Ph.D. Facilitation Center

Ph.D. Entrance Test Syllabus
Life Science (Microbiology)

Shri Govind Guru University

Established by Gujarat Government
Government Polytechnic Campus,
RTO Road, Gadukpur, Godhra, Gujarat 389001

PART- 1
RESEARCH METHODOLOGY
(50% Marks)

1. **Analytical Methods in Biology : Microscopy and Autoradiography :** Tissue fixation and staining techniques, Principles of TEM & SEM, Phase Contrast, Fluorescence Microscopy, Autoradiography. Basic principles of Spectroscopy, UV-VIS, NMR, ESR, Principle of GC-MS, LC – MS Ion Exchange Chromatography, gel permeation, HPLC and FPLC. Principle and applications of Centrifugation techniques, principles of Electrophoresis, Agarose gel, native and SDS-PAGE, Isoelectric focusing, 2D-PAGE and their uses in protein research, Fractionation and Blotting Techniques, Antigen Antibody, Structure of Ig, Ig Classes & Biological Activities, Antigen-Antibody Interactions: ELISA Test, Agglutination, Precipitation, Immunofluorescence.
2. **Biostatistics & Computer Applications:** Significance tests: Student's T-test: Hypotheses, acceptance and rejections, significance levels. Analysis of Variance: General principles, completely randomized and random-block design ANOVA. Regression and correlation – biveriate analysis. Chi-Square and its applications. Use of different software packages. Data Analysis, Graphics, PowerPoint Presentations.
3. **Methods in Cell & Molecular Biology, Genetics & Biochemistry**: Ultrastructure and role of Mitochondria, Chloroplasts, Lysosomes, Golgi Apparatus Peroxisomes & Glyoxisomes and other cellular organelles. Cytoskeleton, Ultrastructure and functions of Microtubules, microfilaments, Apoptosis: Mechanism and significance. Principles of Mendelian genetics, DNA Structure, Genetic Code, Loci, alleles, and Gene structure, spontaneous and induced mutations, Carbohydrates, Lipids and Fatty Acid metabolism, Protein Structure and Function, Principles and mechanism of enzymes catalysis, Coenzymes and cofactors, laws of thermodynamics, Glycolysis and Citric Acid Cycle,
4. **Methods in Biodiversity & Environmental Science:** Concepts of Biodiversity, Genetic, species and ecological diversity, Terrestrial, Marine Biodiversity, Eco-tourism and Biodiversity. Conservation and Sustainable use of Biodiversity. Ecosystem monitoring and Rehabilitation. Definition, principles and Scope of Environmental science. Threats to Biological Diversity: Habitat Destruction, Invasive species, Disease, Over-exploitation, Pollution, Climate change and Biodiversity. Structure and functions, abiotic and Biotic components, food chains, food web, ecological pyramids, population & community ecology and parasitism, prey-predator relationships, Air, Water and Soil pollution. Global Environmental problems: Ozone depletion, global warming and climatic change, clean development mechanism. EIA. Remote sensing and its applications of environmental sciences, Application of GIS in Environmental management.

PART- 2
CORE SUBJECT
(50% Marks)

1. MOLECULES AND THEIR INTERACTION RELAVENT TO BIOLOGY

A. Structure of atoms, molecules and chemical bonds.
B Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).
C. Stablizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).
D. Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties).
E. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, grouptransfer, biological energy transducers.
F. Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes
G. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).
H. Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA).
I. Stability of proteins and nucleic acids.
J. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

2. CELLULAR ORGANIZATION

A) **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 regulationof intracellular transport,electrical properties of membranes).

B) **Structural organization and function of intracellular organelles** (Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids,vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility).

C) **Organization of genes and chromosomes (**Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons).

D) **Cell division and cell cycle** (Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle).

E) **Microbial Physiology** (Growth yield and characteristics, strategies of cell division, stress response)

3. FUNDAMENTAL PROCESSES

A) **DNA replication, repair and recombination** (Unit of replication, enzymes involved,

replication origin and replication fork, fidelity of replication, extrachromosomal replicons, DNA damage and repair mechanisms, 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, andpolyadenylation, structure and function of different types of RNA, RNA transport).

B) **Protein synthesis and processing** (Ribosome, formation of initiation complex, initiation factors and their regulation, elongation and elongation factors, termination, genetic code, aminoacylation of tRNA, tRNA-identity, aminoacyl tRNA synthetase, and translational proof-reading, translational inhibitors, Post- translational modification of proteins).

C) **Control of gene expression at transcription and translation level** (regulating the expression of phages, viruses, prokaryotic and eukaryotic genes, role of chromatin in gene expression and gene silencing).

4. Cell communication and cell signaling

A) **Host parasite interaction** Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.

B) **Cell signaling** Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways, bacterial and plant two- component systems, light signaling in plants, bacterial chemotaxis and quorum sensing.

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

D) Cancer

Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

Innate and adaptive immune system Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules. generation of antibody diversity, monoclonal antibodies, antibody engineering, antigen-antibodyinteractions, MHC molecules, antigen processing and presentation, activationand 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, immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections, congenital and acquired immunodeficiencies, vaccines.

5. DEVELOPMENTAL BIOLOGY

A) Basic concepts of development : Potency, commitment, specification, induction, competence, determination and differentiation; morphogenetic gradients; cell fate and cell lineages; stem cells; genomic equivalence and the cytoplasmic determinants; imprinting; mutants and transgenics in analysis of development

B) Gametogenesis, fertilization and early development: Production of gametes, cell surface molecules in sperm-egg recognition in animals; embryo sac development and double fertilization in plants; zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; embryogenesis, establishment of symmetry in plants; seed formation and germination.

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

***D)* Morphogenesis and organogenesis in plants:** Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in *Arabidopsis* and *Antirrhinum*

E) Programmed cell death, aging and senescence

6. SYSTEM PHYSIOLOGY - PLANT

A. **Photosynthesis** - Light harvesting complexes; mechanisms of electron transport; photoprotective mechanisms; CO_2 fixation-C_3, C_4 and CAM pathways.

B. **Respiration and photorespiration** – Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

C. **Nitrogen metabolism** - Nitrate and ammonium assimilation; amino acid biosynthesis.

D. **Plant hormones** – Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

E. **Sensory photobiology** - Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; photoperiodism and biological clocks.

F. **Solute transport and photoassimilate translocation –** uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates.

G. **Secondary metabolites** - Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.

H. **Stress physiology –** Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses.

7. SYSTEM PHYSIOLOGY - ANIMAL

A. **Blood and circulation** - Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.

B. **Cardiovascular System:** Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.

C. **Respiratory system** - Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration.

D. **Nervous system** - Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, neural control of muscle tone and posture.

E. **Sense organs** - Vision, hearing and tactile response.

F. **Excretory system** - Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.

G. **Thermoregulation** - Comfort zone, body temperature – physical, chemical, neural regulation, acclimatization.

H. Stress and adaptation

I. **Digestive system** - Digestion, absorption, energy balance, BMR.

J. **Endocrinology and reproduction** - Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation

8. INHERITANCE BIOLOGY

A) Mendelian principles : Dominance, segregation, independent assortment.

B) Concept of gene : Allele, multiple alleles, pseudoallele, complementation tests

C) Extensions of Mendelian principles : Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.

D) Gene mapping methods : Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.

E) Extra chromosomal inheritance : Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.

F) Microbial genetics : Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

G) Human genetics : Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.

H) Quantitative genetics : Polygenic inheritance, heritability and its measurements, QTL mapping.

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

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

K) Recombination : Homologous and non-homologous recombination including transposition.

9. DIVERSITY OF LIFE FORMS:

A. Principles & methods of taxonomy:

Concepts of species and hierarchical taxa, biological nomenclature, classical & quantititative methods of taxonomy of plants, animals and microorganisms.

B. Levels of structural organization:

Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs & systems. Comparative anatomy, adaptive radiation, adaptive modifications.

A. Outline classification of plants, animals & microorganisms:

Important criteria used for classification in each taxon. Classification of plants, animals and microorganisms. Evolutionary relationships among taxa.

B. Natural history of Indian subcontinent:

Major habitat types of the subcontinent, geographic origins and migrations of species. Comman Indian mammals, birds. Seasonality and phenology of the subcontinent.

C. Organisms of health & agricultural importance:

Common parasites and pathogens of humans, domestic animals and crops.

D. Organisms of conservation concern:

Rare, endangered species. Conservation strategies.

10. ECOLOGICAL PRINCIPLES

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

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

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 competition, herbivory, carnivory, pollination, symbiosis.

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

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).

Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India.

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

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

11. EVOLUTION AND BEHAVIOUR

A. Emergence of evolutionary thoughts

Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis.

B. Origin of cells and unicellular evolution:

Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiement of Miller (1953); The first cell;
Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes; Anaerobic metabolism, photosynthesis and aerobic metabolism.

C. Paleontology and Evolutionary History:

The evolutionary time scale; Eras, periods and epoch; Major events in the evolutionary time scale; Origins of unicellular and multi cellular organisms; Major groups of plants and animals; Stages in primate evolution including Homo.

D. 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.

E. The Mechanisms:

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

F. Brain, Behavior and Evolution:

Approaches and methods in study of behavior; Proximate and ultimate causation; Altruism and evolution-Group selection, Kin selection, Reciprocal altruism; Neural basis

of learning, memory, cognition, sleep and arousal; Biological clocks; Development of behavior; Social communication; Social dominance; Use of space and territoriality; Mating systems, Parental investment and Reproductive success; Parental care; Aggressive behavior; Habitat selection and optimality in foraging; Migration, orientation and navigation; Domestication and behavioral changes.

12. APPLIED BIOLOGY:

A. Microbial fermentation and production of small and macro molecules.

B. Application of immunological principles, vaccines, diagnostics. Tissue and cell culture methods for plants and animals.

C. Transgenic animals and plants, molecular approaches to diagnosis and strain identification.

D. Genomics and its application to health and agriculture, including gene therapy.

E. Bioresource and uses of biodiversity.

F. Breeding in plants and animals, including marker – assisted selection

G. Bioremediation and phytoremediation

H. Biosensors

13. METHODS IN BIOLOGY

A. Molecular Biology and Recombinant DNA methods:

Isolation and purification of RNA , DNA (genomic and plasmid) and proteins, different separation methods.
Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, 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 plasmid, phage, cosmid, BAC and YAC vectors.
In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms.
Protein sequencing methods, detection of post translation modification of proteins. DNA sequencing methods, strategies for genome sequencing.
Methods for analysis of gene expression at RNA and protein level, large scale expression, such as micro array based techniques
Isolation, separation and analysis of carbohydrate and lipid molecules RFLP, RAPD and AFLP techniques

B. Histochemical and Immunotechniques

Antibody generation, Detection of molecules using ELISA, RIA, western blot, immunoprecipitation, fluocytometry and immunofluorescence microscopy,
detection of molecules in living cells, in situ localization by techniques such as FISH and GISH.

C 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.

D Statisitcal Methods:

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

E. 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.

F. Microscopic techniques:

Visulization 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.

G. Electrophysiological methods:

Single neuron recording, patch-clamp recording, ECG, Brain activity recording, lesion and stimulation of brain, pharmacological testing, PET, MRI, fMRI, CAT .

H. Methods in field biology:

Methods of estimating population density of animals and plants, ranging patterns through direct, indirect and remote observations, sampling methods in the study of behavior, habitat characterization: ground and remote sensing methods..

Ph.D. Entrance Test - SYLLABUS

OF

BOTANY

PART- 1
RESEARCH METHODOLOGY (50%)

1. **Research Methodology** : Introduction and definition of research, Selecting research problem, Steps of research, Hypothesis, Sampling, Experimental Research Methods, Errors in sampling, Variables in research, Different research designs, Review literature, Software's used in Research-SPSS,SAS, PAST etc. References.

2. **Analytical Methods in Biology : Microscopy and Autoradiography :** Tissue fixation and staining techniques, Principles of TEM & SEM, Phase Contrast, Fluorescence Microscopy, Autoradiography. Basic principles of Spectroscopy, UV-VIS, NMR, ESR, Principle ofGC-MS, LC – MS Ion Exchange Chromatography, gel permeation, HPLC and FPLC.Principle and applications of Centrifugation techniques, principles of Electrophoresis, Agarose gel, native and SDS-PAGE, Isoelectric focusing, 2D-PAGE and their uses in protein research, Fractionation and Blotting Techniques, Antigen Antibody, Structure of Ig, Ig Classes & Biological Activities, Antigen-Antibody Interactions: ELISA Test, Agglutination, Precipitation, Immunofluorescence.

3. **Biostatistics & Computer Applications:** Significance tests: Student's't' test: Hypotheses, acceptance and rejections, significance levels.Analysis of Variance: General principles, completely randomized and random-block design ANOVA.Regression and correlation – biveriate analysis.Chi-Square and its applications.Use of different software packages.Data Analysis, Graphics, PowerPoint Presentations.

4. **Methods in Cell & Molecular Biology, Genetics & Biochemistry**: Ultrastructure and role of Mitochondria, Chloroplasts, Lysosomes, Golgi Apparatus Peroxisomes &Glyoxisomes and other cellular organelles. Cytoskeleton, Ultrastructure and functions of Microtubules, microfilaments, Apoptosis: Mechanism and significance. Principles of Mendelian genetics, DNA Structure, Genetic Code, Loci, alleles, and Gene structure, spontaneous and induced mutations, Carbohydrates, Lipids and Fatty Acid metabolism, Protein Structure and Function, Principles and mechanism of enzymes catalysis, Coenzymes and cofactors, laws of thermodynamics, Glycolysis and Citric Acid Cycle,

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PART- 2
CORE SUBJECT (BOTANY) (50%)

Taxonomy and diversity of plants: Concept of species, Qualitative and quantitative methods in plant taxonomy, Biological nomenclature, Different classification systems, Rare and endangered species, conservation strategies, Cryptogams plants and their life cycles- Algae, fungi, Bryophytes, Pteridophytes, Angiosperm diversity, Gymnosperms diversity

Anatomy &Morphogenesis: Meristematic and permanent tissues of plants, Shoot and root apex organization Special and secretory tissues of plants, Types of tissue systems, Anatomical features of dicotyledonous and monocotyledonous plants, Secondary and anomalous growth in plants, Evolution of morphogenetic pattern, Organogenesis of root, stem and leaf, Organogenesis of bud, flower and inflorescence, Morphogenesis: light, temperature and precipitation affecting on morphogenesis

Embryology: Micro and Mega sporangium, Female and Male gametophyte, Fertilization, Endosperm Types Embryogenesis and types of embryo, Apomix, Polyembryony, Embryology in relation to taxonomy, Experimental Embryology

Structure of Plant Communities: Concept of community and continuum, Community analysis analytical character, Community analysis synthetic characters, Physiognomic characters, growth forms and sampling methods

Community Metabolism and Dynamics: Primary production, productivity and methods of measurement
Energy dynamics (energy flow pathways), Litter production and decomposition, Community change (ecological succession)

Population dynamics and Autecology: Population growth, carrying capacity and population regulation, Species interaction: competition, allelopathy, Concept of ecological niche, Ecotype formation and classification, Plant indicators

Soil and Desert: Soil structure, Soil processes, nitrogen mineralization, Desertification: causes and control
Fire: effect on grasslands and forests

Agricultural Products of India: History, origin and distribution of crop plants, Major staple crops: rice, wheat, maize, Minor staple crops: millets, ragi, rye, barley, Major pulses: oil seeds, fibre crops

Forest and Forestry: Classification of Indian Forests, Afforestation, Forms and growth of forest trees, Siviculture, Siviculture systems, Forest Menustration and Protection, Major and minor forest products of India

Grassland and Fodder Resources: Major grassland area of India and its classification, Importance of fodder grasses, forbs and legumes, Grassland management

Intellectual Property Right: Overview of Intellectual Property Plant variety protection, Farmer's and Breeder's rights, Biodiversity act, Protection of traditional knowledge

Growth and Development: Plant growth processes, Physiology of flowering: vernalization and photoperiodism, Seed viability and germination, Seed and bud dormancy, Senescence and Abscission

Mineral Nutrition: Essential elements and their role in plant growth and development, Translocation phenomena in plants, Assimilation of inorganic nutrients, Plant - Water relations, Transpiration and stomatal movement

Physiology and phytochemistry: Photosynthetic pigments and light harvest complexes , Photo oxidation of water , Mechanisms of electron and proton transport, Carbon assimilation the Calvin cycle, photorespiration and its significance, The C4 cycle, the CAM pathway, physiological and ecological considerations, Respiration

Plant growth regulators: Physiological effects and mechanism of action of auxins, gibberellins and cytokines, Physiological role of abscisic acid and ethylene, Minor group of phytohormones: brassinosteroids, polyamines, jasmonic acid, salicylic acid and their role in plant growth and development.

