Rabindranath Tagore University
Raisen

Ph.D. Admission

Entrance Examination Syllabus

Faculty of Agriculture

SUBJECT: AGRONOMY (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Crop growth analysis in relation to environment; agro-ecological zones of India.
Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation, its interpretation and applicability; Baule unit. Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield. Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress.

UNIT-2

Water and its role in plants; water resources of India, major irrigation projects, extent
of area and crops irrigated in India and different states. Water movement in soil and plants; transpiration; soil-water-plant relationships; water absorption by plants; plant response to water stress, crop plant adaptation to moisture stress condition. Soil, plant and meteorological factors determining water needs of crops; scheduling, depth and methods of irrigation; micro- irrigation system; fertigation; management of water in controlled environments and poly- houses. Water management of the crops and cropping systems; quality of irrigation water and management of saline water for irrigation; water use efficiency. Excess of soil water and plant growth; water management in problem soils; drainage requirement of crops and methods of field drainage.

UNIT-3

Cropping systems: definition, indices and its importance; physical resources, soil and
water management in cropping systems; assessment of land use. Concept of sustainability in cropping systems and farming systems, scope and objectives; production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping, mechanism of yield advantage in intercropping systems. Above and below ground interactions and allelopathic effects; competition relations; multi-storied cropping and yield stability in intercropping, role of non-monetary inputs and low cost technologies; research need on sustainable agriculture. Crop diversification for sustainability; role of organic matter in maintenance of soil fertility; fertilizer use efficiency and concept of fertilizer use in intensive cropping system. Plant ideotypes for dryland; plant growth regulators and their role in sustainability.

UNIT -5

Organic farming - concept and definition, its relevance to India and global agriculture
and future prospects; land and water management - land use, minimum tillage; shelter zones, hedges, pasture management, agro-forestry. Organic farming and water use efficiency; soil fertility, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers. Control of weeds, diseases and insect pest management, biological agents and pheromones, biopesticides. Socio-economic impacts; marketing and export potential: inspection, certification, labeling and accreditation procedures; organic farming and national economy.

UNIT -6

Soil fertility and productivity - factors affecting; features of good soil management; problems of supply and availability of nutrients; relation between nutrient supply and crop growth Criteria of essentiality of nutrients; Essential plant nutrients – their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients. Commercial fertilizers; composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades; agronomic, chemical and physiological methods of increasing fertilizer use efficiency; nutrient interactions. Time and methods of manures and fertilizers application; foliar application and its concept; relative performance of organic and inorganic manures; economics of fertilizer use; integrated nutrient management; use of vermicompost and residue wastes in crops.

UNIT -7

Weed biology and ecology, crop-weed competition including allelopathy; principles and methods of weed control and classification; weed indices. Herbicides introduction and history of their development; classification based on chemical, physiological application and selectivity; mode and mechanism of action of herbicides. Herbicide structure - activity relationship; factors affecting the efficiency of herbicides; herbicide formulations, herbicide mixtures; herbicide resistance and management; weed control through bio-herbicides, myco- herbicides and allele-chemicals; Degradation of herbicides in soil and plants; herbicide resistance in weeds and crops; herbicide rotation. Weed management in major crops and cropping systems; parasitic weeds; weed shifts in cropping systems; aquatic and perennial weed control. Integrated weed management; cost : benefit analysis of weed management.

UNIT -8

Definition, concept and characteristics of dry land farming; dry land versus rainfed farming; significance and dimensions of dry land farming in Indian agriculture. Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dry land areas; types of drought, characterization of environment for water availability; crop planning for erratic and aberrant weather conditions. Stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies; preparation of appropriate crop plans for dry land areas; mid contingent plan for aberrant weather conditions. Tillage, tilth, frequency and depth of cultivation, compaction in soil tillage; concept of conservation tillage; tillage in relation to weed control and moisture conservation; techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); anti-transpirants; soil and crop management techniques, seeding and efficient fertilizer use. Concept of watershed resource management, problems, approach and components.

SUBJECT: AGRICULTURAL ECONOMICS (Ph.D. ENTRANCE TEST)

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SECTION II (60 MARKS 30 QUESTIONS)

UNIT -1

Theory of Consumer Behavior-Cardinal Utility Approach-Ordinal Utility Approach–
Income effect and substitution effect–Applications of Indifference curve approach- Revealed Preference Hypothesis–Consumer surplus-Derivation of Demand curve–Elasticity of demand. Theory of Production-`Production functions–Returns to scale and economies of scale–Technical progress–Theory of Costs–Cost curves–Profit maximization and cost minimization–Derivation of supply curve–Law of Supply–Producer's surplus. Market Equilibrium-Behavior of Firms in Competitive Markets–Perfect Competition-Effect of Taxation and Subsidies on market equilibrium-Monopoly-Monopolistic-Oligopoly-Theory of Factor Markets. General Equilibrium Theory-Welfare Economics-Pareto Optimality–Social welfare criteria-Social Welfare functions.

UNIT -2

Nature and Scope of Macro Economics-Methodology and Keynesian Concepts
National Income-Concepts and measurement-Classical theory of Employment and Say's Law-Modern theory of Employment and Effective Demand. Consumption function- Investment and savings-Concept of Multiplier and Accelerator-Output and Employment-Rate of interest-Classical, Neo classical and Keynesian version-Classical theory Vs Keynesian theory–Unemployment and Full employment. Money and classical theories of Money and Price. Inflation: Nature, Effects and control. IS & LM frame work-General Equilibrium of product and money markets-Monetary policy-Fiscal policy-Effectiveness of Monetary and Fiscal policy.

UNIT -3

Evolution of Economic Thought vs. Economic History. Ancient economic though–
medieval economic thought. Development of Classical Thoughts (Adam Smith, Robert Malthus and David Ricardo).The birth of neoclassical economic thought–Marshall and Walras–General Equilibrium Theory-Welfare Theory–Keynesian economics. The Era of globalization–Experiences of developing world. Economic Thought in India–Naoroji and Gokhale–Gandhian Economics -Economic thought of independent India–Nehru's economic philosophy-Experiences of the Structural adjustment programmes of the post liberalization era.

UNIT -4

Nature, scope and significance of agricultural production economics-Agricultural.
Factors of production, classification, interdependence, and factor substitution-Determination of optimal levels of production and factor application–Optimal factor combination and least cost combination of production-Theory of product choice; selection of optimal product combination. Cost functions and cost curves, components, and cost minimization Duality theory–cost and production functions and its applications-Derivation of firm's input demand and output supply functions. Measuring efficiency in agricultural production; technical, a locative and economic efficiencies.

UNIT -5

Agricultural marketing issues, and enhance expertise in improving the performance of
the marketing institutions and the players in marketing of agricultural commodities. Characteristic of Agricultural product and Production-Problems in Agricultural Marketing from Demand and Supply and Institutions sides. Market intermediaries and their role-Need for regulation in the present

context-Marketable & Marketed surplus estimation. Marketing Efficiency-Structure Conduct and Performance analysis-Vertical and Horizontal integration- Integration over space, time and form-Vertical coordination. Marketing Co-operatives– APMC Regulated Markets-Direct marketing, Contract farming and Retailing- Supply Chain Management-State trading, Warehousing and other Government agencies-Performance and Strategies–Market infrastructure needs, performance and Government role-Value Chain Finance. Role of Information Technology and telecommunication in marketing of agricultural commodities- Market research-Market information service-electronic auctions (e-bay), e- Chaupals, Agmarket and Domestic and Export market Intelligence Cell (DEMIC) price forecasting–time series analysis–time series models. Price policy and economic development–non-price instruments. Theory of storage future trading Price discovery- Hedging and Basis-Fundamental analysis-Role of Government in promoting commodity trading and regulatory measures.

UNIT -6

Knowledge related to research process, data collection and data analysis etc.
Importance and scope of research in agricultural economics. Types of research-Fundamental vs. Applied. Concept of researchable problem–research prioritization–selection of research problem. Hypothesis–meaning-characteristics-types of hypothesis–review of literature– setting of Course Objective and hypotheses-testing of hypothesis. Sampling theory and sampling design–sampling error-methods of sampling–probability and non-probability sampling methods. Project proposals– different types of projects to meet different needs. Research design and techniques–Types of research design. Data collection–assessment of data needs–sources of data collection. Mailed questionnaire and interview schedule. Scaling Techniques. Coding editing–tabulation– validation of data. Tools of analysis–data processing. Interpretation of results–Preparing research report / thesis–Universal procedures for preparation of bibliography–writing of research articles.

