. Old world and new world monkeys. Adaptations in aquatic mammals. Evolution of elephants.

Unit 4

Ecology & Conservation

Abiotic and biotic factors – biogeochemical cycles. Food chain, food web – trophic levels - energy low-pyramids. Ecosystem types (Indian) & significance. Concepts and types of habitats and niche – niche width and overlap – resource partitioning. Species interactions and animal relationships. Meta populations. Community structure. Exploitation of Natural resources - Pollution and after effects. Habitat degradation – Deforestation – Human animal conflicts & mitigation. Concepts and strategies of *in situ* and *ex situ* conservation – project tiger - protected areas – Tiger Reserves & National Parks (emphasis to south India) - corridors – community reserves – Joint Forest Management. Biosphere reserves in India.

Unit 5

Animal Behaviour

Approaches and methods in study of behaviour. 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 behaviour. Social communication. Social dominance. Use of space and territoriality. Mating systems, Breeding behaviour. Parental investment and Reproductive success. Aggressive behaviour. Habitat selection and optimality in foraging. Domestication and behavioural changes.

Unit 6

Geo informatics & Data visualisation

Latitudes & longitudes - Topography maps – Contour lines – Colours & symbols – Scale – types & measuring distance. Satellite images and uses in wildlife. GPS and applications. Brief outlines to Arc View – Mapinfo & QGIS. Spatial Data generation, Concept of Database and Metadata, Spatial Modelling and Data Visualization. LULC maps - Usage of layers in mapmaking. Habitat suitability modelling. Usage of bioclimatic variables in habitat prediction. Usage of R Packages in Wildlife Sciences.

Unit 7

Conservation genetics and evolution

Structure of animal cell. Organisation and fine structure of genes and chromosome – extrachromosomal DNA – Cell division and cell cycle. DNA replication. RNA & protein synthesis and processing. Genetic code. Gene regulation. Structure of mitochondrial DNA and barcoding. Use of microsatellites in population genetics – allelic frequency – Hardy Weinberg equilibrium - linkage disequilibrium – genetic drift. Classical and modern evolutionary thoughts. Mutation and evolution. Modern concepts of Natural selection. Neutral evolution, molecular divergence and molecular clocks. Molecular tools in phylogeny.

Unit 8

Biostatistics & Data Science

Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and Normal). Sampling methods. Difference between parametric and non-parametric statistics. Confidence Interval. Errors. Levels of significance. Regression and Correlation. t-test. Analysis of variance. Chi square test. Multivariate analysis. Generalised linear models. Boot strapping and Jacknife test. AIC values and importance. Presence / Absence analysis in Wildlife – Occupancy estimation.

Unit 9

Forestry and Wildlife management

Factors influencing vegetation – types of forests -Regeneration of forests – Methods of propagation – Silviculture management in India. Forest Mensuration - measuring diameter, girth, height and volume of trees. Methods of forest survey. Urban forestry - Watershed management - Harvesting practices – Timber identification. Basic instruments in wildlife studies. Sign survey and significance. Prey species density estimation. Wildlife census methods. Capture - recapture method in population estimation. Tiger monitoring techniques.

Unit 10

Wildlife laws and forensics

History of wildlife laws in India - Wildlife Protection Act and its amendments - Declarations & regulations of Sanctuaries, National parks & protected areas – Central Zoo Authority & recognition of Zoos – Prevention of wildlife trade and Schedule I to VI species. IUCN red list & CITES. Biological Diversity Act, 2002 & Biological Diversity Rules, 2004. Significance of Wildlife forensics – species identification of seized products (Skin, tissue, bones and ivory) based on morphology, trichology and molecular methods. Uses of PCR, RT-PCR, GC-MS, FTIR and radio isotopes in wildlife forensics.

Code No: 49

SUBJECT : ZOOLOGY
SYLLABUS

Unit 1.