Cell, Molecular Biology and Plant tissue culture: Structure of eukaryotic and prokaryotic cell, Lipid bilayer, DNA and RNA, Types of DNA, Types of RNA, Structure of Chromosome, Replication, Protein synthesis process and elements, Control of gene expression, Cell cycle – Mitosis, Meiosis and their regulation, Plant tissue culture process, Callus, Different cultures, Secondary metabolites, Transgenic plants, Cancer, Protein sequencing methods, detection of post translation modification of proteins. DNA sequencing methods, strategies for genome sequencing, Isolation, separation and analysis of carbohydrate and lipid molecules RFLP, RAPD and AFLP techniques

Ph.D. Entrance Test - SYLLABUS - 2022

Chemistry

Part -1

Research Methodology (50 %)

1. Chemistry literature work resources.
   - Name of scientific journals
   - Sci-finders
   - Chemical Abstract
   - Research proposal, Dissertation, Ph.D. Thesis etc.
2. Method Development and Validation.
   - Method development parameters
   - Method validation parameters
   - Sequence of method development
3. Reaction Synthesis :
   - Name reactions
   - Rearrangements
   - Disconnection of molecules
   - In-organic complex synthesis
   - Organic chemical reagents
4. Characterization techniques used in chemistry
   - UV-Visible spectroscopy
   - Single crystal X-ray techniques
   - IR Spectroscopy
   - NMR Spectroscopy
   - Mass Spectroscopy
5. Purification techniques used in chemistry
   - Crystallization
   - Distillation
   - Chromatographic tech. TLC, PC, GC, HPLC, HPTLC, GC-MS, LC-MS.
6. Statistical analysis of scientific data.

Part-2

Core Subjective Paper - Chemistry (50 %)

CSIR-UGC National Eligibility Test (NET) for Junior Research Fellowship and Lecturer-ship

CHEMICAL SCIENCES

Inorganic Chemistry

1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
3. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
5. Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
7. Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical methods.
10. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron- transfer reactions; nitrogen fixation, metal complexes in medicine.
11. Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mossbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.
12. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Physical Chemistry:

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

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

3. Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle.

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

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

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

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

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

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

10. 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.

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

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

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

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

Organic Chemistry

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.

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

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

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

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

6. Common named reactions and rearrangements - applications in organic synthesis.

7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.

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

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

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

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

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

13. Structure determination of organic compounds by IR, UV-Vis, ^{1}H & ^{13}C NMR and Mass spectroscopic techniques.

Interdisciplinary topics

1. Chemistry in nanoscience and technology.
2. Catalysis and green chemistry.
3. Medicinal chemistry.
4. Supramolecular chemistry.
5. Environmental chemistry.

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COMMERCE (INCLUDING ACCOUNTANCY)

PART – I (Research Methodology (50 %)

Unit – 1	Introduction of Research: Concept of Research and Business Research, Objectives and Motivational factors for Research, Research Process, Types of Research Business Research, Identification and Formulation of Research Problem, Major Problems in the Area of Business Research – Finance, Production, Marketing and Personnel-. Importance of Research in Managerial Decisions, Components of an Ideal Research Design.
Unit – 2	Methods and Techniques of Data Collection: Types of Data, Methods and Techniques of Collecting Data, Major Sources of Data, Sampling Design, Attitude Measurement and Scaling Techniques, Processing – Analysis and Interpretation of Data.
Unit – 3	Hypothesis and Basic Statistical Measures: Concept, Types of Hypothesis, Errors in Hypothesis Testing, Levels of Significance, Basic Review of Measures of Central Tendency, Variation, and Skewness, Simple, Partial and Multiple Correlation and Regression; Coefficient of Association and Analysis of Time Series.
Unit – 4	Statistical Analysis and Interpretation of Data: Concept and Application of Parametric Tests for testing Hypothesis. Concept and Application of Non-parametric Tests for testing Hypothesis.
Unit – 5	Report Writing & Presentation: Introduction, Types of Report, Major Divisions of an Ideal M. Phil - Ph.D. level Research Report, Method of Giving Footnotes, References, Precautions for writing the Research Report.

PART – II Core Subject (50%) (UGC NET PAPER SYLLABUS II)

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 Organisation (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

Ph.D. Entrance Test - SYLLABUS - 2022

Economics
Part - 1

Research Methodology (50%)

Course Contents:

Unit – I

Theory of research: pure and applied research, methodological issues in social sciences, formulation of research problems, theoretical frame and hypothesis formulation.**Research Plan**: criteria for good research, broad aspects of researchin social sciences: ideal research plan and its different stages. **Types of research:**descriptive study, analytical study, historical study, survey study and case study

Unit – II

Selection, definition and measurement of variables – reliability and validity of measurement, data collection method: primary and secondary sources of data; time series and cross-sectional data; participant observation method, interview method, and questionnaire method – translation of data – presenting and revision – selection and training of field work – field problems in data collection.Sampling techniques – economics and logic of sampling – sampling procedure – random sampling, purposive sampling and stratified sampling;Analysis and interpretation of data – editing, coding, tabulation and preparation of report writing and bibliography

Unit – III

Statistical methods – basic statistical concepts and techniques – measurement of central tendency – measurement of variability – skewness and kurtosis – correlation – bivariate regression technique – statistical description and inference

Unit – IV

Theory of Probability: Concepts- Events, sample space, Random variable, probability distribution functions, Norma and Binomial Distributions

Part - 2
Subject Syllabus :Economics Core Subject (50%) (UGC NET PAPER SYLLABUS II)

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

Ph.D. Entrance Test - SYLLABUS - 2022
Education
Part - 1
Research Methodology (50%)

1.0 Concept of Educational Research

1.1 Concept of educational research: meaning, characteristics and contribution to knowledge

1.2 Types of research: Basic, Applied, and Action research and basic concept of Qualitative and Quantitative research

1.3 Areas of educational research

1.4 Steps of the research process

2.0 Resources for Research

2.1 Purpose of literature review

2.2 Major steps in a literature review

2.3 Types of sources:

2.4 Library skill: Reading skill and Note taking

2.5 Internet search

3.0 Selection of the Research Problem

3.1 Standards of selection: novelty, uniqueness, originality and researcher skill

3.2 Sources of the selection of the problem

3.3 Narrowing the scope of the problem

3.4 Drafting a research proposal

3.5 Defining the related terms of research problem

4.0 Variables and Hypotheses

4.1 Meaning and types of variables

4.2 Meaning and types of hypotheses

4.3 Hypothesis construction: bases, involving variables

4.4 Testing a hypothesis

5.0 Tools of Research

5.1 Psychological Test: (a) types and its uses (b) general information about construction procedure

5.2 Questionnaire: (a) types, format and basic guidelines for constructing questions and questionnaire, (b) advantages and disadvantages of questionnaire

5.3 Interview: (a) types of interview such as individual & group and structured & unstructured, (b) conduction of interview / interview schedule

5.4 Rating Scales: types, format and basic guidelines for constructing scale

5.5 Measurement of Attitude: Thurston and Likert technique

5.6 Concept of some other tools: format and use of (a) Checklist, (b) Opinionnair (c) observation schedule

5.7 Standardization of research tool: Reliability, Validity , and Norms

6.0 Sampling Technique

6.1 Meaning of population and sample
6.2 Importance of sampling
6.3 Characteristics of a good sample
6.4 Sampling technique: (a) Probability sampling: simple random sampling, stratified random sampling, systematic sampling, cluster sampling. (b) No-probability Sampling: incidental sampling, purposive sampling, quota sampling
6.5 Determining sample size.

7.0 Methods of Research-1

7.1 Historical Method: (a) purpose and steps in doing historical studies, (b) primary and secondary sources including external and internal criticism of source materials, and (c) interpretations in historical research.
7.2 Survey: Problems and method of school surveys, job analysis, documentary analysis, public opinion surveys, community surveys
7.3 Inter Relationship Studies: problems and method of case study, causal comparative study, correlation study
7.4 Developmental Studies: Nature of longitudinal and cross sectional studies

8.0 Methods of Research-2

8.1 Experimental Studies: (a) meaning and characteristics of experimental research, (b) method of control, (c) criteria for selecting (evaluating) an experimental design-appropriateness, adequacy of control, internal validity and external validity, and (d) various types of experimental designs: pre, true and quasi-experimental design.
8.2 Concept of qualitative research., Comparison of qualitative and quantitative research, Brief understanding of methods of qualitative research

9.0 Treatment of Data

9.1 Level of measurement of data
9.2 Treatment of data: editing, coding, classification, tabulation, visualization
9.3 Selection of technique for analysis of data: Descriptive statistics and inferential statistics
9.4 Deriving Conclusions, generalization, and educational implications.

10.0 Writing Research Report

10.1 Divisions of a report: (a) Preliminary part, (b) Content part: problem identification, review of related literature, methodology, analysis and interpretation of data and result section, (c) supplementary part: appendices, references, abstract, glossary of terms
10.2 Format, style, typing, quotations, footnotes, bibliography, pagination, tables, figures, and graphics in the report
10.3 Criteria for evaluating research report

Part - 2

Core Papers (Content) (50%) (UGC NET PAPER II SYLLABUS)

Unit 1: Educational Studies

a) Contribution of Indian Schools of philosophy (Sankhya Yoga, Vedanta, Buddhism, Jainism) with special reference to Vidya, Dayanand 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, Stakes' 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 Weakness 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 a MM designs, Strengths and weakness 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, assessment of learning and Assessment of Learning) - Types of Assessment (Placement, formative, diagnostic, summative) Relations 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: Flanders' 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 Pralhad

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 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

Ph.D. Entrance Test - SYLLABUS - 2022

English

Part - 1

Research Methodology (50%)

Issues to be studied:

1. The Nature & Aims of Literary Research
2. The Stages of Research
3. The Major Areas of Literary Research
4. The Thesis lay-out.
5. Preparing Research Proposal.
6. Writing Research Paper.
7. Documentation.
8. The Style of Research Writing
9. Analysis & Interpretation of various Genres
10. Generalization

Part - 2

Core subject (50%) (UGC NET Paper II Syllabus)

Unit –I : Drama

Unit –II : Poetry

Unit –III : Fiction, short story

Unit –IV : Non-Fictional Prose

NOTE: The first four units must also be tested through comprehension passages to assess critical reading, critical thinking and writing skills. These four units will cover all literatures in English.

Unit –V : Language: Basic concepts, theories and pedagogy. English in Use.

Unit –VI : English in India: history, evolution and futures

Unit –VII : Cultural Studies

Unit –VIII : Literary Criticism

Unit –IX : Literary Theory post World War II

Unit –X : Research Methods and Materials in English

પીએચ.ડી. એલિજીબીલીટી ટેસ્ટનો અભ્યાસક્રમ – 2022
વિષય : ગુજરાતી

અભ્યાસક્રમ

વિભાગ : I–સંશોધન પદ્ધતિશાસ્ત્ર અને પ્રક્રિયા : ૫૦%

(A) સંશોધન પદ્ધતિ –

(૧) સંશોધન : સંજ્ઞા અને વિભાવના
(૨) સંશોધનનું સ્વરૂપ, હેતુ અને પ્રયોજન
(૩) સંશોધનનું કાર્યક્ષેત્ર અને વિવિધ પદ્ધતિઓ
(૪) સંશોધનના વિભિન્ન અભિગમો
(૫) સંશોધન અને વિવેચનનો ભેદ
(૬) સાહિત્યિક સંશોધનના ક્ષેત્રકાર્યનું સ્વરૂપ અને મહત્વ.
(૭) મધ્યકાલીન સાહિત્ય સંશોધનના પ્રશ્નો
(૮) સંતસાહિત્ય સંશોધનના પ્રશ્નો
(૯) કંઠસ્થ પરંપરા સાહિત્ય સંશોધનના પ્રશ્નો
(૧૦) લોકસાહિત્ય સંશોધનના પ્રશ્નો

વિભાગ : II–ગુજરાતી સાહિત્ય (૫૦%) (યુ.જી.સી. નેટ પેપર – ૦૨ અભ્યાસક્રમ)

UNIT: 1ગુજરાતી સાહિત્યનો ઇતિહાસ:

(a) મધ્યકાલીન ગુજરાતી સાહિત્ય:
નરસિંહ પર્વે (પ્રાગ નરસિંહ યુગ)
નરસિંહ મહેતાથી દયારામ

(b) અર્વાચીન ગુજરાતી સાહિત્ય:
દલપતરામથી ઈ.સ. ૧૯૫૦ સુધી
ઈ.સ. ૧૯૫૦થી આજ પર્યન્ત

(c) ગુજરાતી સાહિત્યનાં વિવિધ પ્રવાહો

(d) ગુજરાતી સાહિત્યનું ઇતિહાસ લેખન

UNIT: 2સાહિત્યસિદ્ધાંત : ભારતીય અને પાશ્ચાત્ય સંદર્ભે

(a) ભારતીય સાહિત્યવિચાર:
રસસિદ્ધાંત, રીતીવીચાર, ધ્વનિવિચાર, વક્રોક્તિવિચાર, રમણીયતાવિચાર, કાવ્યવ્યાખ્યા, કાવ્યપ્રયોજન, કાવ્યહેતુ, કાવ્યપ્રકારો