UNIT -7

Introduction–relationship between economic theory, mathematical economics, models
and econometrics, methodology of econometrics-regression analysis. Basic two variable regression-assumptions estimation and interpretation approaches to estimation-OLS, MLE and their properties-extensions to multivariable models-multiple regression estimation and interpretation. Multicolinearity, heteroscedasticity, autocorrelation. Use of dummy variables- limited dependent variables–specification, estimation and interpretation. Simultaneous equation models–structural equations-reduced form equations-identification and approaches to estimation.

UNIT-8

Linear programming techniques. Decision Making-Concepts of decision making,
introduction to quantitative tools, introduction to linear programming, uses of LP in different fields, graphic solution to problems, formulation of problems. Simple Method: Concept of simplex Method, solving profit maximization and cost minimizations problems. Formulation of farm and nonfarm problems as linear programming models and solutions. Extension of linear Programming models: dynamic programming. Game Theory- Concepts of game theory, two person constant sums, zero sum game.

UNIT -9

Role and Importance of Agricultural Finance. Financial Institutions and credit flow to rural/priority sector. Agricultural lending–Direct and Indirect Financing-Financing through Co-operatives, NABARD and Commercial Banks and RRBs. District Credit Plan and lending to agriculture/priority sector. Micro-Financing and Role of MFI's-NGO, and SHG's. Lending to farmers–The concept of 5C's, 7P's and 3R's of credit. Estimation of Technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of credit proposals. Understanding lenders and developing better working relationship and supervisory credit system. Credit inclusions–credit widening and credit deepening. Financial Decisions– Investment, Financing, Liquidity and Solvency. Preparation of financial statements-Balance Sheet, Cash Flow Statement and Profit and Loss Account. Ratio Analysis and assessing the performance of farm/firm. Project Approach in financing agriculture. Financial, economic and environ mental appraisal of investment projects. Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal techniques–Undiscounted measures. Time value of money–Use of discounted measures-B-C ratio, NPV and IRR.Agreements.Net work Techniques–PERT and CPM. Risks in financing agriculture. Risk management strategies and coping mechanism. Crop Insurance programmes–review of different crop insurance schemes-yield loss and weather based insurance and their applications.

SUBJECT: ENTOMOLOGY (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

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SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

External morphology of the insect's body i.e., head, thorax and abdomen, their appendages and functions. Principles, utility and relevance: insect body wall structure, cuticular outgrowths, colouration and special integumentary structures in insects, body tagmata, sclerites and segmentation. Head- Origin, **s**tructure and modification; types of mouthparts and antennae, tentorium and neck sclerites. Thorax- Areas and sutures of tergum, sternum and pleuron, pterothorax; Wings: structure and modifications, venation, wing coupling apparatus and mechanism of flight; Legs: structure and modifications. Abdomen- Segmentation and appendages; Genitalia and their modifications; Embryonic and post- embryonic development; Types of metamorphosis. Insect sense organs (mechano-, photo- and chemoreceptors). Structure, modification and physiology of different systems- digestive, circulatory, respiratory, excretory, nervous, sensory, reproductive, musculature, endocrine and exocrine glands. Thermodynamics; physiology of integument, moulting; growth, metamorphosis and diapause. Insect nutrition- role of vitamins, proteins, amino acids, carbohydrates, lipids, minerals and other food constituents; extra and intra-cellular microorganisms and their role in physiology; artificial diets.

UNIT-2

Brief evolutionary history of Insects- introduction to phylogeny of insects and Major Classification of Superclass Hexapoda – Classes – Ellipura (Collembola, Protura), Diplura and Insecta- Orders contained. Distinguishing characters, general biology, habits and habitats of Insect orders and economically important families contained in them. Collembola, Protura, Diplura. Class Insecta: Subclass Apterygota – Archaeognatha, Thysanura. Subclass: Pterygota, Division Palaeoptera – Odonata and Ephemeroptera. Division: Neoptera: Subdivision: Orthopteroid and Blattoid Orders (=Oligoneoptera): Plecoptera, Blattodea, Isoptera, Mantodea, Grylloblattodea, Dermaptera, Orthoptera, Phasmatodea, Mantophasmatodea, Embioptera, Zoraptera, Subdivision: Hemipteroid Orders (=Paraneoptera): Psocoptera, Phthiraptera, Thysanoptera and Hemiptera. Distinguishing characters, general biology, habits and habitats of Insect orders and economically important families contained in them (Continued). Division Neoptera – Subdivision Endopterygota, Section Neuropteroid-Coleopteroid Orders: Strepsiptera, Megaloptera, Raphidioptera, Neuroptera and Coleoptera, Section Panorpoid Orders Mecoptera, Siphonaptera, Diptera, Trichoptera, Lepidoptera, and Section Hymenopteroid Orders: Hymenoptera.

UNIT-3

History and Definition. Basic Concepts. Organization of the Biological world. Abundance and diversity of insects, Estimates and Causal factors. Study of abundance and distribution and relation between the two. Basic principles of abiotic factors and their generalized action on insects. Implications for abundance and distribution of organisms including insects- Law of the Minimum, Law of Tolerance, and biocoenosis, Systems approach to ecology. Basic concepts of abundance- Model vs Real world. Population growth basic models Exponential vs Logistic models. Discrete vs Continuous growth models. Balance of life in nature- Concepts of Carrying capacity, Environmental Resistance. Vital Statistics- Life Tables and their application to insect biology. Survivorship curves. Case studies of insect life tables. Population dynamics- Factors affecting abundance- Environmental factors, dispersal and migration, Seasonality in insects. Classification and mechanisms of achieving different seasonality- Diapause (Quiescence) - aestivation, hibernation. Biotic factors- Food as a limiting factor for distribution and abundance, Nutritional Ecology. Food chain- web and ecological succession.

Interspecific interactions- Basic factors governing the interspecific interactions- Classification of interspecific interactions – The argument of cost-benefit ratios. Competition- Lotka-Volterra model, Concept of niche, ecological homologues, competitive exclusion. Prey-predator interactions- Defense mechanisms against predators/parasitoids- Evolution of mimicry, colouration, concept of predator satiation; evolution of life history strategies. Community ecology- Concept of guild, Organisation of communities. Relative distribution of organisms, Concept of diversity- the Wallacian view. Assessment of diversity. Diversity stability debate, relevance to pest management. Pest management as applied ecology.

UNIT-4

History and origin, scope and need for IPM, definition and evolution of various related terminologies. Concept and philosophy, ecological principles, economic threshold concept, and economic consideration. Tools of pest management and their integration- legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys; political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost- benefit ratios and partial budgeting; case studies of successful IPM programmes. History, principles and scope of biological control; important groups of parasitoids, predators and pathogens; principles of classical biological control- importation, augmentation and conservation. Biology, adaptation, host seeking behaviour of predatory and parasitic groups of insects. Role of insect pathogenic nematodes, viruses, bacteria, fungi, protozoa etc., their mode of action. Biological control of weeds using insects. Mass production of quality biocontrol agents- techniques, formulations, economics, field release/application and evaluation. Successful biological control projects, analysis, trends and future possibilities of biological control. Importation of natural enemies- Quarantine regulations, biotechnology in biological control. Semiochemicals in biological control.

UNIT-5

Definition and scope of insecticide toxicology; history of chemical control, Classification of insecticides and acaricides based on mode of entry, mode of action and chemical nature. Structure and mode of action of organochlorines, organophosphates, carbamates, pyrethroids, tertiary amines, neonicotinoids, oxadiazines, phenyl pyrozoles, insect growth regulators, microbials, botanicals, new promising compounds, etc. Principles of toxicology; evaluation of insecticide toxicity; joint action of insecticides synergism, potentiation and antagonism; factors affecting toxicity of insecticides; insecticide compatibility, selectivity and phytotoxicity. Insecticide metabolism; pest resistance to insecticides; mechanisms and types of resistance; insecticide resistance management and pest resurgence. Insecticide residues, their significance and environmental implications. Insecticide Act, registration and quality control of insecticides; safe use of insecticides; diagnosis and treatment of insecticide poisoning.