ANIMAL DIVERSITY AND PHYLOGENY

- Concepts of species and hierarchical taxa, biological nomenclature.
- Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs and systems. Organization of Coelom, Symmetry and Metamerism.
- Protozoa: Human Parasitic Protozoana – Entamoeba histolytica and Plasmodium vivax, Canal systems in Porifera, Polymorphism and Metagenesis in Coelentrates, Types of Corals and Coral reefs, Human Parasitic Helmith worms – Liverfluke and Ascatis, Adaptive Radiation in Polychaetes.
- Economic importance of Insects, Torsion in Gastropods, Invertebrate larval forms and their evolutionary significance. Structure, affinities and life history of Minor Phyla – Ctenophora, Rotifera, Chaetognatha, Onychophora, Siphunculida, Entoprocta, Ectoprocta and Phoronida.
- Origin and outline classification of Chordata: Phylogeny, evolutionary significance and interrelationships of Hemichordata, Urochordata, and Cephalochordata and their relation with other deuterosomes.
- Origin, Evolution and general characters of Agnatha (Ostracoderms and Cyclostomes). The early Gnathostomes (Placoderms). General characters and classification of fishes. Adaptive Radiation in Bony fishes. Origin, Evolution and adaptive radiation of Amphibia.
- Origin and evolution of Reptiles, Skulls of reptiles and its importance in biosystematics. Outline classification of Reptiles, Mesozoic world of Reptiles and their extinction. Poisonous and Non-poisonous snakes.
- Origin and evolution of birds. Origin of flight and flight adaptations in birds. Origin of mammals. Primitive mammals – Prototheria, Metatheria and Eutherian Mammals. Aquatic adaptation in Aves and Mammals.
- Structure and functions of integument and its derivatives (glands, scales, feathers and hairs). Comparative account of jaw suspension, girdles and limbs. Comparative study of Heart in Vertebrates.

Unit 2.

CELLULAR ORGANIZATION

- Membrane structure and function: Structure of cell membrane and models, membrane transport- diffusion, osmosis, active transport, membrane pumps, ion channels, mechanism of sorting and regulation of intracellular transport, electrical properties of membranes. Cell membrane synthesis.
- Structural organization and function of intracellular organelles: Nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, ribosomes, peroxisomes, structure and functions of cytoskeleton and its role in motility.
- Organization of genes and chromosomes: Conformation of nucleic acids (helix (A, B, Z), tRNA, mRNA, rRNA, micro-RNA). Operon, unique and repetitive DNA, structure of chromatin and chromosomes, heterochromatin, euchromatin and Giant chromosomes.
- Cell division and cell cycle, regulation and control of cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, Significances of Mitosis and Meiosis, Mitotic Apparatus.
- 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, homologous and site-specific recombination.
- 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, and polyadenylation, 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.

- Control of gene expression at transcription and translation level: Regulating the expression of prokaryotic and eukaryotic genes – *lac* and *trp*operon, role of chromatin in gene expression and gene silencing.
- Cellular communication: General principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix and integrins.
- Cell signaling Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways.
- Cancer: Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, therapeutic interventions of uncontrolled cell growth.
- Programmed cell death (Apoptosis), aging and senescence.

Unit 3.

DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

- Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals, embryo sac development and zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers and embryogenesis.
- Morphogenesis and organogenesis: Ecodermal, Mesodermal and Endodermal derivatives, Organogenesis – vulva formation in *Caenorhabditis elegans*, eye lens induction, limb development and regeneration in vertebrates, Development of Amphibians, Aves and Mammals. Post embryonic development- larval formation, metamorphosis.
- Human Reproduction: Reproductive organs, Menstrual cycle, Human Fertilisation process, infertility and assisted reproductive technology, Birth control methods. Twins, Human Syndromes
- Immunology: Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, General properties, structure and function of antibody molecules, generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibody interactions. Primary and Secondary Lymphoid organs: 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, Toll-like receptors, cell-mediated effector functions, inflammation, hypersensitivity and autoimmunity, acquired immune-deficiencies, vaccines and immunization schedule.

Unit 4.