(b) પાશ્ચાત્યસાહિત્યવિચાર:

પ્લેટો, એરિસ્ટોટલ, ક્લીન્થ બુકસ, સુઝાન લેન્ગર, સોસ્યુંર, રોલા બાર્થ, દર્સીડા, મિશેલ ફુકો, એલન શોવાલ્ટર, હાન્સ ગાડામર લકાન, જુલિયા ક્રિસ્ટિવા

(c) પ્રશિષ્ટતાવાદ (ક્લાસિસિઝમ) , રંગદર્શિતાવાદ (રોમેન્ટિસિઝમ)
સૌંદર્યનિષ્ઠતાવાદ (એસ્થેટીઝમ) , આધુનિકતાવાદ (મોડર્નીઝમ)
પરાવાસ્તવવાદ (સુરરિયાલિઝમ) , ભાવકનિષ્ઠતાવાદ (રિસેપ્શન થીયરી)
નવ્યઇતિહાસવાદ (નિયોહિસ્ટોરિસિઝમ) , નારીવાદ (ફેમિનિઝમ)
પર્યાવરણકેન્દ્રો વિવેચન (ઇકો–ક્રિટીઝમ)

UNIT :3ગુજરાતી વિવેચન

(a) નર્મદ, નવલરામ, રમણભાઈ નીલકંઠ, બળવંતરાય ઠાકોર, આનંદશંકર ધ્રુવ, રામનારાયણ પાઠક, ઉમાશંકર જોશી, સુન્દરમ, વિષ્ણુપ્રસાદ ત્રિવેદી
(b) સુરેશ જોષી, પ્રમોદકુમાર પટેલ, જયંત કોઠારી, ચંદ્રકાંત ટોપીવાળા

UNIT: 4ભાષાવિજ્ઞાન :

(a) ભાષા : વિભાવના, કાર્ય, સ્વરૂપભેદ (બોલી, વાણી, લિપી, અન્ય સામાજિકભેદો) ભાષા વર્ગીકરણની પદ્ધતિઓ, ભાષાઅધ્યનની પદ્ધતિઓ
(b) ભારતના ભાશાકુળો અને ગુજરાતી ભાષાનો ઉદભવ અને વિકાસ
(c) ગુજરાતી ભાષાનું સ્વરૂપ – વ્યાકરણવિચાર : (ધ્વનિવિજ્ઞાન, રૂપવિજ્ઞાન, વાક્યવિજ્ઞાન, અર્થવિજ્ઞાનનાં વિશિષ્ઠ સંદર્ભે)

UNIT: 5સાહિત્યિક સંશોધન :

(a) સાહિત્યિક સંશોધન : વિભાવના, સ્વરૂપ, પ્રયોજન, કાર્યક્ષેત્ર, પદ્ધતિઓ, સમસ્યાઓ મધ્યકાલીન સાહિત્યની કૃતિઓના પાઠનિર્ણય અને સંપાદન માટેની પદ્ધતિઓ, સાહિત્યિક સંશોધન આંતરવિદ્યાકીય સંશોધન
(b) ગુજરાતી સાહિત્યસંશોધનની પ્રવૃત્તિ અને મહત્વના સંશોધકો
મધ્યકાલીન ગુજરાતી સાહિત્ય
અર્વાચીન ગુજરાતી સાહિત્ય
લોકસાહિત્ય
આદિવાસી સાહિત્ય
ભાષાવિજ્ઞાન ક્ષેત્રે થયેલી સંશોધનાની પ્રવૃતિઓ અને મહત્વનાં સંશોધાકો

UNIT: 6સાહિત્યસ્વરૂપો :

લોકસાહિત્ય : લોકગીત, લોકવાર્તા, લોકનાટ્ય, ઉખાણાં
મધ્યકાલીન ગુજરાતી સહિત્ય: રાસ, આખ્યાન, પ્રબંધ, ફાગુ, પદ્યવાર્તા
અર્વાચીન ગુજરાતી સાહિત્ય: કરૂણપ્રશસ્તિ, ખંડકાવ્ય, ગીત, ગઝલ, સોનેટ, અછાંદસકાવ્ય નવલકથા, ટૂંકીવાર્તા, લલિત નિબંધ, નાટક એકાંકી, આત્મકથા, જીવનચરિત્ર

UNIT: 7ભારતીય કૃતિઓ :

(a) વાલમીકિકૃતિ 'રામાયણ' , વ્યાસકૃત 'મહાભારત' , શ્રીમદ ભાગવત, અભિજ્ઞાનશાકુન્તલમ (કાલિદાસ) , કર્ણભાર (ભાસ) , મૃચ્છકટિકમ (શુદ્રક) , ઉતરરામચરિતમ (ભવભુતિ) ,
(b) ગોરા (ટાગોર) , જિંદગીનામા (કૃષ્ણા સોબતી) , છ વીંઘા જમીન (ફકીરમોહન સેનાપતિ) , ન હન્યતે (મૈત્રેયીદેવી) , ગૃહભંગ (એસ. એલ. ભૈરપ્પા) , ચેમ્મીન (તકશી શિવશંકરપિલ્લા) , ધરતી ખોલે પાછો વળે

(શીવારામાં કારન્થ), આરોગ્યનિકેતન (તારાશંકર બંધોપાધ્યાય), દ્રૌપદી (પ્રતિભા રાય), માટીનો માનવી (કાલિન્દિચરણ પાણીગ્રહી), તમસ (ભીષ્મ સાહની).

UNIT:8ગુજરાતી કૃતિઓ:

(a) કાન્હડદેપ્રબંધ (પદ્મનાભ), રણયજ્ઞ (પ્રેમાનંદ), નંદબત્રિસી (શામળ), સરસ્વતીચંદ્ર (ગોવર્ધનરામ), પૃથિવીલ્લભ (ક.મા.મુનશી), માનવીની ભવાઈ (પન્નાલાલ પટેલ), મરણોતર (સુરેશ જોષી), દીપનિર્વાણ (દર્શક), ચહેરા (મધુ રાય), નાઈટમેર (સરોજ પાઠક), આગન્તુક (ધીરુબહેન પટેલ), સમુદ્રાન્તિકે (ધ્રુવ ભટ્ટ) કુવો (અશોકપુરી ગોસ્વામી), બત્રીસ પુતળીની વેદના (ઈલા આરબ મહેતા)
ગીધ (દલપતરામ ચૌહાણ)

(b) મીરાના પદો, અખેગીતા (અખો) પૂર્વાલાપ (કાન્ત), ભાણકાર (બ.ક. ઠાકોર), સપ્તપદી (ઉમાશંકર જોષી), યાત્રા (સુન્દરમ), ધ્વનિ (રાજેન્દ્ર શાહ), છંદોલય (નિરંજન ભગત), બારી બહાર (પ્રહલાદ પારેખ), અંગત (રાવજી પટેલ), પ્રતીક (પ્રિયકાન્ત મણિયાર), જટાયું (સિતાંશુ યશશ્ચન્દ્ર), આઠો જામ ખુમારી (અમૃત ઘાયલ), બહિષ્કૃત ફૂલો (નિરવ પટેલ), ધ્રીબાંગસુંદર એણીપેર ડોલ્યા (હરીશ મિનાશ્રુ),

(c) મારી હકીકત (નર્મદ), ફારબ્સવિરહ (દલપતરામ), સત્યના પ્રયોગો (મહાત્મા ગાંધી), ઉગમણો દેશ (કાકા સાહેબ), દુરના એ સુર (દિગીશ મહેતા), ખરા બપોર (જયંત ખત્રી), હોહોલીકા, (ચં.ચી.મહેતા) મનઘરોળ (સ્વામી આનંદ) અલગારી રખડપટ્ટી (રસિક ઝવેરી), પાદરાના તીરથ (જયંતિ દલાલ), બજાતા નુપુર (પ્રવિણ દરજી), નવલશા હિરજી (ચિનુ મોદી), વનાંચલ (જયંત પાઠક), અંધારી ગલીમાં સફેદ ટપકાં (લિમાંશી શેલત), બાપાની પીંપર (કિરીટ દુધાત)

UNIT: 9વિશ્વસાહિત્ય : સિદ્ધાંત અને કૃતિઓ

(a) તુલનાત્મક સાહિત્ય : વિભાવના સ્વરૂપ, પધ્ધતિ કાર્યક્ષેત્ર વિશ્વસાહિત્ય : વિભાવના, સ્વરૂપ પ્રયોજન ભારતીયતાની વિભાવના પ્રાંતીય સાહિત્ય (ધ પ્રોવિન્શીયલ લીટરેચર), ઉપખંડીય સાહિત્ય (ધ કોન્ટિનેન્ટલ લિટરેચર), વિશ્વસહિત્ય (વર્લ્ડ લિટરેચર).

(b) વિશ્વસાહિત્યની કૃતિઓ :

(c) ઈલિયડ (હોમર), ઈડીપસ રેક્સ (સોફોક્લીસ), મેકબેથ (શેક્સપિયર), ધ વેસ્ટ લેન્ડ (ટી.એસ.એલીયટ), યુલીસિસ (જેમ્સ જોયસ), મધર (મકિસમ ગોર્કી), સિદ્ધાર્થ (હરમાન હેસ), વેઈટિંગ ફોર ગોદો (બેકેટ), નોટસ ફ્રોમ ધ અન્ડરગ્રાઉન્ડ (દોસ્તોએવસ્કી), ધ ટ્રાયલ (કાફ્કા), ધ આઉટસાઈડર (કામૂ), ફોન્તામારા (ઈગ્નાઝિયો સીલોની), અ રમ ઓવ વન્સ ઓઉન (વર્જિનિયા વુલ્ફ), રાઈણોસરોસ (યુજીન ઈયોનેસ્કો) બ્યુટીફુલ વન્સ આર નોટ યટ બોર્ન (યી ક્વે આર્મ્હે), ધ રોડ (વોલ સોયન્કા), સોન્ગ ઓવ સોલોમન (ટોની મોરીસન), ફાયર ઓન ધ માઉન્ટેઈન (અનીતા દેસાઈ).

UNIT:8સાહિત્ય અને આંતરવિદ્યાઓ:

સાહિત્ય અને સંસ્કૃતિ
સાહિત્ય અને સમાજશાસ્ત્ર
સાહિત્ય અને વૈશ્વિકીકરણ
સાહિત્ય અને સિનેમા
લોકપ્રિય સાહિત્ય
સાહિત્ય અને કાયદો

(B) સાહિત્ય પત્રકારત્વ,
વિવિધ માધ્યમો અને સાહિત્ય,
ગુજરાતી સાહિત્યિક સામયિકો,
ગુજરાતી સાહિત્યિક સંસ્થાઓ,
ગુજરાતી ભાષાનાં પારિતોષિકો.

विद्यावाचस्पति(हिन्दी) प्रवेश परीक्षा पाठ्यक्रम

वर्ष 2022

विभाग – 1 (50%)

➢ अनुसंधान की प्रविधि और प्रक्रिया

- अनुसंधान का अर्थ, परिभाषा, स्वरूप, महत्त्व एवं उद्देश्य
- अनुसंधान की विभिन्न पद्धतियाँ
- अनुसंधान के प्रकार – साहित्यिक अनुसंधान
  - तुलनात्मक अनुसंधान
  - क्षेत्रीय अनुसंधान
  - मनोवैज्ञानिक अनुसंधान
  - ऐतिहासिक अनुसंधान
  - शैली–वैज्ञानिक अनुसंधान
  - भाषा–वैज्ञानिक अनुसंधान
  - प्रयोगात्मक अनुसंधान
  - समाजशास्त्रीय अनुसंधान
  - क्रियात्मक अनुसंधान
- अनुसंधान के सोपान
- अनुसंधान की प्रक्रिया

- अनुसंधान, शोध और आलोचना
- हिन्दी अनुसंधान में सम्बन्ध–विषयों की भूमिका
- पाठालोचन के मुख्यसिद्धांत
- हिन्दी शोध–प्रबंध का प्रारूप

(विश्वविद्यालय अनुदान आयोग एवं श्री गो वंद गुरु विश्वविद्यालय के अधिनियमानुसार)

समालोचना

<u>साहित्यिक समालोचना</u>

- साहित्य:अर्थ, परिभाषा एवं स्वरूप
- साहित्य का महत्त्व, उद्देश्य एवं प्रकार
- समालोचना : अर्थ, परिभाषा एवं स्वरूप
- समालोचना के प्रकार – साहित्यिक समालोचना
  - साक्षात्कार समालोचना
  - अवलोकनीय समालोचना
  - निर्णयात्मक समालोचना
  - सर्वेक्षणात्मक समालोचना
  - प्रश्नावली/मतावली सर्वेक्षण

समालोचना

- साहित्यिक समालोचना – गद्य–कृतियों की समालोचना
  - पद्य–कृतियों की समालोचना
  - गद्य–पद्य कृतियों की समालोचना

- गद्य कृतियों की समालोचना – नाटक, उपन्यास, कहानी, निबंध,रेखाचित्र, संस्मरण की समालोचना (उदाहरणार्थ एक विधाकी समालोचना निर्दिष्ट है ।)
- पद्य कृतियों की समालोचना – महाकाव्य, खण्डकाव्य, गीतिकाव्य, वीरकाव्य, स्फूटकाव्य आदि की समालोचना
- गद्य–पद्य कृतियों की समालोचना : चम्पू काव्य की समालोचना

पुस्तक समालोचना ८ख::ऋढचभ्–ध्भ्६९

- प्रस्तावना(कृतिकार की प्रतिष्ठा, रचना काल, वैचारिकताआदि का संक्षिप्त ब्यौरा)
- कृतिकार का व्यक्तित्व एवं कृतित्व
- कृतिकी संक्षिप्त कथावस्तु
- कृति का रचना समय
- कृतिकार पर अन्य साहित्य–सर्जक एवं विचारकों का प्रभाव
- कृतिमें कृतिकार की वैचारिकता
- रचना की समकालीनता
- कृतिद्वाराकृतिकार का भाव–बोध
- कथा, पात्र, संवाद, वातावरण द्वारा समाज का संदेश
- कृति का निष्कर्ष–निष्पादन
- समापन

➢ **शोध–प्रबंध का स्वरूप**

शोध–प्रबंध प्रविधि

- शोध–प्रबंध का मुखपृष्ठ–स्वरूप एवं टंकण
- शोध–प्रबंध की प्रामाणिकता–प्रमाणपत्र
  – प्रारंभिक विद्यावाचस्पति मौखिकी प्रमाणपत्र
  – निर्देशक का घोषणापत्र
  – शोधार्थी का घोषणापत्र
  – निर्देशक एवं शोधार्थी का शोध–सत्यापन प्रमाणपत्र
- शोध–प्रबंध की प्रस्तावना
  – विषयचयन
  – विषयचयन की प्रेरणा
  – शोध–विषय का महत्त्व