UNIT-6

Systematic position, identification, distribution, host-range, bionomics, nature and extent of damage, seasonal abundance and management of insect and mite pests and vectors. Insect pests of cereals and millets and their management. Polyphagous pests: grasshoppers, locusts, termites, white grubs, hairy caterpillars, and non-insect pests (mites, birds, rodents, snails, slugs etc.). Insect pests of pulses, tobacco, oilseeds and their management

SUBJECT: EXTENSION EDUCATION (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Extension Education, Adult Education and Distance Education. Poverty Alleviation Programmes – SGSY, SGRY, PMGSY, DPAP, DDP, CAPART – Employment Generation Programmes – NREGP, Women Development Programmes – ICDS, MSY, RMK, Problems in Rural Development. Current Approaches in Extension: Decentralized Decision Making, Bottom up Planning, Farming System Approach, Farming Situation Based Extension, Market – Led – Extension, Farm Field School, ATIC, Kisan Call Centers, and NAIP.

UNIT-2

Communication and communication process, Communication skills, fidelity of communication, communication competence and empathy, communication effectiveness and credibility. Methods of communication: Meaning and functions, classification. Forms and types of communication, organizational communication. Key communicators– Meaning, characteristics and their role. Agricultural Journalism, Techniques of writing scripts for Radio and TV.

UNIT-3

The adoption and Diffusion process, covert and overt processes at stages. Adopter categories and their rate of adoption, factors influencing rate of adoption. Diffusion effect and concept of over adoption, opinion leadership- measurement and Characteristics of opinion leaders, multi-step flow of innovation; concepts of homophile and heterophily.

UNIT-4

Research, social research, Behavioural sciences research. Types and methods of Research**.** Review of literature, Research problem. Objectives, Concept & Construct, Variable, Hypothesis, Measurement. Validity and Reliability. Sampling – Universe, Sample and Sampling. Types of sampling and sampling procedures. Research Designs: types, advantages and limitations of each design. Data Collection devices – Interview, Enquiry forms, Schedules and Questionnaires Rating scales, Observation, Case studies and Social survey. Data processing and Report writing.

UNIT-5

ICTs- Concept, definition, tools and application in extension education. Reorganizing the extension efforts using ICTs, advantages, limitations and opportunities. ICTs projects, case studies in India and developing world. Different approaches (Models) to ICTs, ICT use in field of extension- Expert systems, Agricultural web sites and portals related crop production and marketing etc. Community Radio, Web, Tele, and Video Conferencing, Computer Aided Extension, Knowledge management, Information kiosks, Multimedia, Online, Offline Extension, Tools-Mobile technologies, e-learning concepts.

UNIT-6

Entrepreneur, Entrepreneurship and Agri – entrepreneurship, Theories of Entrepreneurship, Traits & Types of Entrepreneurs, Stages of establishing enterprise – Identification of sound enterprise. Project Management and Appraisal – Market, Technical, Financial, Social Appraisal of Projects. Micro enterprises – Profitable Agri enterprises in India – Agro Processing, KVIC industries. Gender issues in entrepreneurship development – Understanding gender and subordination of women, Gender as a development tool, Policy approaches for women entrepreneurship development.

Management, Extension Management, Planning and Decision making, Steps in DM Process, Meaning of Organization, Concept, Principles, Span of Management, Departmentalization, Authority and responsibility, Delegation and decentralization, line and staff relations. Coordination, Staffing, Training and Development and Direction. Supervision, Managerial Control, Budgeting, Observation, PERT and CPM, MIS.

UNIT-7

Human Resource Development, Conceptual frame work, inter disciplinary approach, function systems and case studies in HRD; HRD Interventions, Recruitment, Induction Staff Training and Development, Career planning; Social and Organizational Culture. Human Resource management: Collective bargaining, Negotiation skills; Human Resource Accounting (HRA). Intra personal processes: Collective behaviour, learning, and perception; Stress and coping mechanisms; Inter-Personal Process, Helping Process – communication and Feedback and interpersonal styles; Group & Inter group process: group information and group processes; Organizational communication, Team building Process and functioning, Conflict management, Collaboration and Competition; HRD & Supervisors: Task Analysis; Capacity Building – Counseling and Mentoring. Training and development strategies – Training types, models, methods and evaluation. Main issues in HRD: HRD culture and climate – organizing for HRD – emerging trends and Prospective.

SUBJECT: PLANT BREEDING AND GENETICS
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

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SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Beginning of genetics; Cell structure and cell division; Mendel's laws; Multiple alleles, Sex determination, sex-linkage, Sex-influenced and sex-limited traits; in eukaryotes, Somatic cell genetics, Extra chromosomal inheritance. Population Genetics; Hardy-Weinberg equilibrium. Structural and numerical changes in chromosomes; Central Dogma; Genetic fine structure analysis, Jumping gene theory; Overlapping genes, seudogenes, Oncogenes, Gene Regulationin Prokaryotes an eukaryotes; mutation; Bacterial plasmids, Molecular chaperones and gene expression. RNA editing. Gene isolation, synthesis and cloning, genomic and cDNA libraries, PCR based cloning; Nucleic acid hybridization and immunochemical detection; DNA sequencing; DNA restriction and modification, Anti-sense RNA and ribozymes; Micro-RNAs (miRNAs).Genomics and proteomics; Metagenomics. Transgenic bacteria and bioethics; Gene silencing; genetics of mitochondria and chloroplasts. Concepts of Eugenics, Epigenetics, Genetic disorders and Behavioural genetics.

UNIT-2

Architecture of chromosome in prokaryotes and eukaryoties; Chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; artificial chromosome construction and its uses; Special types of chromosomes. Synapsis, structure and function of synaptonemal complex and spindle apparatus, anaphase movement of chromosomes and crossing over-mechanisms and theories of crossing over- recombination models, cytological basis, - Variation in chromosome structure: Evolutionary significance – Introduction to techniques for karyotyping; Chromosome banding and painting – in situ hybridization and various applications. Utilization of aneuploids in gene location somatic segregation and chimeras – Endomitosis and somatic reduction ; Evolutionary significance of chromosomal aberrations – balanced lethal and chromosome complexes. Inter- varietal chromosome substitutions; Polyploidy and role of polyploids in crop breeding allopolyploids utilization in gene mapping and gene blocks transfer – Alien addition and substitution lines – creation and utilization; Apomixis Reversion of autopolyploids to dipoloids; Genome mapping in polyploids – Interspecific hybridization and allopolyploids; Synthesis of new crops (wheat, triticale and brassica) Gene transfer using amphidiploids – Bridge species. Fertilization barriers in crop plants at pre- and post fertilization levels- In vitro techniques to overcome the fertilization barriers in crops; of haploids, dihaploids and doubled haploids in genetics and breeding.

UNIT-3

History & objectives of plant breeding, patterns & characteristics of evolution of crop plants; centres of Origin-biodiversity; Genetic basis of breeding self- and cross - pollinated crops; components of variation; Heritability and genetic advance, genotype environment interaction; General and specific combining ability; gene actions and implications in plant breeding; Plant introduction and role of plant genetic resources in plant breeding. Self- incompatibility and male sterility; Pure line theory, pure line election and mass selection methods; Line breeding, pedigree, bulk, backcross, single seed descent and multiline method; Population breeding; Breeding methods in cross pollinated crops; Heterosis& Hybrid breeding ; seed production of hybrid and their parent arieties/inbreds. Breeding methods in asexually/clonally propagated crops, clonal selection apomixes, clonal selection. Self- incompatibility and male sterility; Concept of plant ideotype and its role in crop improvement; Transgressive breeding. Mutation breeding; Breeding for abiotic and biotic stresses. Cultivar development- testing, release and notification, maintenance breeding, Participatory Plant Breeding, Plant breeders' rights and

regulations for plant variety protection and farmers rights.