ANIMAL PHYSIOLOGY

- Digestive system: Nutrients – Vitamins and Minerals. Balance Diet, BMR, Digestion and absorption.
- Blood and circulation: Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity and haemostasis.
- Cardiovascular System: Structure of Human Heart, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation. Blood vessels – Arteries, Veins and Lymphatic vessels.
- Respiratory system: Respiratory Structure – Insects, Fish and Human beings, respiratory pigments, Comparison of respiration in different species, transport of gases, exchange of gases, neural and chemical regulation of respiration.
- Nervous system: Central Nervous system, Peripheral and Autonomic nervous system. Structure of Neuron, types, transmission of nerve impulses, action potential, Synapse, neurotransmitters, Neuroanatomy of the brain and spinal cord and Reflex action.
- Receptors: Photoreceptors, mechanoreceptors and Gustatoreceptors. Echolocation, Bioluminescence, Colouration, and colour change. Lateral line system in fishes.
- Excretory system: Ammonotelism Uricotelism and Ureotelism process, structure of kidney, and Nephron, Mechanism of urine formation, Counter-current principle, micturition, regulation of water balance, electrolyte balance, acid-base balance.

- Thermoregulation and Stress Adaptations: Thermoregulation in homeotherms, poikilotherms – acclimation and acclimatization, physical, chemical and neural regulation of body temperature. Adaptation to high altitudes, Deep Sea adaptation.
- Endocrinology: Endocrine glands, basic mechanism of hormone action, hormones and diseases, neuroendocrine regulation. Invertebrate hormones.

Unit 5.

INHERITANCE BIOLOGY

- Mendelian principles: Dominance, segregation, independent assortment.
- Concept of gene: Allele, multiple alleles, pseudoallele, complementation tests.
- 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.
- Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids.
- Cytoplasmic Inheritance: Inheritance of Mitochondrial, genes, maternal inheritance, shell coiling in *Limnaea*. Extra nuclear inheritance by endosymbionts- Kappa particles in *Paramecium.*
- Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sexduction, mapping genes by interrupted mating.
- Human genetics: Pedigree analysis, LOD score for linkage testing, karyotypes, genetic disorders.
- Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.
- Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.
- Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.
- Recombination: Homologous and non-homologous recombination including transposition.

Unit 6.

ECOLOGICAL PRINCIPLES

- The Environment: Physical environment, biotic environment, biotic and abiotic interactions. Concept of habitat and niche, niche width and overlap, fundamental and realized niche.
- 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.
- Species Interactions: Types of interactions, interspecific and Intra specific, Symbiosis, Mutualism, Parasitism, Commensalism, competition, herbivory, carnivory, pollination, symbiosis.
- Community Ecology: Nature of communities, community structure and attributes, levels of species diversity and its measurement, edge effect and ecotone.
- Ecological Succession: Types, mechanisms, changes involved in succession, concept of climax.
- Ecosystem Ecology: Ecosystem structure, ecosystem function, 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).
- Biodiversity: Definition, types, Hotspots, Flagship species, keystone species, Biodiversity concerns.
- Biodiversity conservation: *In situ* and *ex situ* conservation, concept of protected areas, National parks, sanctuaries, Red data book, Gene bank, threatened and endangered species. Salient features of Wildlife Protection Act, 1972 and Biological Diversity Act, 2002. Threats to survival and conservation strategies for elephant, tiger, Olive Ridley sea turtle, White rumped Vulture and Gangetic Dolphin.

- Environmental issues: Urbanisation, deforestation, habitat loss, remote sensing and GIS in conservation.
- E–wastes and its erradication.
- Environmental Summits: Conventions, Climate change conventions, Environmental laws and Acts.
- Environmental Exploitation: Exploitation and depletion of natural resources.
- Pollution: definition, types, sources, effects. Global warming, climate change, glacial melting and rising sea levels, floods, droughts and desertification, Creating buffer zones, sustainable development, carbon sequestration, carbon sink, carbon foot print, carbon credit, carbon trading and carbon budget.
- Clean energy sources: solar, wind, hydel, biofuel, hydrogen as fuel
- Effluent management: Hazardous and biomedical waste management.
- Emission standards : BS6, AQI, WQI.
- Clean potable water: Desalination, rain water harvesting, conserving water bodies.