– शोध–विषय की विशेषता

  – शोध–विषय की प्रासंगिकता
  – शोध–विषय की परिसीमा
  – पूर्ववर्ती शोध–कार्य
  – परवर्ती शोध–कार्य
  – सामग्री–संकलन
  – शोध–प्रबंध का अध्यायविभाजन
  – कृतज्ञताज्ञापन

- अनुक्रमणिका
- पृष्ठ–क्रमांक
- पृष्ठ–सज्जा
- शोध–पत्र प्रस्तुतिकरण
- संदर्भ सूची
- संदर्भ ग्रंथ सूची :
    - आधार–ग्रंथ
    - सहायक ग्रंथ
    - पत्र–पत्रिकाएँ
    - शब्दकोश
    - वेबसाईट
    - साक्षात्कार
    - चित्र–सज्जा–तस्वीर इत्यादि

➢ **Computer Application**

- A Brief History of Computers
- Invention, Evaluation & Types
- Computer system components and their functions
- The role of a computer service professional
- Basics of Electronics
- Operating System
- Basic Network Concepts
- Implementing and Maintaining Network
- Protocol Suites

PART – II (50%) (UGC NET Paper II Syllabus)

इकाई–१

हिन्दी भाषा और उसकाविकास :

हिन्दी की ऐतिहासिक पृष्ठभूमि : प्राचीन भारतीय आर्य भाषाएँ, मध्यकालीन भारतीय आर्य भाषाएँ–पालि, प्राकृत–शौरसेनी, अर्द्धमागधी, मागधी, अपभ्रंश और उनकीविशेषताएँ, अपभ्रंश अवहट्ठ, और पुरानी हिन्दी का संबंध, आधुनिक भारतीय आर्य भाषाएँ और उनका वर्गीकरण। हिन्दी का भौगोलिकविस्तार : हिन्दी की उपभाषाएँ, पश्चिमी हिन्दी, पूर्वी हिन्दी, राजस्थानी, बिहारी तथा पहाड़ी वर्ग और उनकीबोलियाँ। खड़ीबोली, ब्रज और अवधी की विशेषताएँ। हिन्दी के विविध रूप : हिन्दी, उर्दू, दक्खिनी, हिन्दुस्तानी। हिन्दी का भाषिक स्वरूप : हिन्दी की स्वनिमव्यवस्था–खंड्य और खंड्येतर, हिन्दीध्वनियों के वर्गीकरण का आधार, हिन्दीशब्द रचना–उपसर्ग, प्रत्यय, समास, हिन्दी की रूप रचना–लिंग, वचन और कारक व्यवस्था के सन्दर्भ में संज्ञा, सर्वनाम, विश्लेषण और क्रिया रूप, 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। देवनागरी लिपि : विशेषताएँ और मानकीकरण ।

इकाई–२

हिन्दी साहित्य का इतिहास

हिन्दी साहित्येतिहास दर्शन :

हिन्दी साहित्य के इतिहास लेखन की पद्धतियाँ

हिन्दी साहित्य का कालविभाजन और नामकरण, आदिकाल की विशेषताएँ एवं साहित्यिक प्रवृत्तियाँ, रासो–साहित्य, आदिकालीनहिन्दी 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 स्वरूप और उसका अन्त:प्रादेशिक वैशिष्ट्य।

भक्तिकाव्यकी सामाजिक–सांस्कृतिक पृष्ठभूमि, आलवार सन्त।भक्तिकाव्य के प्रमुख सम्प्रदाय और उनका वैचारिक आधार। निर्गुण–सगुण कवि और उनकाकाव्य।

रीतिकाल :

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

रीतिकाल के प्रमुख कवि और उनकाकाव्य

आधुनिककाल :

हिन्दी गद्य का उद्‌भवऔर विकास। भारतेन्दु पूर्व हिन्दी गद्य, १८५७ की क्रान्ति और सांस्कृतिक पुनर्जागरण, भारतेन्दु और उनका युग, पत्रकारिता का आरम्भ और १९वीं शताब्दी की हिन्दी पत्रकारिता, आधुनिकता की अवधारणा।

द्विवेदी युग : महावीरप्रसाद द्विवेदी और उनका युग, हिन्दी नवजागरण और सरस्वती, राष्ट्रीय काव्य धारा के प्रमख कवि, स्वछन्दतावाद और उनके प्रमुख कवि।

छायावाद : छायावादी काव्य की प्रमुखविशेषताएँ, छायावाद के प्रमुख कवि, प्रगतिवाद की अवधारणा, प्रगतिवादी काव्य और उनके प्रमुख कवि, प्रयोगवाद और नई कविता, नईकविता के कवि, समकालीन कविता(मार्च २००० तक) समकालीन साहित्यिक पत्रकारिता।

हिन्दी साहित्य का गद्य विधाएँ

हिन्दी उपन्यास	: भारतीय उपन्यास की अवधारणा। प्रेमचन्द पूर्व उपन्यास, प्रेमचन्द और उनका युग। प्रेमचन्द के परवर्ती उपन्यासकार (वर्ष २००० तक)।
हिन्दी कहानी	: हिन्दी कहानी का उद्‌भवऔर विकास, २०वीं सदी की 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 २००० तक) हिन्दी एकांकी। हिन्दी रंगमंच और विकास के चरण, हिन्दी का लोक रंगमंच। नुक्कड़ नाटक ।
हिन्दीनिबंध	: हिन्दीनिबन्ध का उद्‌भवऔर विकास, हिन्दनिबंध के प्रकार और प्रमुख निबंधकार।

हिन्दीआलोचना : हिन्दी आलोचना का उद्भव और विकास। समकालीन हिन्दी आलोचना एवं
उसके विविध प्रकार, 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–३

साहित्यशास्त्र

काव्यके लक्षण, काव्य हेतु और काव्य प्रयोजन।
प्रमुख संप्रदाय और सिद्धान्त – रस, अलंकार, रीति, ध्वनि, वक्रोक्ति और औचित्य ।
रस निष्पति, साधारणीकरण।
शब्दशक्ति, काव्यगुण, काव्य दोष
प्लेटो के काव्यसिद्धान्त।
अरस्तू : अनुकरण सिद्धान्त, त्रासदी विवेचन, विरेचन सिद्धान्त ।
वड्र्सवर्थ का काव्यभाषासिद्धान्त।
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, नयी समीक्षा, मिथक, फन्तासी, कल्पना, प्रतीक, बिम्ब ।

इकाई–४

वैचारिक पृष्ठभूमि

भारतीय नवजागरण और स्वाधीनता आन्दोलन की वैचारिक पृष्ठभूमि
हिन्दी नवजागरण, खड़ीबोलीआन्दोलन। फोर्ट विलियम कॉलेज
भारतेन्दु और हिन्दी नवजागरण
महावीप्रसादद्विवेदी और हिन्दी नवजागरण
गांधीवादी दर्शन
अम्बेडकर दर्शन
लोहिया दर्शन
मार्क्सवाद, मनोविश्लेषणवाद, अस्तित्ववाद, उत्तर आधुनिकतावाद, अस्मिता विमर्श, (दलित, स्त्री, आदिवासी एवं अल्पसंख्यक)

इकाई–५

हिन्दीकविता

पृथ्वीराज रासो – रेवा तट ।

अमीर खुसरो – खुसरो की पहेलियाँ और मुकरियाँ ।

विद्यापति की पदावली (संपादक : डॉ. नरेन्द्र झा) – पद संख्या १–२५ ।

कबीर – (सं. हजारीप्रसाद द्विवेदी) – पद संख्या – १६०–२०९ ।

जायसी ग्रंथावली – (सं. रामचन्द्र शुक्ल) – नागमती वियोग खण्ड ।

सूरदास – भ्रमरगीत सार – (सं. रामचन्द्र शुक्ल) – पद संख्या २१ से ७० ।

तुलसीदास – रामचरितमानस, उत्तर काण्ड ।

बिहारी सतसई – (सं. जगन्नाथ दास रत्नाकर) – दोहा संख्या १–५० ।

घनानन्द कवित्त – (सं. विश्वनाथमिश्र) – कवित्त संख्या १–३० ।

मीरा – (सं. विश्वनाथ त्रिपाठी) – प्रारम्भ से २० पद

अयोध्यासिंह 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, कुकुरमुत्ता, बाँधो न नाव

इस ठाँव बंधु ।

सुमित्रानंदन पंत – परिवर्तन, प्रथम रश्मि, द्रुत झरो जगत के जीर्ण पत्र ।

महादेवी वर्मा – बीन भी हूँ मैं तुम्हारीरागिनी भी हूँ, मैं नीर भरी दुख की बदली, फिरविकल है प्राण मेरे, यह मन्दिर का दीप इसे नीरव जलने दो ।

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 हीरानन्दवात्स्यायन अज्ञेय – कलगी बाजरे की, यह दीप अकेला, हरी घास पर क्षण भर, असाध्यवीणा, कितनी नावों में कितनी बार ।

भवानीप्रसादमिश्र – गीत फरोश, सतपुड़ा के जंगल ।

मुक्तिबोध – भूल गलती, ब्रह्म राक्षस, अंधेरे में ।

धूमिल – नक्सलवाड़ी, मोचीराम, अकाल दर्शन, रोटी और संसद ।

इकाई–६

हिन्दी उपन्यास

पं. गौरीदत्त – देवरानी जेठानी की कहानियाँ ।

लाला श्रीनिवास दास – परीक्षा गुरु

प्रेमचन्द – गोदान ।

अज्ञेय – शेखर एक जीवनी (भाग–१)

हजारीप्रसादद्विवेदी – बाणभट्ट की आत्मकथा ।

फणीश्वरनाथ 'रेणु' – मैला आंचल ।

यशपाल – झूठा सच ।

अमृतलाल नागर – मानस का हंस ।

भीष्म साहनी – तमस ।

श्रीलाल शुक्ल – राग दरबारी ।

कृष्णा सोबती – जिन्दगी नामा ।

मन्नू भंडारी – आपका बंटी ।

जगदीशचन्द्र – धरती धन न अपना ।

इकाई–७

हिन्दी कहानी

राजेन्द्रबाला घोष (बंग साहित्य) – चन्द्रदेव से मेरी बातें, दुलाईवाली ।

माधवराव सप्रे – एक टोकरी भर मिट्टी ।

सुभद्रकुमारी चौहान – राही ।

प्रेमचंद – ईदगाह, दुनिया का अनमोल रतन ।

राजा राधिकारमणप्रसाद 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 चाँद पर ।

ज्ञानरंजन – पिता ।

कमलेश्वर – राजा निरबंसिया ।

निर्मल वर्मा – परिंदे ।

इकाई–८

हिन्दी नाटक

भारतेन्दु – अंधेर नगरी, भारत दुर्दशा ।

जयशंकर प्रसाद – चन्द्रगुप्त, स्कंदगुप्त, ध्रुवस्वामिनी ।

धर्मवीर भारती – अंधा युग ।

लक्ष्मीनारायण लाल – सिंदूर की होली ।

मोहन राकेश – आधे–अधूरे, आषाढ़ का एक दिन ।

हबीब तनवीर – आगरा बाज़ार ।

सर्वेश्वर दयाल सक्सेना – बकरी ।

शंकरशेष – एक और द्रौणाचार्य ।

उपेन्द्रनाथ'अश्क' – अंजो दीदी ।

मन्नू भंडारी – महाभोज ।

इकाई–९

हिन्दीनिबंध

भारतेन्दु – दिल्ली दरबार, दर्पण, भारतवर्षोन्नति कैसे हो सकती है ।

प्रताप नारायण मिश्र – शिवमूर्ति ।

बालकृष्ण भट्ट – शिवशंभु के चिट्ठे ।

रामचन्द्र शुक्ल – कविता क्या है ।

हजारप्रसादद्विवेदी – नाखून क्यों बढ़ते हैं ।

विद्यानिवास मिश्र – मेरे राम का मुकुट भीग रहा है ।

अध्यापक राय – उत्तराफाल्गुनी के आस–पास ।

विवेकीराय – उठ जाग मुसाफिर ।

नामवर सिंह – संस्कृति और सौंदर्य ।

इकाई–१०

आत्मकथा, जीवन तथा अन्य गद्य विधाएँ

रामवृक्ष बेनीपुरी – माटी की मूरतें ।

महादेवी वर्मा – ठकुरी बाबा ।

तुलसीराम – मुर्दहिया ।

शिवरानीदेवी – प्रेमचन्द घर में ।

मन्नू भंडारी – एक कहानी यह भी ।

विष्णु प्रभाकर – आवारा मसीहा ।

हरिवंशराय बच्चन – क्या भूलूँ क्या याद करूँ ।

रमणिका गुप्ता – आपहुदरी ।

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 ।

Ph.D. Entrance Test - SYLLABUS - 2022

History

Part - 1

Research Methodology (50 %)

UNIT 1

1. Nature and scop of philosophy of history - morden concept of history
2. History - its relationship with litreture and social science
3. History - art and science
4. Types of history - their characteristics
5. Biases in history
6. Nature and classification of source - questionnaire system - feild work personal interviews

UNIT 2

7. Writing the dessertation - foot - notes , appendices &bibliography
8. Historiography - its meaning subject matter and its utility
9. Influence of european historiography on thye writing of indian history - shortcoming in indian historiography
10. Historical writing on the nationalist & popular movement with special refrence to gujarat
11. Authenticity and credibility of source - forgery in sources
12. Collection and selection of source - evidence and its transmission

UNIT 3

13. Rewriting of history
14. Characteristics and pitfalls of historism
15. Greek, roman , Islamic and chinese traditions of historiography
16. Ancient and medievelindian traditions
17. Oxford , romantic ,prussian school of historiography

UNIT 4

18. Modern approaches to history - imperialist, nationalist, marxist and subaltern
19. Theory of causation in history
20. Contribution to regional historiography of bhgwanlalindraji, durgashankarshastri and vallabhaji H. acharya.
21. Contribution of - JadunathSarkar , R.C. Majumdar ,S.N. Sen& G.S. Sardesai
22. Contribution of - Ranke and Arnold Toynbee

History (Core Subject)

Part - 2 (50 %) (UGC NET Paper II Syllabus)

Concepts, Ideas and Terms

Bharatvarsha
Sabha and Samiti
Varnasrama
Vedanta
Purusharthas
Rina
Samskaras
Yajna
Ganarajya
Janapada
Doctrine of Karma
Dandaniti / Arthasastra / Saptanga
Dharmavijaya
Stupa / Chaitya/ Vihara
Nagara / Dravida / Vesara
Bodhisattva / Tirthankara
Alvars / Nayanars
Sreni
Bhumi-chidra-vidhana-nyaya
Kara-bhoga-bhaga
Vishti
Stridhana
Memorial Stones
Agraharas

Khilafat
Sulah-i-kul
Turkan-i-Chahlghani
Watan
Baluta
Taquavi
Iqta
Jaziya
Zakat
Madad-i-maash
Amaram
Raya-Rekho
Jangama / Dasa
Madarasa / Maqtab
Chauth / Sardeshmukhi
Sarai
Polygars
Jagir / Shariyat
Dastur
Mansab (Rank)
Deshmukh
Nadu / Ur
Ulema
Firman

Ain-i-Dashsalah
Pargana
Shahna-i-Mandi
Mahalwari
Hind Swaraj
Mercantilism
Economic Nationalism
Indian Renaissance
Economic Drain
Colonialism

Satyagraha
Swadeshi
Revivalism
Communalism
Orientalism
Oriental Despotism
De-Industrialisation
Subsidiary Alliance
Evangelicalism
Bhudan

Paramountcy	Panchsheel
Dyarchy	Mixed Economy
Federalism	Socialism
Utilitarianism	Hindu Code Bill
Filtration Theory	Historical Methods
Forward Policy	Plagiarism
Doctrine of Lapse	Ethics and Morality in History Writing

Unit – I

Negotiating the Sources: Archaeological sources: Exploration, Excavation, Epigraphy and Numismatics. Dating of Archaeological Sites. Literary Sources: Indigenous Literature: Primary and Secondary: problem of dating Religious and Secular Literature, Myths, Legends, etc. Foreign Accounts: Greek, Chinese and Arabic.