UNIT-4

Mendelian traits vs polygenic traits; Multiple factor hypothesis - analysis of continuous variation; Variations associated with polygenic traits - phenotypic, Models of G X E; non-allelic interactions; Nature of gene action - additive, dominance, epistatic and linkage effects. ANOVA; MANOVA, biplot analysis; Experimental Designs; Genetic diversity analysis; D2 analyses; correlations; Path analysis and Parent - progeny regression analysis; Discriminant function and principal component analyses; Selection indices; Simultaneous selection models heritability and genetic advance. Generation mean analysis; Mating designs; Concepts of combining ability and gene action; adaptability and stability; Models for GxE analysis and stability parameters; AMMI analysis – principles and interpretation. QTL mapping; Marker assisted selection (MAS).

UNIT-5

Ultrastructure of the cell; eukaryotic and prokaryotic cells, macromolecules; Structure and function of cell wall, nuclear membrane and plasma membrane; Cellular Organelles Bioenergetics; Ultrastructure and function of mitochondria and biological membranes; Chloroplast and other photosynthetic organelles; Interphase nucleus- Structure and chemical composition; Cell division and physiology of cell division. Historical background of molecular genetics; Genetic material in organisms; Structure and properties of nucleic acid, DNA transcription and its regulation – Transcription factors and their role; Genetic code, regulation of protein synthesis in prokaryotes and eukaryotes – ribosomes, t-RNAs and translational factors. Mechanisms of recombination in prokaryote; DNA organization in eukaryotic chromosomes – DNA content variation, types of DNA sequences; organelle genomes; Gene amplification and its significance; Proteomics and protein-protein interaction; Signal transduction; Genes in development; Cancer and cell aging.

UNIT-6

Biotechnology and its relevance in agriculture; Definitions, terminologies and scope in plant breeding. Tissue culture- History, callus, suspension cultures, cloning; Regeneration; Somatic embryogenesis; Anther culture; somatic hybridization techniques; Meristem, ovary and embryo culture; cryopreservation. Techniques of DNA isolation, quantification and analysis; Genotyping; Sequencing techniques; Vectors, vector preparation and cloning, Biochemical and Molecular markers: morphological, biochemical and DNA-based markers (RFLP, RAPD, AFLP, SSR, SNPs, ESTs etc.), mapping populations (F2s, back crosses, RILs, NILs and DH). Molecular mapping and tagging of agronomically important traits. Statistical tools in marker analysis, Robotics; Marker-assisted selection for qualitative and quantitative traits; QTLs analysis in crop plants, Gene pyramiding. Molecular breeding; Genomics and geno-informatics for crop improvement; Integrating functional genomics information on agronomically/economically important traits in plant breeding; Marker- assisted backcross breeding for rapid introgression, Generation of EDVs. Recombinant DNA technology, transgenes, method of transformation, selectable markers and clean transformation techniques, vector-mediated gene transfer, physical methods of gene transfer. Production of transgenic plants in various field crops: cotton, wheat, maize, rice, soybean, oilseeds, sugarcane etc. Commercial releases. Biotechnology applications in male sterility/hybrid breeding, molecular farming. MOs and related issues (risk and regulations); GMO; International regulations, biosafety issues of GMOs; Regulatory procedures in major countries including India, ethical, legal and social issues; Intellectual property rights; Bioinformatics & Bioinformatics tools. Nanotechnology and its applications in crop improvement programmes.

UNIT-7

Variety Development and Maintenance; Definition- variety, cultivar, extant variety, essentially derived variety, independently derived variety, reference variety, farmers' variety, hybrid and population;

Variety testing, release and notification systems in India and abroad. DUS testing- Genetic purity concept and maintenance breeding. genetic deterioration of varieties - safeguards during seed production; Maintenance of varieties; Principles & methods of seed production; Generation system of seed multiplication -nucleus, breeders, foundation, certified, - Quality seed production technology; of self and cross-pollinated crop varieties viz. cereals & millets (wheat, barley, paddy, pearlmillet, sorghum, maize and ragi etc.); Pulses (greengram, blackgram, cowpea, pigeonpea, chickpea, fieldpea, lentil); Oilseeds (groundnut, soybean, sesame, castor, sunflower, safflower, linseed, rapeseed and mustard); fibres (cotton, jute) and forages (guar, forage sorghum, teosinte, oats, berseem, lucerne).; Seed certification procedures; Seed laws and plant variety protection regulations in India and international systems.

SUBJECT: PLANT PATHOLOGY (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

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SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Classification of fungi, economic mycology, edible fungi and entomogenous fungi mycorrhizal association, cell organelles, their morphology, functions and chemical composition.

UNIT-2

Nature, composition and structure of viruses and viroids Symptomatology of important plant viral diseases, transmission, properties of viruses , host virus interaction, virus vector relationship. Virus nomenclature and classification, genome organization, replication and movement of viruses. Isolation and purification, electron microscopy, protein and nucleic acid based diagnostics. Myco-viruses, satellite viruses, satellite RNAs, phages, prions. Origin and evolution, mechanism of resistance, genetic engineering, ecology, and management of plant viruses.

UNIT-3

Importance of phytopathogenic bacteria. Evolution, classification and nomenclature of phytopathogenic procaryota and important diseases caused by them. Growth, nutrition requirements, reproduction, preservation of bacterial cultures and variability among phytopathogenic procaryota. General biology of bacteriophages, L form bacteria, plasmids and bdellovibrios. Procaryotic inhibitors and their mode of action against phytopathogenic bacteria. Survival and dissemination of phytopathogenic bacteria.

UNIT-4

Importance, definitions and concepts of plant diseases, history and growth of plant pathology, biotic and abiotic causes of plant diseases. Growth, reproduction, survival and dispersal of important plant pathogens, role of environment and host nutrition on disease development. Host parasite interaction, recognition concept and infection, symptomatology, disease development- role of enzymes, toxins, growth regulators; defense strategies- oxidative burst; Phenolics, Phytoalexins, PR proteins, Elicitors. Genetics of resistance; 'R' genes; mechanism of genetic variation in pathogens; molecular basis for resistance; marker- assisted selection; genetic engineering for disease resistance. Disease management strategies.

UNIT-5

Pure culture techniques, use of selective media to isolate pathogens. Preservation of plant pathogens and disease specimens, use of haemo-cytometer, micrometer, centrifuge, pH meter, camera lucida. Microscopic techniques and staining methods, phase contrast system, chromatography, use of electron microscope, spectrophotometer, ultracentrifuge and electrophoretic apparatus, disease diagnostics, serological and molecular techniques for detection of plant pathogens. Evaluation of fungicides, bactericides etc.; field experiments, data collection and preparation of references.

UNIT-6

Morphology and anatomy of typical monocotyledonous and dicotyledonous infected seeds. Recent advances in the establishment and subsequent cause of disease development in seed and seedling. Localization and mechanism of seed transmission in relation to seed infection, seed to plant transmission of pathogens. Seed certification and tolerance limits, types of losses caused by seed-borne diseases in true and vegetatively propagated seeds, evolutionary adaptations of crop plants to defend

seed invasion by seed-borne pathogens.

Epidemiological factors influencing the transmission of seed-borne diseases, forecasting of epidemics through seed-borne infection. Production of toxic metabolites affecting seed quality and its impact on human, animal and plant health, management of seed-borne pathogen/diseases and procedure for healthy seed production, seed health testing, methods for detecting microorganism.

UNIT-7

Molecular mechanisms of pathogenesis, process of infection, variability in plant pathogens. Mechanism of resistance. Host defense system. Antiviral protein.SAR, active oxygen radicals. Hypersensitivity and its mechanisms Tissue culture, elementary genetic engineering. Gene-for-gene concept, protein-for-protein and immunization basis, management of resistance genes. Strategies for gene deployment.

UNIT-8

Introduction, definition, concept and tools of disease management, components of integrated disease management- their limitations and implications. Development of IDM- basic principles, biological, chemical and cultural disease management.IDM in important crops- rice, wheat, cotton, sugarcane, chickpea, rapeseed, mustard, pearlmillet, *kharif* pulses, vegetable crops and fruit crops.