Unit 7.

MOLECULES AND THEIR INTERACTIONS

- Structure of atoms, molecules and chemical bonds. Structure of water molecule.
- Composition, structure and function of biomolecules: carbohydrates, lipids, proteins, nucleic acids and vitamins.
- Stabilizing interactions: Van der Waals, electrostatic, hydrogen bonding, hydrophobic interactions, etc.
- Principles of biophysical chemistry: pH, buffer, reaction kinetics, thermodynamics, colligative properties.
- Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.
- Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes and coenzymes.
- Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

Unit 8.

EVOLUTION AND BEHAVIOUR

- Emergence of evolutionary thoughts: Lamarck, Darwin–concepts of variation, adaptation, struggle, fitness and natural selection, Spontaneity of mutations, the evolutionary synthesis.
- Origin of cells and unicellular evolution: Origin of basic biological molecules, Abiotic synthesis of organic monomers and polymers, Concept of Oparin and Haldane, Urey-Miller Experiment(1953), The first cell, Evolution of prokaryotes, Origin of eukaryotic cells.
- Paleontology and Evolutionary History: The evolutionary time scale, Major events in the evolutionary time scale, Stages in primate evolution. Evolution of Man.
- Molecular Evolution: Concepts of neutral evolution, molecular divergence and molecular clocks, Molecular tools in phylogeny, classification and identification, Protein and nucleotide sequence analysis, origin of new genes and proteins, Gene duplication and divergence.
- 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, Isolating mechanisms, Speciation, Allopatric and Sympatric, Convergent evolution, Sexual selection, Co-evolution.
- Brain, Behavior and Evolution: Approaches and methods in the 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 investment and Reproductive success, Parental care, Aggressive behavior, Habitat selection and optimality in foraging, Migration, orientation and navigation, Domestication and behavioral changes.

Unit 9.

BIOTECHNOLOGY

- Recombinant DNA technology: Molecular tools, host cells, Isolation and purification of nucleic acids, Cloning vectors, methods of gene transfer. Gene cloning Strategies, Blotting techniques, PCR, gene libraries, screening strategies, DNA sequencing methods, Protein sequencing methods, methods for analysis of gene expression at RNA and protein level, large scale expression- micro array based techniques. Isolation, separation and analysis of carbohydrate and lipid molecules RFLP, RAPD and AFLP techniques. Human Genome project.
- Biotechnology in health care: Gene therapy, DNA in the diagnosis of genetic diseases. DNA finger printing.
- Pharmaceutical Products of DNA Technology: Human protein replacements and therapeutic agents for human diseases. Recombinant vaccines, production of monoclonal antibodies.
- Microbial Fermentation Technology – Production of low and high molecular weight compounds.
- Enzyme technology: Commercial production of enzymes, immobilization of enzymes and cells- therapeutic applications, Biosensors.
- Animal cell culture methods and Applications, Transgenic animals.
- Biodegradation and Bioremediation.
- IPR, Patenting, Trade Mark, Copy rights. GMOs and GM foods–Pros and Cons. Microbial warfare, Microbial weapons, bioterrorism.

Unit 10.

METHODS IN BIOLOGY

- Histochemical and Immuno techniques: Antibody generation, Detection of molecules using ELISA, RIA, immunoprecipitation, flow cytometry and immune fluorescence microscopy, detection of molecules in living cells, *in situ* localization by techniques such as FISH and GISH.
- Biophysical Method: Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods.
- Statistical Methods: Measures of central tendency and dispersal, probability distributions (Binomial, Poisson and normal), Sampling distribution, Difference between parametric and non-parametric statistics, Levels of significance, Regression and Correlation, t-test, Analysis of variance, chi square test.
- Radiolabeling techniques: Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.
- 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.
- Electrophysiological methods: Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI and CAT.

A. KARTHIK,
Principal Secretary to Government.

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