Pastoralism and Food production: Neolithic and Chalcolithic Phase: Settlement, distribution, tools and patterns of exchange.

Indus/Harappa Civilization: Origin, extent, major sites, settlement pattern, craft specialization, religion, society and polity, Decline of Indus Civilization, Internal and external trade, First urbanization in India.

Vedic and later Vedic periods; Aryan debates, Political and Social Institutions, State Structure and Theories of State; Emergence of Varnas and Social Stratification, Religious and Philosophical Ideas. Introduction of Iron Technology, Megaliths of South India.

Expansion of State system: Mahajanapadas, Monarchical and Republican States, Economic and Social Developments and Emergence of Second Urbanization in 6th century BCE; Emergence of heterodox sects-Jainism, Buddhism and Ajivikas.

Unit – II

From State to Empire: Rise of Magadha, Greek invasion under Alexander and its effects, Mauryan expansion, Mauryan polity, society, economy, Asoka's Dhamma and its Nature, Decline and Disintegration of the Mauryan Empire, Mauyan art and architecture, Asokan edicts: language and script. Dissolution of Empire and Emergence of Regional Powers: Indo-Greeks, Sungas, Satavahanas, Kushanas and Saka-Ksatrapas, 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. Gandhara, Mathura and Amaravati schools.

Gupta Vakataka age: Polity and Society, Agrarian Economy, Land Grants, Land Revenue and Land Rights, Gupta Coins, Beginning of Temple Architecture, Emergence of Puranic Hinduism, Development of Sanskrit Language and Literature. Developments in Science Technology, Astronomy, Mathematics and Medicine.

Harsha and his Times: Administration and Religion.

Salankayanas and Visnukundins in Andhradesa.

Unit – III

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, Colas 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, and urban settlements, ports and trade routes, merchandise and exchange, trade guilds; trade and colonization in south-east Asia.
Growth of Brahminical religions: Vaisnavism and Saivism; Temples; Patronage and Regional Ramification; Temple Architecture and Regional Styles. Dana, Tirtha and Bhakti, Tamil Bhakti movement - Shankara, Madhava and Ramanujacharya.
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.
Education and Educational Institutions: Agraharas, Mathas and Mahaviharas as Centres of Education. Growth of Regional Languages. Debates of state formation in early medieval India: A) Feudal model; B) Segmentary model; C) Integrative model
Arab contracts: Suleiman Ghaznavid conquests. Alberuni's Accounts.

Unit – IV

Source of Medieval Indian History: Archaeological, Epigraphic and Numismatic sources, Material evidences and Monuments; Chronicles; Literary sources – Persian, Sanskrit and Regional languages; Daftar Khannas: Firmans, Bahis / Pothis / Akhbarat; Foreign Travellers' Accounts – Persian and Arabic.
Political Developments – The Delhi Sultanate – the Ghorids, the Turks, the Khaljis, the Tughlaqs, theSayyids and the Lodis. Decline of Delhi Sultanate.
Foundation of the Mughal Empire – Babur, Humayun and the Suris ; Expansion and Consolidation from Akbar to Aurangzeb. Decline of the Mughal Empire.
Later Mughals and Disintegration of the Mughal Empire.
The Vijayanagara and the Bahmanis - Deccan Sultanate; Bijapur, Golkonda, Bidar, Berar and Ahmadnagar – Rise, Expansion and Disintegration; Eastern Gangas and SuryavamshiGajapatis.
Rise of the Marathas & the foundation of Swaraj by Shivaji ; its expansion under the Peshwas ; Mughal – Maratha relations, Maratha Confederacy, Causes of Decline.

Unit – V

Administration & Economy**:** Administration under the Sultanate, Nature of State – Theocratic and Theocentric, Central, Provincial and Local Administration, Law of succession.
Sher Shah's Administrative Reforms ; Mughal Administration – Central, Provincial and Local : Mansabdari and Jagirdari Systems.
Administrative System in the Deccan – The Vijayanagara State & Polity, Bahamani Administrative System; Maratha Administration – Asta Pradhan.
Frontier Policies under Delhi Sultanate and Mughals.
Inter-State Relations during the Sultanate and the Mughals.
Agricultural Production and Irrigation System, Village Economy, Peasantry, Grants and Agricultural Loans, Urbanization and Demographic Structure.
Industries – Cotton Textiles, Handicrafts, Agro-Based industries, Organisation, Factories & Technology. Trade and Commerce – State Policies, Internal and External Trade: European Trade, Trade Centres and Ports, Transport and Communication.
Hundi (Bills of Exchange) and Insurance, State Income and Expenditure, Currency, Mint System; Famines and Peasant Revolts.

Unit – VI
Society and Culture: Social Organisation and Social Structure.
The Sufis – Their Orders, Beliefs and Practices, the leading Sufi Saints, Social Synchronization.
Bhakti Movement – Shaivism; Vaishnavism, Shaktism.
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 Dev: his teachings and practices, Adi Granth; the Khalsa.
Social Classification**:** Ruling Class, Major Religious Groups, the Ulemas, the Mercantile and Professional Classes – Rajput Society.
Rural society – Petty Chieftains, Village Officials, Cultivators and Non-Cultivating Classes, Artisans.
Position of Women – Zanana System – Devadasi System.
Development of Education, Centres of Education and Curriculum, Madarasa Education.
Fine Arts – Major Schools of Painting – Mughal, Rajasthani, Pahari, 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 –VII
Sources of Modern Indian History: Archieval Materials, Biographies and Memoirs, Newspapers, Oral Evidence, Creative Literature and Painting, Monuments, Coins.
Rise of British Power: European Traders in India in the 16th to 18th Centuries – Portuguese, Dutch, French and the British.
Establishment and Expansion of British Dominion in India. 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.

Unit – VIII

Colonial Economy: Changing Composition, Volume and Direction of Trade.
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.
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, Technology, Public Health & Medicine – Towads 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 & Constitutional Position.
The Printing Press – Journalistic Activity and the Public opinion.
Modernisation of Indian Languages and Literary Forms – Reorientation in Painting, Music and Performing Arts.

Unit – IX

Rise of Indian 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.
Swadeshi and Swaraj.
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.
Communal Politics; Muslim League and Genesis of Pakistan.

Towards Independence and Partition.
India after Independence: Challenges of Partition; Integration of the Indian Princely States; Kashmir, Hyderabad & Junagarh.
B.R. Ambedkar – The making of the Indian Constitution, its Features.
The Structure of Bureaucracy.
New Education Policy.
Economic Policies and the Planning process; Development, Displacement and Tribal Issues.
Linguistic Reorganisation of States; Centre-State Relations.
Foreign Policy Initiatives – Panchsheel; Dynamics of Indian Politics-Emergency; Liberalisation, Privatisation&Globalisation of Indian Economy.

Unit – X

Historical Method, Research, Methodology and Historiography:
Scope and Importance of History
Objectivity and Bias in History
Heuristics Operation, Criticism in History, Synthesis and Presentation
History and its Auxiliary Sciences
History a Science, Arts or a Social Science
Causation and Imagination in History
Significance of Regional History
Recent Trends of Indian History
Research Methodology
Hypothesis in History
Area of Proposed Research
Sources – Data Collection, Primary / Secondary, Original and Transit Sources
Trends in Historical Research
Recent Indian Historiography
Selection of Topic in History
Notes Taking, References, Footnotes and Bibliography
Thesis and Assignment Writing
Plagiarism, Intellectual Dishonesty and History Writing
Beginnings of Historical Writings – Greek, Roman and Church Historiography
Renaissance and its Impact on History Writing
Negative and Positive Schools of Historical Writing
Berlin Revolution in History Writing – Von Ranke
Marxist Philosophy of History – Scientific Materialism
Cyclical Theory of History – Oswald Spengler
Challenge and Response Theory – Arnold Joseph Toynbee
Post – Modernism in History

Ph.D. Entrance Test - SYLLABUS - 2022

LIBRARY & INFORMATION SCIENCE

Part - 1

Research Methodology (50 %)

Unit-1 Research

Concept, Meaning, Need and Process of Research

Types of Research – Fundamental and Applied including inter disciplinary and multidisciplinary approach, LIS Research in India.

Unit-2 Research Design

Conceptualisation and Operationalisation

Types of Research Design

Identification and Formulation of Problem

Hypothesis; Nominal and Operational Definition

Designing Research Proposal

Ethical aspects of Research

Literature Search – Print, Non-print and Electronic sources

Unit-3 Research Methods

Scientific, Historical and Descriptive Methods

Survey Method and Case Study Method

Experimental Method and Delphi Method

Unit-4 Research Techniques and Tools

Questionnaire, Interview and Observation

Scales and Check lists

Library Records and Reports

Sampling Techniques

Unit-5 Data Analysis and Interpretation

Descriptive Statistics-Measures of Central Tendency: Mean, Mode, Median

Tabulation and Generalisation

Measures of dispersion, variance and covariance, correlation, regression

Standard Deviation

Graphical presentation of data- bar, pie, line graphs, histograms etc.

Inferential Statistics

Unit-6 Research Reporting

Structure, Style, Contents

Guidelines for Research Reporting

Part - 2

Core Subject (50 %) (UGC – NET Paper II Syllabus)

Unit – I

1. Data, Information, Knowledge and Wisdom.
2. Information Life Cycle - Generation, Collection, Storage and Dissemination.
3. Role of Information in Planning, Management, Socio-economic, Cultural, Educational and Technological Development.
4. Information Science - Relationship with other subjects, Information Society and Knowledge Society.
5. Communication – Concept, Types, Theories, Models, Channels and Barriers; Trends in Scholarly Communication.
6. Information Industry - Generators, Providers and Intermediaries.
7. IPR and Legal Issues - Categories, Conventions, Treaties, Laws.
8. Plagiarism: Concept and Types.
9. Right to Information Act (RTI); Information Technology Act.
10. National Knowledge Commission; National Mission on Libraries.

Unit – II

1. Historical Development of Libraries in India; Committees and Commissions on Libraries in India.
2. Types of Libraries – Academic, Public, Special and National.
3. Library Legislation and Library Acts in Indian States; The Press and Registration of Books Act; The Delivery of Books and Newspapers (Public Libraries) Act.
4. Laws of Library Science.
5. Library and Information Science Profession - Librarianship as a Profession, Professional Skills and Competences; Professional Ethics.
6. Professional Associations - National – ILA, IASLIC, IATLIS; International – IFLA, ALA, CILIP, ASLIB, SLA; Role of UGC, RRRLF and UNESCO in Promotion and Development of Libraries.
7. Library and Information Science Education in India.
8. Library Public Relations and Extension Activities.
9. Type of Users - User Studies, User Education.
10. Information Literacy - Areas, Standards, Types and Models; Trends in Information Literacy.

Unit – III

1. Information Sources - Nature, Characteristics, Types and Formats.
2. Sources of Information - Primary, Secondary and Tertiary; Documentary and Non-Documentary.
3. Primary Information Sources (Print and Electronic) - Journals, Conference Proceedings, Patents, Standards, Theses & Dissertations, Trade Literature.

4. Secondary Information Sources (Print and Electronic) - Dictionaries, Encyclopedias, Bibliographies, Indexing & Abstracting, Statistical sources, Handbooks and Manuals.

5. Tertiary Information Sources (Print and Electronic)- Directories, Year Books, Almanacs.

6. Reference Sources - Bibliographical, Biographical, Educational, Language and Geographical.

7. Electronic Information Resources - Subject Gateways, Web Portals, Bulletin Boards, Discussion Forums /Groups.

8. Databases: Bibliographic, Numeric, Full text, Multimedia; Open Access Databases.

9. Institutional and Human Resources.

10. Evaluation of Reference Sources and Web Resources.

Unit - IV

1. Community Information Services.

2. Reference Service – Concept and Types; Referral Services

3. Alerting Services - CAS, SDI, Inter Library Loan and Document Delivery.

4. Mobile based Library Services and Tools – Mobile OPAC, Mobile Databases, Mobile Library Website, Library Apps, Mobile Library Instructions, Augmented Reality, SMS Alerts, Geo-Location, Reference Enquiry.

5. Web 2.0 and 3.0 - Library 2.0- Concept, Characteristics, Components; Instant Messaging, RSS Feeds, Podcasts, Vodcasts, Ask a Librarian

6. Collaborative Services- Social Networks, Academics Social Networks, Social Tagging, Social Bookmarking.

7. Web – Scale Discovery Services

8. National Information Systems and Networks: NISCAIR, DESIDOC, SENDOC, ENVIS, INFLIBNET, DELNET, NICNET, ERNET, National Knowledge Network (NKN), Biotechnology Information System Network

9. International Information Systems and Networks: INIS, AGRIS, INSPEC, MEDLARS, BIOSIS, ERIC, Patent Information System (PIS), Biotechnology Information System (BIS).

10. Library Resource Sharing and Library Consortia – National and International.

Unit - V

1. Universe of Knowledge - Nature and Attributes; Modes of Formation of Subjects.

2. Knowledge Organisation - Classification – Theories, Cannons, and Principles; Simple Knowledge Organisation System (SKOS), Taxonomies, Folksonomy, Trends in Classification.

3. Mapping of Subjects in Library Classification Schemes – DDC, UDC and CC.

4. Knowledge Organisation: Cataloguing - Cannons and Principles; Centralized and Co-operative Catalogue; Library Cataloguing Codes: CCC and AACR - II.

5. Standards of Bibliographic Record Formats and Description – ISBD, MARC 21, CCF, RDA, FRBR, Bibframe.

6. Standards for Bibliographic Information Interchange & Communication – ISO 2709, Z39.50, Z39.71.

7. Metadata Standards: Dublin Core; MARC21, METS, MODES, EAD.

8. Indexing Systems and Techniques: Assigned - Pre-coordinate; Post-Coordinate; Derived- Title-based; Vocabulary Control.