SUBJECT: SOIL SCIENCE & AGRICULTURAL CHEMISTRY
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Chemical (elemental) composition of the earth`s crust and soils. Elements of equilibrium thermodynamics, chemical equilibria, electrochemistry and chemical kinetics. Soil colloids: inorganic and organic colloids – origin of charge, concept of point of zero- charge (PZC) surface charge characteristics of soils; diffuse double layer theories of soil colloids, zeta potential, stability, coagulation/flocculation and peptization of soil colloids; electrometric properties of soil colloids; sorption properties of soil colloids; soil organic matter – fractionation of soil organic matter and different fractions, clay- organic interactions. Ion exchange processes in soil; cation exchange – theories based on law of mass action adsorption isotherms, donnan-membrane equilibrium concept, clay-membrane electrodes and ionic activity measurement, thermodynamics, statistical mechanics; anion and ligand exchange – innersphere and outer-sphere surface complex formation, fixation of oxyanions, hysteresis in sorption-desorption of oxy-anions and anions, AEC, CEC; experimental methods to study ion exchange phenomena and practical implication in plant nutrition. Potassium, phosphate and ammonium fixation in soils covering specific and non-specific sorption; precipitation – dissolution equilibria; step and constant –rate K; management aspects. Chemistry of acid soils; active and potential acidity; lime potential, chemistry of acid soils; sub-soil acidity. Chemistry of salt-affected soils and amendments; soil pH, ECe, ESP, SAR and important relations; soil management and amendments. Chemistry and electrochemistry of submerged soils.

UNIT-2

Fundamentals of crystallography, space lattice, coordination theory, isomorphism and polymorphism. Classification, structure, chemical composition and properties of clay minerals; genesis and transformation of crystalline and non-crystalline clay minerals; identification techniques; amorphous soil constituents and other non-crystalline silicate mineral and their identification; clay minerals in Indian soils. Factors of soil formation, soil formation models; soil forming processes; weathering of rocks and mineral transformation; soil profile; weathering sequences of minerals with special reference to Indian soils. Concept of soil individual; soil classification system, soil mineralogy and soil maps – usefulness. Soil survey and its types; soil survey techniques – conventional and modern; soil series – characterization and procedure for establishing soil series; benchmark soils and soil correlations; soil survey interpretation; soil mapping, thematic soil maps, cartography, mapping units, techniques for generation of soil maps. Landform – soil relationship; major soil groups of India with special reference to respective states; land capability classification and land irrigability classification; land evaluation and land use type (LUT) – concepts and application; approaches for managing soils and landscapes in the framework of agro- ecosystem.

UNIT-3

Soil biota, soil microbial ecology, types of organisms in different soils; soil microbial biomass; microbial interaction; un-culturable soil biota. Microbiology and biochemistry of root-soil interface; phyllosphere; soil enzymes, origin activities and importance; soil characteristics influencing growth and activity of microflora. Microbial transformation of nitrogen, phosphorus, sulphur, iron and manganese in soil; biochemical composition and biodegradation of soil organic matter and crop residues, humus formation; cycles of important organic nutrients. Biodegradation of pesticides, organic wastes and their use for production of biogas and manures; biotic factors in soil development; microbial toxins in the soil. Preparation and preservation of farmyard manure, animal manures, rural

and urban composts and vermicompost. Biofertilizers – definition, classification, specifications, method of production and role in crop production.

UNIT-4

Introduction and history of remote sensing; sources, propagation of radiations in atmosphere; interactions with matter. Sensor system – camera, microwave radiometers and scanners; fundamentals of aerial photographs and image processing and interpretations. Application of remote sensing techniques – land use soil surveys, crop stress and yield forecasting, prioritization in watershed and drought management, wasteland identification and management. Significance and sources of the spatial and temporal variability in soils; variability in relation to size of sampling; classical and geo-statistical techniques of evolution of soil variability. Introduction to GIS and its application for spatial and non – spatial soil and attributes.

UNIT-5

Soil texture, textural classes, mechanical analysis, specific surface. Soil consistence; dispersion and workability of soils; soil compaction and consolidation; soil strength; swelling and shrinkage – basic concepts. Soil structure – genesis, types, characterization and management soil structure; soil aggregation, aggregate stability; soil tilth, characteristics of good soil tilth; soil crusting – mechanism, factors affecting and evaluation; soil conditioners; puddling, its effect on soil physical properties; clod formation. Soil water: content and potential, soil water retention, soil-water constants, measurement of soil water content, energy state of soil water, soil water potential, soil moisture characteristic curve; hysteresis, measurement of soil-moisture potential. Water flow in saturated and unsaturated soils, Poiseuille`s law, Darcy`s law; hydraulic conductivity, permeability and fluidity, hydraulic diffusivity; measurement of hydraulic conductivity in saturated and unsaturated soils. Infiltration; internal drainage and redistribution; evaporation; hydrologic cycle, field water balance; soil-plant-atmosphere continuum. Composition of soil air; renewal of soil air – convective flow and diffusion; measurement of soil aeration; aeration requirement for plant growth; soil air management. Modes of energy transfer in soils; energy balance; thermal properties of soil; measurement of soil temperature; soil temperature in relation to plant growth; soil temperature management.

UNIT-6

Nature and sources of pollutants – agricultural, industrial, urban wastes, fertilizers and pesticides, acid rains, oil spills etc.; air, water and soil pollutants – their CPC standers and effect on plants, animals and human beings. Sewage and industrial effluents – their composition and effect on soil properties/health, and plant growth and human beings; soil as sink for waste disposal. Pesticides – their classification, behavior in soil and effect on soil microorganisms. Toxic elements – their sources, behavior in soils, effect on nutrients availability, effect on plant and human health. Pollution of water resources due to leaching of nutrients and pesticides from soil; emission of greenhouse gases – carbon dioxide, methane and nitrous oxide. Remediation/amelioration of contaminated soil and water; remote sensing applications in monitoring and management of soil and water pollution.

UNIT-7

Soil fertility and soil productivity; nutrient sources; essential plant nutrients – functions and deficiency symptoms. Soil and fertilizer nitrogen – sources, forms, immobilization and mineralization, nitrification, denitrification; biological nitrogen fixation types, mechanism, microorganism and factors affecting; nitrogenous fertilizers and their fate in soils; management of fertilizer nitrogen in lowland and upland conditions for high fertilizer use efficiency. Soil and fertilizer phosphorus – forms, immobilization, mineralization, reactions in acid and alkali soils; factors affecting phosphorus availability in soils; phosphatic fertilizers – behavior in soils and management under field conditions. Potassium – forms, equilibrium in soils and its agricultural significance; mechanism of potassium fixation; management of potassium fertilizers. Sulphur – source, forms, fertilizers and their behavior in

soils; calcium and magnesium – factors affecting their availability in soils; management of sulphur, calcium and magnesium fertilizers. Micronutrients – critical limits in soils and plants; factors affecting their availability and correction of their deficiencies in plants; role of chelates in nutrient availability. Common soil test methods for fertilizer recommendation; quantity – intensity relationships; soil test crop response correlations and response functions. Fertilizer use efficiency; blanket fertilizer recommendations – usefulness and limitations; site-specific nutrient management; plant need based nutrient management; integrated nutrient management. Soil fertility evaluation; soil quality in relation to sustainable agriculture.

SUBJECT: HORTICULTURE (FRUIT SCIENCE)
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Importance and management of tropical sub tropical temperate and dry land fruits grown in India. Commercial varieties of regional, national and international importance. Recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, water management, fertigation, role of bio-regulators. Physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential. Agri. Export Zones (AEZ) and industrial supports. Crops Mango, Banana, Citrus, Papaya, Guava, Sapota, Jackfruit, Aonla, Pomegranate, Ber, Apple, Pear, Grapes, Plums, Peach, Nuts- walnut, Almond Minor fruits- Bael, Fig and Jamun.

UNIT-2

Sexual propagation, apomixis, polyembryony, chimeras. Asexual propagation – rooting of soft and hard wood cutting under mist by growth regulators. Rooting of cuttings in hotbeds. Rejuvenation through top working–Progeny orchard and scion bank. Micro- propagation–principles and concepts, commercial exploitation in horticultural crops. Nursery–types, structures, components, planning and layout. Nursery management practices for healthy propagule production.

UNIT-3

Principles of biodiversity in germplasm conservation of fruit crops. Present status of gene centers; exploration and collection of germplasm *in situ* and *ex situ;*I ntellectual property rights. Crops Mango, citrus, guava, banana, papaya, coconut.

UNIT-4

Principles and practices of breeding of fruit crops. Breeding systems, breeding objectives, approaches for crop improvement-introduction, selection, hybridization, mutation breeding, polyploidy breeding, rootstock breeding, improvement of quality traits, resistance breeding for biotic and abiotic stresses in the following selected fruit crops. Crops Mango, banana, citrus, grapes, guava, papaya.

UNIT-5

Principles and practices in canopy management of fruit crops. Canopy management- importance and advantages; factors affecting canopy development. Canopy types and structures with special emphasis on geometry of planting, canopy manipulation for optimum utilization of light. Canopy management through plant growth inhibitors, training and pruning and management practices in temperate fruits, grapes, mango, guava, citrus and ber. Role of hormones in different horticultural crops- fruit thinning, fruit drop, ripening, dormancy breaking and propagation.

SUBJECT: HORTICULTURE (VEGETABLE SCIENCE)
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Production technology of vegetable crops. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties / hybrids, sowing / planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection measures and seed production of vegetable crops like - solanaceous crops, root crops, bulb crops, cucurbitaceous crops, sweet potato, okra and leafy vegetables.

UNIT-2

Breeding methods (introduction, selection, hybridization, mutation) of vegetable crops. Resistance breeding for biotic and abiotic stress, quality improvement, molecular marker, genomics like - Potato, tomato, okra, peas, cabbage, cauliflower, carrot, radish, melons and pumpkins.

UNIT-3

Role of auxins, gibberellilns, cyktokinins and abscissic acid; Application of synthetic hormones, plant growth retardants and inhibitors for various purposes in vegetable crops; Role and mode of action of morphactins, antitranspirants, anti-auxin, ripening retardant and plant stimulants in vegetable crop production.

UNIT-4

Genetical and agronomical principles of seed production; methods of seed production; use of growth regulators and chemicals in vegetable seed production, methods of hybrid seed production. Categories of seed; maintenance of nucleus, foundation and certified seed; seed certification, seed standards; seed act and law enforcement, plant quarantine and quality control. Agro-techniques for seed production in solanaceous vegetables, cucurbits, leguminous vegetables, cole crops, bulb crops, okra and leafy vegetables.

UNIT-5

Production technology of underutilized vegetable crops. Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties / hybrids, sowing / planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures and production of: Asparagus, Elephant foot yam, lima bean, Sweet gourd, spine gourd and pointed gourd.

UNIT-6

Organic farming in vegetable production. Importance, principles, perspective, concept and component of organic production of vegetable crops. Organic production of vegetables crops, *viz.,* solanaceous crops, cucurbits, cole crops, root and tuber crops. Methods for enhancing soil fertility, mulching, raising green manure crops. Indigenous methods of compost, Panchagavvya, Bio-dynamics, preparation etc.

SUBJECT: AGRICULTURE- BIOTECHNOLOGY
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

History, scope and importance; DNA structure, function and metabolism. DNA modifying enzymes and vectors; Methods of recombinant DNA technology; Nucleic acid hybridization; Gene libraries; PCR amplification; Plant and animal cell and tissue culture techniques and their applications. Molecular markers and their applications; DNA sequencing; Applications of gene cloning in basic and applied research; Genetic engineering and transgenics; Genomics, transcriptomics and proteomics. General application of biotechnology in Agriculture, Medicine, Animal husbandry, Environmental remediation, Energy production and Forensics; Public perception of biotechnology; Bio-safety and bioethics issues; Intellectual property rights in biotechnology.

UNIT-2

Historical developments of molecular biology; Nucleic acids as genetic material; Chemistry, structure and properties of DNA and RNA. Genome organization in prokaryotes and eukaryotes; Chromatin structure and function; DNA replication; DNA polymerases, topoisomerases, DNA ligase, etc; Molecular basis of mutations; DNA repair mechanisms. Transcription process; RNA processing; Reverse transcriptase; RNA editing; Ribosomes structure and function; Organization of ribosomal proteins and RNA genes; Genetic code; Aminoacyl tRNA synthases. Translation and post-translational odifications; Operon concept; Attenuation of trp operon; important features of gene regulation in eukaryotes.

UNIT-3

General structure and constituents of cell; Similarities and distinction between plant and animal cells; Cell wall, cell membrane, structure and composition of biomembranes, cell surface related functions. Structure and function of major organelles: Nucleus, Chloroplasts, Mitochondria, Ribosomes, Lysosomes, Peroxisomes. Endoplasmic reticulum, Microbodies, Golgi apparatus, Vacuoles, etc. Organellar genomes and their manipulation; Ribosomes in relation to cell growth and division; Cyto-skeletal elements. Cell division and regulation of cell cycle; Membrane transport; Transport of water, ion and biomolecules; Signal transduction mechanisms; Protein targeting.

UNIT-4

History of plant cell and tissue culture; Culture media; Various types of culture; callus, suspension, nurse, root, meristem, etc.; In vitrod differentiation: organogenesis and somatic embryogenesis; Plant growth regulators: mode of action, effects on in vitro culture and regeneration; Molecular basis of plant organ differentiation. Micropropagation; Anther and microspore culture; Somaclonal variation; In vitro mutagenesis; In vitro fertilization; In vitro germplasm conservation; Production of secondary metabolites; Synthetic seeds. Embryo rescue and wide hybridization; Protoplast culture and regeneration; Somatic hybridization: protoplast fusion, cybrids, asymmetric hybrids, etc. Methods of plant transformation; Vectors for plant transformation; Genetic and molecular analyses of transgenics; Target traits and transgenic crops; Biosafety issues, testing of transgenics, regulatory procedures for commercial approval.

UNIT-5

Introduction, scope and historical developments; Isolation, screening and genetic improvement (involving classical approaches) of industrially important organisms. Primary metabolism products,

production of industrial ethanol as a case study; Secondary metabolites, bacterial antibiotics and non ribosomal peptide antibiotics; Recombinant DNA technologies for microbial processes; Strategies for development of industrial microbial strains with scale up production capacities; Metabolic pathway engineering of microbes for production of novel product for industry. Microbial enzymes, role in various industrial processes, production of fine chemicals for pharmaceutical industries ; Bio- transformations, Bio- augmentation with production of vitamin C as a case study; Bioreactors, their design and types; immobilized enzymes based bioreactors; Microencapsulation technologies for immobilization of microbial enzymes. Industrial biotechnology for pollution control, treatment of industrial and other wastes, biomass production involving single cell protein; Bio- remediation of soil; Production of eco- friendly agricultural chemicals, bio-pesticides, bio-herbicides, bio-fertilizers, bio-fuels, etc.

UNIT-6

Principles of plant breeding; Breeding methods for self and cross pollinated crops; Heterosis breeding; Limitations of conventional breeding; Aspects of molecular breeding. Development of sequence based molecular markers - SSRs and SNPs; Advanced methods of genotyping; Mapping genes for qualitative and quantitative traits. QTL mapping using structured populations; AB-QTLanalysis; Association mapping of QTL; Fine mapping of genes/QTL; Map based gene/QTL isolation and development of gene based markers; Allele mining by TILLING and Eco-TILLING; Use of markers in plant breeding. Marker assisted selection (MAS) in backcross and heterosis breeding; Transgenic breeding; Foreground and background selection; MAS for gene introgression and pyramiding: MAS for specific traits with examples.