9. Abstracting – Types and Guidelines.

10. Information Retrieval System – Features, Components, Models and Evaluation.

Unit - VI

1. Management - Principles, Functions and Schools of thought.
2. Library and Information Centers Management - Book Selection Tools and Principles; Library Acquisition, Technical Processing, Circulation, Serial Control, Maintenance and Stock Verification; Preservation and Conservation; Hazards and Control Measures of Library Materials.
3. Human Resource Management – Planning, Job Analysis, Job Description, Job Evaluation, Selection, Recruitment, Motivation, Training and Development, Performance Appraisal; Staff Manual.
4. Financial Management in Libraries - Sources of Finance, Resource Mobilisation, Budgeting Methods; Cost Effective and Cost Benefit Analysis, Annual Reports & Statistics; Library Authority and Committee.
5. Project Management - SWOT, PEST, PERT / CPM.
6. Total Quality Management (TQM) - Concepts, Principles and Techniques, Six Sigma; Evaluation of Services of Libraries and Information Centers.
7. Library Building, Furniture and Equipments; Green Library Building; Information Commons; Makers Space; Security and Safety.
8. Management Information System (MIS), MBO, Change Management, Disaster Management, Crisis Management.
9. Knowledge Management – Principles, Tools, Components and Architecture.
10. Marketing of Library Products and Services – Plan, Research, Strategies, Mix, Segmentation, Pricing and Advertising; Management Consultancy.

Unit - VII

1. Computer Technology - Character Representation (ASCII, ISCII, Unicode); Computer Hardware, Software; Storage Devices; Input and Output Devices.
2. Types of Software - System Software, Application Software.
3. Programming Languages – Object Oriented, Procedural, High Level, Scripting; Web Languages.
4. Telecommunication - Transmission Channels, Mode, and Media, ISDN, PSDN, Multiplexing, Modulation, Standards and Protocols.
5. Wireless Communication – Media, Wi-fi, Li-fi, Satellite Communication, Mobile Communication.
6. Computer Networks - Topologies, Types of Networks – LAN, MAN, WAN.
7. Internet - Web browsers, WWW, E-mail; Search Engines, Meta and Entity Search engines.
8. Internet Protocols and Standards – HTTP, SHTTP, FTP, SMTP, TCP/IP, URI, URL.
9. Hypertext, Hypermedia, Multimedia, Video conferencing, Virtual Reality, Augmented Technologies.
10. Data Security, Network Security, Firewalls, Cryptographic Techniques, Anti-virus software, Anti-spyware, Intrusion Detection System.

Unit – VIII

1. Library Automation – Areas, Planning, Selection of Hardware and Software, Implementation and Evaluation; Standards for Library Automation.
2. Barcode, RFID, QR Code, Biometric, Smartcard: Features and Applications.
3. Digitization – Planning, Selection of Materials, Hardware, Software, Process, Issues.

4. Digital Library: Genesis, Characteristics, Types, Architecture; Standards, Formats and Protocols, DOI.

5. Digital Preservation - Need, Purpose, Standards, Methods, Techniques, Projects (National and International).

6. Digital Library Initiatives – National and International.

7. Institutional Repositories - Need, Purpose, Types and Tools; Institutional Repositories in India; ROAR, DOAR, SHARPA-ROMIO.

8. Content Management Systems – Architecture, Data Integration, CMS Software – Selection, Implementation and Evaluation.

9. Application of Artificial Intelligence, Expert Systems and Robotics in Libraries; Social Mobile Analytics Cloud (SMAC); Cloud Computing.

10. Ontology – Tools (RDF, RDFS, Potege); Semantic Web, Linked Data, Big Data, Data Mining, Data Harvesting.

Unit – IX

1. Research - Concept, Purpose, Functions, Scope and Ethics; Types of Research – Basic and Applied, Interdisciplinary and Multidisciplinary.

2. Research Methods: Historical, Descriptive, Experimental and Delphi.

3. Research Design - Selection of Research Problem, Review of Literature; Formulation of Research Problem; Hypothesis – Formulation, Types and Testing; Sampling Techniques.

4. Methods of Data Collection: Questionnaire, Interview, Observation, Library Records, Scales and Checklist.

5. Data Analysis and Interpretation - Presentation of Data; Statistical Methods/ Techniques.

6. Statistical Packages – Spreadsheet, SPSS, Bibexcel, 'R' Statistics.

7. Research Report Writing and Citation Tools – Structure, Style, Contents, Guidelines; Style Manuals; Online Citation Tools; Reference Style Management Tools; Anti-plagiarism Tools; Evaluation of Research Report.

8. Metric Studies in LIS - Bibliometrics, Scientometric, Webometrics, Altmetrics;

9. Impact Factors – Journal, Institutional and Authors; h-Index, g-Index, i10 Index.

10. Trends in Library and Information Science Research.

Unit –X

1. Academic Library and Information System.
2. Public Library and Information System.
3. Special Library and Information System.
4. Health Science Library and Information System.
5. Corporate Library and Information System.
6. Agricultural Library and Information System.
7. Engineering and Technological Library and Information System.
8. Archive, Museums and Oriental Libraries.
9. Community Information System.
10. Information Services and System for Persons with Disability, Children and Women

Ph.D. Entrance Test Syllabus– 2022
Management
Part – I Research Methodology (50 %)

Unit - I

Foundations of Research: Meaning, Objectives, Motivation, Utility - Concept of theory, empiricism, deductive and inductive theory- Characteristics of scientific method - Understanding the language of research - Concept, Construct, Definition, Variable- Research Process

Unit - II

Problem Identification & Formulation – Management Question – Research Question – Investigation Question – Measurement Issues - Hypothesis - Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance

Unit - III

Research Design: Concept and Importance in Research - Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental Design: Causal relationships, Concept of Independent & Dependent variables, concomitant variable, extraneous variable, Treatment, Control group

Unit - IV

Qualitative and quantitative research: Qualitative research - Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches

Unit - V

Measurement: Concept of measurement– what is measured? Problems in measurement in management research - Validity and Reliability. Levels of measurement - Nominal, Ordinal, Interval, Ratio

Unit - VI

Attitude Scaling Techniques: Concept of Scale – Rating Scales viz. Likert Scales, Semantic Differential Scales, Constant Sum Scales, Graphic Rating Scales – Ranking Scales – Paired Comparison & Forced Ranking

Unit - VII

Types of Data: Secondary Data - Definition, Sources, Characteristics. Primary Data - Definition, Advantages and disadvantages over secondary data, Observation method, Questionnaire Construction, Personal Interviews, Telephonic Interview, Mail Survey, Email/Internet survey

Unit - VIII

Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non-Response - Characteristics of a good sample - Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Non-Probability Sample – Judgment, Convenience, Quota & Snowballing methods. Determining size of the sample - Practical considerations in sampling and sample size

Unit - IX

Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations - Hypothesis formulation, level of signification, degree of freedom, t-test, F-test, Chi-square test, ANOVA, Z-test

Unit - X

Interpretation of Data and Report Writing - Layout of a Research Report

Part – II (Core Subjects)(50 %)(UGC NET Paper II Syllabus)

Unit – I

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

Unit – II

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

Unit – III

- Strategic Role of Human Resource Management Competency Mapping & Balanced Scoreboard Career Planning and Development
- Performance Management and Appraisal
- Organization Development, Change & OD Interventions Talent Management & Skill Development
- Employee Engagement & Work Life Balance
- Industrial Relations: Disputes & Grievance Management, Labour Welfare and Social Security
- Trade Union & Collective Bargaining
- International Human Resource Management – HR Challenge of International Business
- Green HRM

Unit– IV

- Accounting Principles and Standards, Preparation of Financial Statements
- Financial Statement Analysis – Ratio Analysis, Funds Flow and Cash Flow Analysis, DuPont

Analysis

- Preparation of Cost Sheet, Marginal Costing, Cost Volume Profit Analysis Standard Costing & Variance Analysis
- Financial Management, Concept & Functions
- Capital Structure – Theories, Cost of Capital, Sources and Finance Budgeting and Budgetary Control, Types and Process, Zero base Budgeting
- Leverages – Operating, Financial and Combined Leverages, EBIT–EPS Analysis, Financial Breakeven Point & Indifference Level.

Unit –V

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

Unit - VI

- Strategic Management – Concept, Process, Decision & Types
- Strategic Analysis – External Analysis, PEST, Porter's Approach to industry analysis, Internal Analysis – Resource Based Approach, Value Chain Analysis
- Strategy Formulation – SWOT Analysis, Corporate Strategy – Growth, Stability, Retrenchment, Integration and Diversification, Business Portfolio Analysis - BCG, GE Business Model, Ansoff's Product Market Growth Matrix
- Strategy Implementation – Challenges of Change, Developing Programs Mckinsey 7s Framework
- Marketing – Concept, Orientation, Trends and Tasks, Customer Value and Satisfaction
- Market Segmentation, Positioning and Targeting
- Product and Pricing Decision – Product Mix, Product Life Cycle, New Product development, Pricing – Types and Strategies
- Place and promotion decision – Marketing channels and value networks, VMS, IMC, Advertising and Sales promotion

Unit –VII

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

and Green Marketing
- International Marketing – Entry Mode Decisions, Planning Marketing Mix for International Markets

Unit –VIII

- Statistics for Management: Concept, Measures of Central Tendency and Dispersion, Probability Distribution – Binominal, Poison, Normal and Exponential
- Operations Management – Role and Scope
- Facility Location and Layout – Site Selection and Analysis, Layout – Design and Process
- Enterprise Resource Planning – ERP Modules, ERP implementation Scheduling; Loading, Sequencing and Monitoring
- Quality Management and Statistical Quality Control, Quality Circles, Total Quality Management – KAIZEN, Benchmarking, Six Sigma; ISO 9000 Series Standards
- Operation Research – Transportation, Queuing Decision Theory, PERT / CPM

Unit –IX

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

Unit – X

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

Ph.D. Entrance Test - SYLLABUS – 2022

Mathematics

Part- 1

(Research Methodology) (50 %)

Graph Theory:

Graph, degree of a vertex, path, cycle, connected and disconnected graphs, Planner graphs, components, Hamiltonian Path and Cycles, Trees, Euler graph, Hamiltonian Paths and circuits, Coloring of graphs, chromatic number, chromatic polynomial, Matching and Factors.

Discrete Mathematics:

Counting rules and Pigeon hole principle, Permutation & Combination, Lattices as partially ordered sets, Properties of Lattices, Lattices as algebraic systems, Sublattices, Direct product and Homomorphisms of Lattices, Some Special Lattices, Finite Boolean Algebras, Functions on Boolean Algebras, Karnaugh Map Method, Propositions and Logical operations, Truth tables, Conditional statements and Logical Equivalence, Quantifiers, Rules of Inference

Differential Geometry:

Local theory of curves, Frenet – Serret apparatus, First Fundamental form and arc length, Normal curvature, Geodesic curvature and Gauss formulae, Shape operator Lp of a surface at a point, vector field a curve, Second and third fundamental forms of a surface, Gaussian curvature, Riemannian curvatures, Gauss theorem ofEgregium.

Number Theory:

Congruences, Linear Congruences and their solutions, Chinese Remainder Theorem, Primitive roots, Arithmetic Functions, Farey Fractions and Approximation of Irrationals by Rationals, Hurwitz's Theorem, Periodic Continued Fractions, Pell's Equations, Diophantine Equations, Pythagorean Tripletes, Some other Examples

Numerical Analysis:

Solution of simultaneous algebraic equations introduction, Gauss elimination method, refinement of the solution obtained by Gaussian elimination, Gauss-Seidel iterative method, comparison of direct and iterative methods. Interpolation introduction, Lagrange interpolation, difference tables.

Linear Algebra:

The Algebra of linear transformations, Characteristic roots, Matrices, Nilpotent linear transformations, The primary decomposition theorem, Jordan Form, Rational canonical Form,

Hermitian, Unitary and Normal transformations, Trace and Transpose, Determinants, Cramer's rule, Cayley-Hamilton theorem, Bilinear Forms.

Part - 2

Core Subject (50 %) CSIR-UGC National Eligibility Test (NET)

UNIT - 1

Analysis: Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum.
Sequences and series, convergence, limsup, liminf.
Bolzano Weierstrass theorem, Heine Borel theorem.
Continuity, uniform continuity, differentiability, mean value theorem. Sequences and series of functions, uniformconvergence.
Riemann sums and Riemann integral, ImproperIntegrals.
Monotonic functions, types of discontinuity, functions of bounded variation, Lebesgue measure, Lebesgue integral.
Functions of several variables, directional derivative, partial derivative, derivative as a linear transformation, inverse and implicit function theorems.
Metric spaces, compactness, connectedness. Normed linear Spaces. Spaces of continuous functions as examples.

Linear Algebra: Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations.
Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem.
Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms.

Inner product spaces, orthonormal basis.

Quadratic forms, reduction and classification of quadratic forms

UNIT - 2

Complex Analysis: Algebra of complex numbers, the complex plane, polynomials, power series, transcendental functions such as exponential, trigonometric and hyperbolic functions. Analytic functions, Cauchy-Riemann equations.
Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem.
Taylor series, Laurent series, calculus of residues.
Conformal mappings, Mobius transformations.

Algebra: Permutations, combinations, pigeon-hole principle, inclusion-exclusion principle, derangements.
Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese Remainder Theorem, Euler's 0- function, primitive roots.

Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley's theorem, class equations, Sylow theorems.
Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain.
Polynomial rings and irreducibility criteria.
Fields, finite fields, field extensions, Galois Theory.

Topology: basis, dense sets, subspace and product topology, separation axioms, connectedness and compactness.

UNIT - 3

Ordinary Differential Equations (ODEs):
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, Green's function.

Partial Differential Equations (PDEs):
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.

Numerical Analysis :
Numerical solutions of algebraic equations, Method of iteration and Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolation, Numerical differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

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.

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, resolvent kernel.

Classical Mechanics:
Generalized coordinates, 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, theory of small oscillations.

UNIT - 4
Descriptive statistics, exploratory data analysis
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. Characteristic functions. Probability inequalities (Tchebyshef, Markov, Jensen). Modes of convergence, weak and strong laws of large numbers, Central

Limit theorems (i.i.d. case).
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.

Standard discrete and continuous univariate distributions. sampling distributions, standard errors and asymptotic distributions, distribution of order statistics and range.

Methods of estimation, properties of estimators, confidence intervals. Tests of hypotheses: most powerful and uniformly most powerful tests, 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, rank correlation and test for independence. Elementary Bayesian inference.

Gauss-Markov models, estimability of parameters, best linear unbiased estimators, confidence intervals, tests for linear hypotheses. Analysis of variance and covariance. Fixed, random and mixed effects models. Simple and multiple linear regression. Elementary regression diagnostics. Logistic regression.