SUBJECT: PLANT PHYSIOLOGY (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

UNIT-1

Cell organelles and their physiological functions, Cell membrane structure and functions. Water and its role in plants, properties and functions of water in the cell. Water potential of plant cells. Mechanism of water uptake and transport in roots, aquaporins, Mycorhizal association on water uptake. Energy balance-Solar energy input-energy dissipation at crop canopy level- evapotranspiration, transpiration Stomata structure and function. Influence of water stress at cell, organ, plant and canopy levels. Indices for assessment of drought resistance. The role of mineral nutrients in plant metabolism. Essential elements. Mechanisms of uptake-translocation of minerals in plants. Metabolic functions of mineral elements, deficiency symptoms, and toxicity. Foliar nutrition. Synthesis of sucrose, starch, oligo and polysaccharides (composition of cell wall). Translocation of photosynthates. Mitochondrial respiration, growth and maintenance respiration, cyanide resistant respiration. Lipid metabolism- Types of lipids. Biosynthesis of fattyacids, diacyl and triacyl glycerol, fatty acids of storage lipids. Secondary metabolites. Hormonal concept of growth and differentiation, plant growth hormones and their physiological role synthetic growth regulators. Growth retardants, Apical dominance, senescence, fruit growth, abscission. Photo morphogenesis- Photo receptors, physiology of flowering, Photoperiodism and Vernalisation.

UNIT-2

Plant Biodiversity, evolution in plants. General Aspects – Plant growth and development; Analysis of plant growth. Mobilization of food reserves during seed germination; Hormonal control of seed germination and seedling growth. Shoot, Leaf and Root Development –Floral Induction and Development – Photoperiodism and Vernalization, Molecular genetics of floral development and floral organ differentiation; Sex determination. Seed Development and Dormancy – Molecular and genetic determinants; Seed maturation and dormancy. Senescence and Programmed Cell Death (PCD) – PCD in the life cycle of plants. Light Control of Plant Development. Phytochromes and cryptochromes, Molecular mechanisms of light perception, signal transduction and gene regulation; Biological clocks Embryonic Pattern Formation –Maternal , Zygotic and Homeotic gene effects in Drosophila; Embryogenesis and early pattern formation in plants. Regeneration and totipotency; Organ differentiation and development; Pollen germination and pollen tube guidance; Phloem differentiation; Sex determination in plants. Self-incompatibility and its genetic control; Heterosis and apomixis.

UNIT-3

Definition of abiotic stresses. Abiotic stress factors. Water stress and Drought characteristic features. Physiological processes affected by drought. Drought resistance. mechanisms: Drought avoidance, Stress proteins. Water use efficiency as a drought resistant trait. Molecular responses to water deficit: Stress and hormones- ABA as a signaling molecule. Oxidative stress: Reactive Oxygen Species (ROS). High temperature stress: HSP's, Chilling stress: Salinity: Glycophytes and halophytes. Heavy metal stress: Phytochelatins

UNIT-4

Definition and classification of plant growth regulators- Hormones, endogenous growth substances and synthetic chemicals Site of synthesis, biosynthetic pathways and metabolism and the influence on plant growth development of individual group of hormones- Auxins, Gibberlins, cytokinins, Abscisic acid and

Ethylene Brassinosteroids. Hormone

mutants and transgenic plants in understanding role of hormones. Signal perception. transduction, and effect at functional gene level of different hormones- Auxins- cell elongation, Gibberellins -, germination of dormant seeds, cytokinins- cell division. Retardation of senescence of plant parts, Abscisic acid-Stomatal closure and induction of drought resistance, Ethylene- fruit ripening. Interaction of hormones in regulation of plant growth and development processes. Synthetic growth regulators- Classification, their effect on plant growth and development. Practical utility in agriculture and horticulture.

UNIT-5

Crop growth analysis, key growth parameters. Factors limiting crop growth and productivity- the concept of rate limitation. Phenology- Growth stages, Factors influencing flowering. Photoperiodic and thermo-periodic responses. Canopy architecture, light interception, energy use efficiency of different canopies. Source-sink relationships. Physiological and molecular control of sink activity. Plant growth analysis techniques, yield structure analysis, theoretical and actual yields. Plant ideotypes. Simple physiological yield models- Duncan's. Monteith's, and Passioura's. Crop growth models-empirical models testing and yield prediction.

UNIT-6

The cellular basis of growth and morphogenesis cyto-differentiation. The cell cycle- Cell division and cell organization. Cell structure, morphogenesis and cellular totipotency. Introduction to in vitro methods : Terms and definitions, Use of growth regulators. Beginning of in vitro cultures in our country. Embryo culture, embryo rescue Endosperm culture and production of triploids. Embryogenesis and organogenesis and their practical applications : Clonal Multiplication of elite species. (Micro-propagation) Haploids and their applications. Somaclonal variations. Protoplast isolation : Principles and applications. Testing of viability of isolated protoplast. Steps in the regeneration of protoplast. Somatic hybridization –Various methods for fusing protoplast. Use of makers for selection of hybrid cells. Practical applications of somatic hybridization (hybrids vs cybrids). Use of plant cells, protoplast and tissue culture for genetic manipulation of plant : Introduction to *A. tumefaciens*. Tumour formation on plants using *A. tumefaciens* (Monocots vs Dicots), Root – formation using *A. rhizogenes*.

UNIT-7

Photosynthesis- its significance in plant growth, development and bio-productivity. Physiological and biochemical aspects: chloroplast structure development and replication, photo systems, mechanism of light absorption, electron transport chain, Coupling factors and mechanisms of ATP synthesis, quantum yield. Photosynthetic carbon reduction cycle and its regulation. CO2Concentration Mechanism (CCM) as a complementary strategy for carbon fixation. CCM in photosynthetic bacteria, micro algae, Submerged Aquatic macrophages (SAM), C4, CAM and single celled C4 organisms. Rubisco structure, assembly and kinetics, photorespiration and its significance. Carbon fluxes between chloroplast and cytoplasm, the concept of RA, RS and RM. Pi recycling, starch and sucrose synthesis and export. Concept of canopy photosynthesis, influence of environmental factors such as water stress, high light stress VPD etc. Molecular aspects: chloroplast genome organization, expression and regulation of plastid genes Genes regulating potential traits of photosynthesis, biotechnological approaches for improving photosynthetic rate and productivity – transgenics. Conceptual approaches of expressing C4 photosynthesis genes in C3 species. Photosynthesis and crop productivity, energy utilization efficiency by crops. Photo inhibition, photo oxidation, excitation energy dissipation mechanisms, photochemical and no- photochemical quenching of chlorophyll fluorescence. Photosynthesis and transpiration interaction, significance of WUE, carbon isotope discrimination concept. Nitrogen assimilation in photosynthesizing cells – NO_3 -NO_2 - reduction, GS-GOGAT pathway. Photorespiration loss of Ammonia and its re-assimilation and NUE

Faculty of Commerce

SUBJECT: COMMERCE (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Business Environment: Meaning and Elements of Business Environment, Economic Environment, Economic Policies, Economic Planning. Competition policy , Consumer protection, Environment protection Liberalization , Privatization and globalization, Second generaltion reforms , Industrial policy and implementation, Industrial growth and structural changes.

Financial & Management Accounting: Basic Accounting concepts, Capital & Revenue, Financial statements. Partnership Accounts: Admission, Retirement, Death, Dissolution and cash Distribution. Advanced Company Accounts: Issue, Forfieture, Purchase of Business, Liquidation, Valuation of shares, Amalgamation, Absorption and Reconstruction , Holding company accounts. Cost Management Accounting: Ratio Analysis, Funds Flow Analysis , Cash Flow Analysis, Marginal costing & Break-even analysis, Standard costing, Budgetary control, Costing for decision making, Responsibility accounting.

Business Economics: Nature & uses of Business Economics, Concept of Profit & Wealth maximization. Demand Analysis & Elasticity of Demand, Curve Analysis Law Utility Analysis & Indifference Curve analysis, Laws of Returns and Law of Variable proportions.

Business Statistics & Data Processing: Data types , Data collection and analysis, Sampling, need , errors, & method of sampling, Normal Distribution , Hypothesis testing, Analysis and Interpretation of data. Correlation and Regression , small sample tests-t-test, F-test and chi-square test

Business Management: Concept of management Planning : Objectives, Strategies, Planning process, Decision¬making. Staffing : Leading , Motivation, Leadership, Committees, Communication. Controlling: Corporate Governance and Business Ethics.

Marketing Management : The evolution of marketing concepts, Concepts of Marketing, Marketing mix, Marketing environment, Product decision, Pricing decision, Distribution decision.

Financial Management: Capital Structure, Financial & Operating leverage Cost of capital, Capital budgeting, Working capital management. Dividend Policy.