Multivariate normal distribution, Wishart distribution and their properties. Distribution of quadratic forms. Inference for parameters, partial and multiple correlation coefficients and related tests. Data reduction techniques: Principle component analysis, Discriminant analysis, Cluster analysis, Canonical correlation.

Simple random sampling, stratified sampling and systematic sampling. Probability proportional to size sampling. Ratio and regression methods.

Completely randomized designs, randomized block designs and Latin-square designs. Connectedness and orthogonality of block designs, BIBD. 2^k factorial experiments: confounding and construction.

Hazard function and failure rates, censoring and life testing, series and parallel systems.

Linear programming problem, simplex methods, duality. Elementary queuing and inventory models. Steady-state solutions of Markovian queuing models: M/M/1, M/M/1 with limited waiting space, M/M/C, M/M/C with limited waiting space, M/G/1.

Ph.D. Entrance Test - SYLLABUS - 2022

PHYSICAL EDUCATION

PART - 1
RESEARCH METHODOLOGY (50%)

૧) સંશોધન પરિચય
- સંશોધનનો અર્થ, મહત્વ, પ્રકૃતિ
- શારીરિક શિક્ષણમાં સશોધન ક્ષેત્રો, સંશોધનો
- સંશોધકોના લક્ષણો

૨) સમસ્યા
- સમસ્યા–શોધ અને અર્થ
- ઉદભવ અને સ્ત્રોત
- પસંદગી અને ધોરણો
- કથન અને અર્થઘટન
- સમસ્યાના પ્રકાર
- સંશોધન રૂપ રેખા
- શારીરિક શિક્ષણ અને રમત ગમતમાં સમસ્યા ક્ષેત્રો

૩) ઉત્કલ્પના
- ઉત્કલ્પનાનો અર્થ, મહત્વ, લક્ષણો, કથન અને સ્ત્રોત
- ઉત્કલ્પનાના પ્રકાર

૪) નમુનો
- નમૂનાનો અર્થઘટન લક્ષણો અને તેના પ્રકારો
- નમુના પસંદગીની પ્રક્રિયા અને નમુના ભૂલ

૫) સંશોધન ઉપકરણો
- સંશોધન ઉપકરણ એટલે શું ?
- ઉપકરણોની વિશેષતાઓ અને પ્રકાર
- સંશોધન પદ્ધતિઓ અને પ્રકારો

૬) સંશોધનમાં આંકડાશાસ્ત્ર

૭) સંશોધન અહેવાલ

૮) આલેખ

૯) T-ટેસ્ટ, F-ટેસ્ટ, કાઈ સ્કેવર, Z-ટેસ્ટ

૧૦) આંકડાશાસ્ત્રીય માહિતીનું અર્થઘટન અને રજૂઆત

PART - 2

Core Subject Content (50%) (UGC NET Paper II Syllabus)

Unit -I:

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.

Unit -II:

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

Cardio respiratory adaptations to long and short term physical activities.

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- III:
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 – IV:
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 -V:
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 -VI:
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 -VII :
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 -VIII:
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 - IX:
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, skinfolds, body mass index, ponderal index.
Somatotype 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 - X:
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.
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Ph.D. Entrance Test - SYLLABUS - 2022

Physics

Part – 1

(Research Methodology) (50%)

Synthesis and characterization methods for Materials

Solid State Reaction (Ceramic) Method

General Principles, Experimental Procedure: Reagents, Mixing, Container Material, HeatTreatment, Analysis, Kinetics of Solid State Reaction, Disadvantages

Microwave Synthesis

Background & General Principle, Preparation of YBa2Cu3O7-δ Superconductor throughMicrowave Synthesis, Importance

Sol-gel Method

Principle, Lithium Niobate (LiNbO3), Doped Tin Dioxide

Co-precipitation Method

Co-precipitation as a precursor to Solid State Reaction, Advantages & Disadvantages,Synthesis of CMR Manganites

Thin Film Synthesis

Vacuum Evaporation, Sputtering, Spin Coating, Pulsed Laser Deposition (PLD)

Growth of Single Crystals

Introduction to Methods of Growth of Crystals, Czochralski Method, Bridgman andStockbarger Methods, Zone Melting and Zone Refining Methods, Impurity LevelingFactor, Verneuil Method, Molten Flux Method.

Vapor Phase Transport Methods and Thin Film Growth

Hydrothermal Methods, Vapor Methods, Fundamental of Epitaxial Growth of Thin Layers.

X-ray Diffraction

X-rays and their Generation, Diffraction: Diffraction of Light by an Optical Grating,Crystals and the Diffraction of X-rays, d-spacing & Unit Cell Formulae, Overview of Powder Diffractometer, Effect of Crystal Size on the Powder Pattern; Particle Size Measurement, Effect of Stresson a Powder Pattern, Refinement of Unit Cell Parameters and Indexing of PowderPatterns, A Powder Pattern as a Crystal‟s „Fingerprint‟, Structure Determination fromPowder Patterns, Powder Patterns Calculated from Crystal Structure Data, Influence ofCrystal Symmetry and Multiplicities on Powder Patterns.

Imaging Techniques (Microscopy)

Scanning Electron Microscopy (SEM)

Physical Basis and Primary Modes of Operation, Instrumentation, Sample Requirements, FESEM, Advantages over conventional SEM, Applications

Transmission Electron Microscopy (TEM)

Basic Principle, Resolution, Sensitivity, TEM Operation, Image Mode, Specimen Preparation

Scanning Tunneling Microscopy (STM) and Scanning Force Microscopy (SFM)

Introduction, Instrumentation, Topography, Profilometry, Sample Requirements

Resistivity

Two point-four point probes, Derivation of four point probe expression, Correction factors, Measurement errors and precautions factors:- sample size, Carrier injection, probe spacing, current, temperature, surface preparation, high sheet resistance material,
Van der Pauw method – measurement of arbitrary shape samples

Dielectric Study

Dielectric materials, types of polarizability, dielectric behavior with frequency, introduction to Cole- Cole plot, Ferro-electricity, P-E loop.

UV-Vis

Introduction, principle of UV-vis spectroscopy, Beer-Lambert‟s law, molar absorbility, absorbing species, containing π, σ and η electrons, charge transfer absorption, Instrumentation of UV-vis spectroscopy: Radiation Sources, Wavelength Selectors, Monochromators, Sample Handling, Detectors, Signal Processing and Output Devices, Types of UV-Visible Spectrometers: Single Beam Spectrometers, Double Beam
Spectrometers, Photodiode Array Spectrometer, applications

FT-IR

What is FT-IR, Why IR spectroscopy, Principle of IR spectroscopy, Theory of infrared absorption, vibrational modes, infrared ranges, Typical Instrumentation, use of FT-IR, typical spectral analysis

Magnetometry

Basic principle, Vibrating sample magnetometer, SQUID magnetometer

Thermogravimetry

Principle, Apparatus, application, Differential thermal analysis and Differential Scanning Calorimetry, Principles, Apparatus and Applications

Radiation sources, Radiation interactions, Radiation detectors – gas filled detectors – scintillation detectors – semiconductor detectors

Introduction to production of X-ray & X-ray spectra, Instrumentation, X-ray generation,collimators, filters, detectors, X-ray absorption methods, X-ray fluorescence methods, XF– Spectrometer (XFS), Electron spectroscopy for chemical analysis (ESCA)

Nuclear Magnetic Resonance (NMR) spectroscopy, basic principles, nuclear magneticenergy levels, magnetic resonance, NMR SpectrometerElectron Spin Resonance spectroscopy, ESR spectrometer, ESR spectra, Hyperfineinteractions.

Mass spectroscopy – principle, spectrometer, and its operation, resolution, Mass spectrum, applications Infrared Spectroscopy, correlation of IR spectra with molecular structure, Instrumentation.

Mossbauer Spectroscopy – Mossbauer effect, spectrometer, 57 Fe Mossbauer spectroscopy, nuclear hyperfine interactions Neutron diffraction, neutron diffractometer (position sensitive diffractometer).

Numerical Analysis and Computer Awareness

Methods of solving of linear and non-linear algebraic equations, transcendentalequations, Convergence of Solutions, Solution of simultaneous linear equations, Gaussianelimination

Finite differences, interpolation with equally spaced and unevenly spaced points, Curvefitting, Polynomial, Least squares and Cubic Spline fitting

Numerical differential and integration, error estimates. Numerical solutions of ordinarydifferential equations – Euler and Runge-Kutta methodsHarmonic Analysis and FFT techniques.

Elementary information about digital computers, Introduction to compilers and Operatingsystems.

MS Office, Excel, Power Point, Internet Awareness

Part - 2

(Core subject) (50%)

CSIR-UGC National Eligibility Test (NET) for Junior Research Fellowshipand Lecturer-ship

PHYSICAL SCIENCES

PART 'A' CORE

I. Mathematical Methods of Physics

Vector algebra and vector calculus. Linear algebra, matrices, Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel, Laguerre and Legendre functions). Fourier series, Fourier and Laplace transforms. Elements of complex analysis, analytic functions; Elementary probability theory, random variables, binomial, Poisson and normal distributions.

II. 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-moment of inertia tensor. Non-inertial frames and pseudoforces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws and cyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity-Lorentz transformations, relativistic kinematics and mass-energy equivalence.

III. Electromagnetic Theory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at interfaces. Scalar and vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields.

IV. Quantum Mechanics

Wave-particle duality. Schrodinger 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.

V. 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.

VI. 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.

Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting,

PART 'B' ADVANCED

I. Mathematical Methods of Physics

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. Finite difference methods.

II. Classical Mechanics

Dynamical systems, Phase space dynamics, stability analysis. Poisson brackets and canonical transformations. Symmetry, invariance and Noether's theorem. Hamilton-Jacobi theory.

III. Electromagnetic Theory

Dispersion relations in plasma. Lorentz invariance of Maxwell's equation. Radiation- from moving charges and dipoles and retarded potentials.

IV. Quantum Mechanics

Spin-orbit coupling, fine structure. WKB approximation. Elementary theory of scattering: phase shifts, partial waves, Born approximation. Relativistic quantum mechanics: Klein-Gordon and Dirac equations.

V. **Thermodynamic and Statistical Physics**

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.

VI. **Electronics and Experimental Methods**

Linear and nonlinear curve fitting, Transducers (temperature, pressure/vacuum, magnetic fields, vibration, optical, and particle detectors) Impedance matching, amplification (Op-amp based, instrumentation amp, feedback), filteringand noise reduction, shielding and grounding. Fourier transforms, modulation techniques.

High frequency devices (including generators and detectors).

VII. **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.

VIII. **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. 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. kinds of liquid crystalline order. Quasi crystals.

IX. **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, Evidence of shell structure, single-particle shell model, its validity and limitations. 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.). Quark model, baryons and mesons. C, P, and T invariance.. Parity non-conservation in weak interaction.

Ph.D. Entrance Test - SYLLABUS - 2022

Psychology

Part: 1

(Research Methodology) (50%)

UNIT-1 Research and Psychology.
Meaning of research – objectives of Research – Types of Research – Significance of Research – Research Methods V/s. Methodology – Importance of knowing how Research is Done – Research Process – Criteria of Good Research – Problems encountered by Researchers in India.
Methods of Psychological research: Experimental, quasi experimental, case studies, field studies and cross cultural studies.

UNIT-2 : Selecting the Research Problem :
What is Research Problems – Selecting the problem – Necessity of defining the problem – Technique involved in defining problem –Meaning and types of variables –meaning and types of Hypotheses –characteristics of a good hypothesis, Suggestions for hypothesis construction.

UNIT-3 : Research Design :
Meaning of Research Design - Need for Research Design – Features of a Good Design – Important concepts relating to Research Design – Different types research design and testing causal hypothesis.

UNIT: 4 Sampling
Meaning and types of Sampling- Probability and non- Probability Sampling Methods, Need of Sampling- Random Sampling- simple and stratified random sampling- other types of sampling

UNIT-5: Tools of Research:
Questionnaire – Interview – Observation- Survey Method – Rating Scales – other tools : Check list – Socio-metry – Q sort technique – the Semantic Differential technique and Psychological Testing, Characteristics of a good Psychological Test- Types of Reliability and Validity of Psychological Test.

Part: 2

(Core Subject Content) (50%) (UGC NET Paper II Syllabus)

1. Emergence of Psychology

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

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

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

2. 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.

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.

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. Neuroplasticity.
Methods of Physiological Psychology: Invasive methods – Anatomical methods, degeneration techniques, lesion techniques, chemical methods, microelectrode studies. Non-invasive methods – EEG, Scanning methods.
Muscular and Glandular system: Types and functions
Biological basis of Motivation: Hunger, Thirst, Sleep and Sex.
Biological basis of emotion: The Limbic system, Hormonal regulation of behavior.
Genetics and behavior: Chromosomal anomalies; Nature-Nurture controversy [Twin studies and adoption studies]

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: Neurophysiology of learning
Memory and Forgetting
Memory processes: Encoding, Storage, Retrieval

Stages of memory: Sensory memory, Short-term memory (Working memory), Long-term Memory (Declarative – Episodic and Semantic; Procedural)
Theories of Forgetting: Interference, Retrieval Failure, Decay, Motivated forgetting

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

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].

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.

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

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 wellbeing [Hedonic and Eudemonic], Character strengths, Resilience and Post-Traumatic Growth.
Health: Health promoting and health compromising behaviors, Life style and Chronic diseases [Diabetes, Hypertension, Coronary Heart Disease], Psychoneuroimmunology [Cancer, HIV/AIDS]
Psychology and technology interface: Digital learning; Digital etiquette: Cyber bullying; Cyber pornography: Consumption, implications; Parental mediation of Digital Usage.

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SANSKRIT

Part - 1

Research Methodology (50%)

1 संशोधन : अर्थ, प्रकार, स्वरूप और उद्देश्य

2 शोधनिबन्धलेखन : विषयचयन, स्वरूप और लेख्यप्रक्रिया,शोधनिबन्धके प्रकार, सन्दर्भग्रन्थ-सूचीकरण

3 प्राचीन भारतीय लेखन सामग्री और लिपि के प्रकार
हस्तप्रतविज्ञान: हस्तप्रत के विविध प्रकार, आदर्श लिपिकार के लक्षण, हस्तप्रतों के सङ्ग्रहस्थान, विवरणात्मक सूचियाँ (केटलोग्स)

4 हस्तलिखित पाठ्यग्रन्थों में प्रविष्ट अशुद्धियाँ, पाठान्तर, लुप्तांश और प्रक्षेपांश

5 संस्कृत पाठसमीक्षा :अर्थ और महत्त्व
संमीक्षित संपादन के सोपान : Heuristics, Recention, EmendationऔरHigher Criticism
पाठ समीक्षा के अधिनियम और व्यवहारु सूचन
संस्कृत ग्रन्थों के पाठसम्पादन की समस्याएँ

6 समीक्षित आवृत्ति : रामायण, महाभारत, पञ्चतन्त्र, अभिज्ञानशाकुन्तल

7 संस्कृतऔर प्राच्यविद्या की संशोधन संस्थाओं का परिचय और उनकी शोध-प्रवृत्तियाँ

8 राष्ट्रीय स्तर के प्रसिद्ध शोधग्रन्थों और गुजरात में संशोधनकार्य का विवरण

Part - 2

Core Subject (50%) (UGC – NET Paper II Syllabus)

Unit - I

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: PururavāUrvaśī; Yama-yamī; Saramā-Paṇi ;Viśvāmitra-Nadī
- Brāhamaṇa-Literature
- Āraṇyaka Literature
- Vedāṅgas: Śikṣā; Kalpa; Vyākaraṇa; Nirukta; Chandas; Jyotiṣa

Unit - II

(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 :Śivasaṁkalpa , 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; Bṛhadārṇyaka ;Taittirīya; Śvetāśvatara
- Vedic Grammar, Nirukta and Vedic interpretation
- Ṛkprātiśākhya : Definitions of Samānākṣara ; Sandhyakṣara; Aghoṣa; Soṣman; Svarabhakti ; Yama ; Rakta; Saṁyoga; Pragṛhya ; Riphita
- Nirukta (Chapters-1 & 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:

Āchārya; Vīra; Hrada; Go; Samudra; Vṛtra; Āditya; Uṣas; Megha; Vāk; Udak; Nadī; Aśva; Agni; Jātavedas; Vaiśvānara; Nighaṇtu
Nirukta (Chapter-7; Daivatakāṇḍa)
Vedic Accent- Udātta, Anudātta and Svarita

Unit - III

(c) Darśana:

- General Introduction of major schools of Darśana with special reference to the following :

Pramāṇamīmānsā ;Tattvamīmānsā ; Ācāramīmānsā (Cārvāka , Jaina, Bauddha) Nyāya, Sāṁkhya, Yoga, Nyāya, Vaiśeṣika, mīmānsā

Unit - IV

(d) Darśana Literature: Special Study:

- Īśvarakṛṣna :Sāṁkhyakārikā - Satkāryavāda, Puruṣasvarūpa, Prakṛtisvarūpa, Sṛṣtikrama, Pratyaysarga, 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 ;Nyāyasidhāntamuktāvalī (AnumānaKhaṇḍa)
- Sarvadarśana-Saṁgraha ; Jainism ; Buddhism

Unit - V

(e) Grammar and Linguistics:

- General Introduction of the following grammarians:

Pāṇini ,Kātyāyana , Patañjali , Bhartṛhari , Vāmanajayāditya , Bhaṭṭojidīkṣita , Nāgeśabhaṭṭa , Kaiyyaṭa , Jainendra , Śākaṭāyana , Hemacandrasūri , Sārasvatavyākaraṇakāra.

PāṇinīyaŚikṣā.

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 - VI

(f) Specific Study of Grammar

- Definition :Saṁhitā, SaṁyogaGuṇa, 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 ,Viśvavāh , 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 , Edh , Ad , Us, Hu , Div , Ṣuñ , Tud , Tan, Kṛ , Rudh , Krīñ, Cur .
- Prayayānta- Nijant, Sannanta ,Yaṅanta , Yaṅluganta , Nāmdhātu.
- Ṛdanta - Tavya / Tavyat ,Anīyar , Yat , Ṇyat , Kyap , Śatṛ , Śānac , Ktvā , Kta , Ktavatu , Tumun , Ṇamul .
- Strīpratyaya- According to Laghusiddhāntakaumudī.
- KārakaPrakarana- According to Siddāntakaumudī .
- Parasmaipada and ĀtmanepadaVidhāna- According to Siddāntakaumudī .
- Mahābhāṣya (Paspaśāhnika)- 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 - VII

Sanskrit Literature, Poetics and Prosody

(a) General Introduction of following

- Bhāsa, Aśvaghośa ,kālidāsa, Śūdraka, Viśākhadatta, Bhāravi, Māgha, Harṣa, Bāṇabhaṭṭa, Daṇḍin, Bhavabhūti, Bhaṭṭanārāyaṇa, Bhilhaṇa, Shrīharṣa, Ambikādattavyāsa, PanditāKṣamārao, V. Raghavan, Shri Dhar Bhaskar Varnekar
- Schools of Sanskrit Poetics– Rasa, Alaṅkāra, Rīti, Dhwani, Vakrokti, Aucitya,
- Western Poetics– Aristotle, Longinus, Croche

Unit - VIII

(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(viiiUcchvāsa), Harṣacaritam (V Ucchvāsa),

Kādambarī (Śukanāsopadeśa)

- CampūKāvya- Nala Campū (I Ucchvāsa)
- Sāhityadarpaṇaḥ:

Definition of Kāvya, Refutation of other definitions of Kāvya, Śabdaśakti - Saṅketagraha; Abhidhā; Lakṣanā; Vyanjanā, Kāvyabheda (Chapter Fourth), Śravyakāvya (prose poetry and mix)

- Kāvyaprakaśa–

Kāvyalakṣhṇa, Kāvyaprayojana, Kāvyahetu, Kāvyabheda, Śabdaśakti, Abhihitānvayavāda, Anvitābhidhānvayavāda, concept of Rasa, discussion of Rasasūtra, Rasadoṣa, Kāvyaguṇa, Vyanjanāvriti (Fifth Chapter)

- Alaṁkāras –

Vakrokti; Anuprāsa, Yamaka, Śleṣa, Upamā, Rūpaka, Utprekṣā, Samāsokti, Apahnuti, Nidarśanā, Arthāntaranyāsa, Dṛṣṭānta, Vibhāvanā, Viśeṣokti, Svabhāvokti, Virodhābhāsa, Saṅkara, Sansṛṣṭi

- Dhvanyāloka (I Udyota)
- Vakroktijīvitam (I Unmeṣa)
- Bharata– Nāṭyaśāstram (First and Sixth Chapter)
- Daśarūpakam (First and Third Prakāśa)
- Chanda–

Āryā, Anuṣṭup, Indravajrā, Upendravajrā, Vasantatilakā, Upajāti, Vaṁśastha, Drutavilambita, Śālinī, Mālinī, Śikharṇī, Mandākrāntā, Hariṇī, Śārdūlavikrīḍita, Sragdharā

Unit - IX

Purāṇetihāsa, Dharmaśāstra and Epigraphy

(a) General introduction of the followings:

- 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, mahaPurāṇa and UpaPurāṇas, Purāṇic cosmology and Purāṇic legends

- General introduction of main Smṛitis.
- General introduction KauṭilīyaArthaśāstra
- Paleography –

History of the decipherment of Brāhmī script, Theories of the origin of Brāhmī Script

- Inscriptions- General introduction

Unit - X

(b) Specific study of the following

- Kauṭilīyaarthaśātra (First – Vinayadikarika)
- Manusmṛti (I, II and VII Adhyāyas)
- Yājñavalkyasmṛti (Vyavahārādhyaya only)
- Paleography and Inscriptions –
- Brahmi 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 Inscription of Rudradāman,
Hāthīgumphā inscription of Khāravela

- Gupta and Post-Gupta inscriptions –

Allahabad Pillar Inscriptions of Samudragupta,
Mandasor Pillar Inscription of Yasodharman,
Banāskherā Copper Plate Inscription of Harṣa,
Aihole Stone Inscription of Pulakeśīn II

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Sociology

Part -1
Research Methodology (50%)

Unit -1.Meaning,Nature and Methodological Approach in Social Research

- The Scientific Method
- The problems in the study of social phenomena: objectivity, fact and value
- Social Survey and anthropological approach, perspective from below, subaltern Dimensions

Unit -2 Qualitative Methods

- Survey techniques - meaning - Important Limitations
- Hypothesis
- Sampling
- Research Design:- Explanatory design, Descriptive design, Diagnostic, Experimental, Historical design , Comparative design
- Techniques of data collection

Unit – 3 **Qualitative Methods**

- Ethno methodology
- Symbolic Interactions
- Phenomenology
- Participant observation - Ethnography
- Interview guide - Case study method
- Content analysis - Oral History, Genealogy
- Group discussion, Focus Group discussion
- Census - N.S.S., Data search in Secondary Sources and Use
- (Book, Journals, Internet and Other Sources)

Unit – 4 **Statistics in Social Research**

- Meaning of statistics. Important Limitations.
- Scaling, Measures of Central tendency, Mean, Median, Mode
- Correlation Analysis - Tests of significance.
- Classification
- Dialogism Research - Objectivity, Validity, reliability
- Value neutrality
- Methodological dilemmas and issues in qualitative research.
- Interpretative Understanding
- Encounters in field work.

Part - 2
Core subject (50%) (UGC NET Paper II Syllabus)

Unit -1 : Sociological Theory

1. Classical Sociological Traditions

- Emile Durkheim
- Max Weber
- Karl Marx

2. Structure- Functionalism and Structuralism

- Bronislaw Malinowski
- A.R. RadcliffeBrown
- 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
- IrawatiKarve

Unit - 2 : Research Methodology and Methods

1. Conceptualizing Social Reality
- Philosophy of Science
- Scientific Method and Epistemology in Social Science
- Hermeneutic Traditions
- Objectivity and Reflexivity in Social Science
- Ethics and Politics

2. Formulating Research Design
- Reading Social Science Research, Data and Documents
- Induction and Deduction
- Fact, Concept and Theory
- Hypotheses, Research Questions, Objectives

3. Quantitative and Qualitative Methods
- Ethnography
- Survey Method
- Historical Method
- Comparative Method

4. Techniques
- Sampling
- Questionnaire and Schedule
- Statistical Analysis
- Observation, Interview and Case study
- Interpretation, Data Analysis and Report Writing

Unit -3 : Basic Concepts and Institutions

1. Sociological Concepts
- Social Structure
- Culture

- Network
- Status and Role
- Identity
- Community
- Diaspora
- Values, Norms and Rules
- Personhood, Habitus and Agency
- Bureaucracy, Power and Authority

2. Social Institutions
- Marriage, Family and Kinship
- Economy
- Polity
- Religion
- Education
- Law and Customs

3. Social Stratification
- Social Difference, Hierarchy, Inequality and Marginalization
- Caste and Class
- Gender, Sexuality and Disability
- Race, Tribe and Ethnicity

5. Social Change and Processes
- Evolution and Diffusion
- Modernization and Development
- Social Transformations and Globalization
- Social Mobility

Unit – 4 : Rural and Urban Transformations

1. Rural and Peasant Society
- CasteTribe Settlements
- Agrarian Social Structure and Emergent Class Relations
- Land Ownership and Agrarian Relations
- Decline of Agrarian Economy, DePeasantization 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

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Statistics

Part - 1
Research Methodology (50%)

1. Research Methodology Introduction:
   Meaning of research, characteristic of research, objectives of research, classification of research, kind of research, types of research, research and scientific research.
2. Defining the Research Problem:
   Research problem, selecting the problem, necessity and techniques of defining the problem
3. Research Design:
   Meaning of research design, need for research design, features of good design, importance of research design, different types of research design, basic principles of experimental design.
4. Sampling Design:
   Census and sample survey, implications and steps in sampling design, criteria and characteristic of good sample design, types of sample design.
5. Measures and Scaling Techniques:
   Measurement in research, measurement scales, sources of error in measurement, techniques of measurement tools, meaning of scaling and its classification.
6. Method of Data Collection:
   Collection of primary data, observation method, types of collection of data, other methods of data collection, collection of secondary data.

Part - 2
Core Subject (Statistics) (50%)

1. Exploratory data analysis and Descriptive Statistics: Random Variables, Types of Variable and Data Types, Graphical Displays of Sample Data, Histograms, Box plot, Scatter plot, Bar chart, Measures of Centre Tendency, Measures of Dispersion, Moments, Skewness and Kurtosis.
2. Theory of Probability: Basic Ideas, Definitions and Properties. Conditional Probability and Independent Events, Bays Formula.
3. Classical Probability Distributions:
   Discrete Distributions: Bernoulli, Binomial, Poisson, Negative Binomial, Geometric, Hyper geometric,
   Continuous Distributions: Normal, Uniform, Gamma, Beta distribution of first kind, Beta distribution of second kind, Exponential, Weibull, Cauchy, Central Limit Theorem.
4. Sampling Distributions: Chi-Square Distribution, t-distribution, F- distribution.

5. Statistical Inference and Hypothesis Testing: One sample tests, two sample tests, several sample tests. Applications: Case-Control Studies, Test of Association.
6. Correlation and Regression: Karl Pearson's Coefficient of Correlation, Spearman's rank correlation coefficient, Linear Regression.
7. Power series distribution: its mean, variance, mgf, cgf, and recurrence relations. Various discrete distributions as its particular cases.
8. Sampling distributions: Non central chi square, t and f – distributions and their properties. Distributions of quadratic form under normality.
9. Vector space, subspace, linear dependence and independence, basis, dimension of a vector space, example of vector spaces.
10. Null space, Special types of matrices: elementary operations, rank of a matrix. Orthonormal basis and orthogonal projection of a vector. Gram-Schmidt orthogonalisation, Kroneckar product. Idempotent matrices, inverse of a matrix, their Simple properties, Partitioned Matrices, Orthogonal matrices.
11. Characteristic roots of a matrix, algebraic and geometric multiplicities, characteristic vectors and their orthogonal property. Caley-Hamilton Theorem and applications.
12. Balanced incomplete block design, its properties, parametric relations, intra block analysis of BIB design. Finite group and finite field geometry projective and Euclidean. Mutually orthogonal lattice square design. Construction of (1) MOLS and (2) BIB designs using MOLS, PG (N, S), EG(N, S) and other methods.
13. General factorial experiment, main effects and interaction effects. 2^n and 3^n factorial experiment. Analysis of 2^n and 3^n factorial experiments in randomized block. Confounding experiments: complete partial and balanced confounding and its ANOVA table.
14. Control charts for measurements and attributes *x*, R, S, p, np. Charts with sub grouping, CUSUM chart, tabular form and V-mask use of these charts for process control. Moving average and exponentially weighted moving average charts
15. Linear programming problem (LPP): Theorems related to the development of Simplex algorithm, Proof of the theorems related to a basic feasible solution (b.f.s); Reduction of a feasible solution to a basic feasible solution, Improvement of a basic feasible solution, Existence of unbounded solution, Optimality conditions. For other related theorems, statements only.
16. Transportation problem: North-West method, Least – Cost method, Vogel's approximation method, Modi method.
17. Assignment Problem: Introduction, Mathematical Statement, Hungarian Method, Variations of assignment problem.
18. Nature of econometrics: the general model (GLM) and its existence. Ordinary least square (OLS) estimation and prediction. Use of dummy variables. Generalized least square (GLS) estimation and prediction. Heteroscedastic disturbance.
19. Auto correlation, its consequences and tests. Their BLUE procedure. Estimation and prediction. Multi co linearity problem, its implication and tools for handling the problem. Ridge regression