Human Resources Management: Concepts, Role and Functions of Human Resource management, Human Resource planning, Recruitment & Selection. Training & Development, Succession planning. Compensation: Wage & Salary Administration

Banking & Financial Institutions: Importance of Banking to Business, Types of Banks & Their functions Development Banking: IDBI, IFCI, SFCs, UTI, SIDBI.

International Business: World Trade Organisation: Its function & policies.

REFERENCE BOOKS:

1. Chisnall, Peter M: The Essonce of Marketing Research Prentice Hall, New Delhi.
2. Davis ,J.J.: Advertising Research, Prentice Hall, New Delhi.
3. Hooda, R.P.: Statistics for Business and Economics. Macmillan India, New Delhi.
4. Adhikary K: Conomic Environment of Business, Sultan Chand & Sons. New Delhi.
5. Ahluwalia. I. J: Industrial Growth in India, Oxford University Press. New Delhi.
6. Aswathappa K: Legal Environment of Business, Himalaya Publication New Delhi.
7. Ghose Biswanath: Economic Environment of Business, Vikas Publication. New Delhi.
8. Agrawal, K.N. Deeksha Agrawal : Business on the Net : What's & How's of E-Commerce MacMillan New Delhi.
9. Agrawal, K.N. Deeksha Agrawal : Business on the Net :bridge to the Online Storeform: MacMillan. New Delhi. © Diwan Prag & Sunil Sharma : Electronic Commerce : A Manager's guide toE-Business, Vanity Books International, Delhi.

Faculty of Education

SUBJECT: EDUCATION (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. Philosophical & sociological foundation of Education.
- Relationship of education & philosophy.
- Western schools of philosophy- Idealism, Naturalism, Pragmatism.
- Contributions of John Dewey, Vivekananda, Tagore & M.K.Gandhi to educational fields.
- Relationship of education & Sociology.
- Sociology of Education & Educational sociology.
- Meaning and Factors influencing Social Change.

2. Psychological Foundation of Education.
- Educational psychology- concept, nature & scope.
- Meaning & Factors influencing Growth & Development.
- Theories of Learning- Pavlov's classical, Skinner's operant conditioning, Learning by Insight, Lewin's Field Theory.
- Learning & Motivation.
- Intelligence- it's meaning, theories & measurement.
- Personality- Type & trait theories, Measurement of personality.

3. Methodology of Educational Research.
- Meaning needs & scope of educational research.
- Fundamental, Applied & Action Research.
- Criteria & Sources for identifying the Research problem.
- Hypothesis- Meaning & types.
- Sampling- concept of population & sample, Various methods of sampling.
- Tools & Techniques- Observation, Interview, Questionnaire.
- Inferential Statistics - Mean,Median, Mode, SD, 't' test, one way ANOVA, Chi-square.

REFERENCE BOOKS:

1. Swroop & saxena - Educational philosophy.
2. Ramshakal Pandey - Educational philosophy
3. S.S.Chauhan - Advance Educational Psychology.
4. S.P.Gupta - Educational Psychology.
5. Lokesh Koul - Research Methodology.
6. C.R.Kothari - Research Methodology.

SUBJECT: PHYSICAL EDUCATION (PH.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates' capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Unit-I

Introduction to and definition, aim and objectives of physical education an other terms-health education and recreation
Philosophies of education a s applied to physical Education-Idealism, Naturalism, Realism, Pragmatism, existentialism, Humanism
Biological of Physical activity-benefit of exercise, growth and exercise, exercise and well being sex and age chaatetstics of adolescent, body types
Psychological basis of Physical Education-Play and play theories, generall principles of growth and development, Principles of Motor-Skill acquisitions transfer of training effects.
Sociological; basis of physical Education-Socialization process, Social nature of men and physical activity, sports as cultural heritage of mankind, custom traditions and sport, competition and cooperation
Physical Education in ancient Greece, Rome, and contemporary Germany, Sweden Denmark and Russia
Olympic Movement-Historical development of ancient and modern Olympic Games
Physical education in India

Unit-II

Physiology of Muscular activity, Neurotransmission and Movement mechanism
Physiology of respiration
Physiology of blood circulation
Factors influencing performance in sports
bioenergetics and recovery process
Athletic injuries-their management and rehabitation
Therapeutic modalities
Acrogenic aids and doping

Unit-III

Joints ad their movement-planes and axes
Kinetics, Kinematics linear and angular levers
Laws of motion, principles of equilibrium and force, spin and elasticity
Posture, postural deformation and their correction
Muscular analysis of Motor movement
Mechanical analysis of various sports activities
mechanical analysis of fundamental movements- (running, jumping, throwing, pulling and pushing)
Massage manipulation and therapeutic exercises

Unit-IV

Learning process-theories and laws of learning
Motivation, theories and dynamic of motivation in sports
Psychological factors affecting sport performance-viz. stress, anxiety, tension and aggression
Personality, it's dimensions, theories, personality and performance
Individual difference and their impact on skill learning and performance

Group dynamics, team decision and leadership in sports
Sociometric, economic and politics in sports
media and Sports

Unit-V
Development of teacher education in Physical education
Professional courses in Sports and Physical education in India
Professional Ethics
Qualities and Qualification of Physical Educational Personnel
Principles of Curriculum planning
Courses content for academic and professional courses
Age characteristics of pupils and selection of activities
construction of class physical education time table

Unit-VI
Health-Guiding principles of health and health education
Nutrition and dietary manipulation
Health-related fitness, obesity and it's management
Environmental and occupational hazards and first aid
Communicable diseases-their preventive and therapeutic aspect
School health programmed and personnel hygiene
Theories and principles of recreation
Recreation Programme for various categories of people

Unit-VII
Chaatetstics ad principles of sport training
Training and per iodization
Training method and specific training programme for development of various qualities
Technical and tactic preparation for sports
Short-term and long term training plans
Sports talent identification -process and procedure
Preparing for competition-(build up competition, main competition, competition frequency , psychological preparation)
Rules of Games and Sports and their interpretation

Unit-VIII
Nature , scope and types f research
Formulation and selection of research problems
Sampling-process and techniques
Methods of research
Data collection-tools and techniques
Statistical techniques of data analysis-measure of central tendency and variability, coorelation,normal probability curve, t-test, and f-test, chi square, z-test
Hypothesis formulation , types and testing ,Writing research report

Unit-IX
Concept of test, measurement and evaluation
principles of measurement and evaluation
Construction and classification of tests
Criteria of test evaluation
Concepts and assessment of physical fitness, motor fitness, motor ability and motor educability
Skill test for Badminton, Basket ball, Hockey, Lawn Tennis, Soccer, Volley Ball
Testing psychological varaiables-Competetive anxiety, aggression, team cohesion, motivation, self concept
Anthropometric measurement and body composition

Unit-X

Concept and principles of management
organization and function of sport bodies
Intramurals and Extramulars
Management and Techniques of teaching
Principles of planning Physical education lessons

Faculty of Engineering & Technology

SYLLABUS FOR Ph.D. ENTRANCE EXAMINATION
SUBJECT: CIVIL (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

STRUCTURAL ENGINEERING

Mechanics: Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr's circle. Simple bending theory, flexural and shear stresses. Bending moment and shear force in statically determinate beams.

Concrete Structures: Properties of concrete, basics of mix design, Concrete design – analysis of ultimate load capacity and design of members.

Steel Structures: Analysis and design of tension and compression members, beam and beam – columns, column bases.

GEOTECHNICAL ENGINEERING

Soil Mechanics: Origin of soils, soil classification, three-phase system, fundamental definitions. Permeability & seepage, effective stress principle, consolidation, compaction, shear strength.

Foundation Engineering : Earth pressure theories, effect of water table, layered soils, Stability of slopes-infinite slopes, finite slopes. Foundation types – foundation design requirements.

WATER RESOURCES ENGINEERING

Fluid Mechanics and Hydraulics : Properties of fluids, principle of conservation of mass, momentum energy and corresponding equations, Bernoulli's equation, laminar and turbulent flow, flow in pipes. Hydraulic jump. Kinematics of flow, velocity triangles and specific speed of pumps and turbines.

Irrigation : Duty, delta, estimation of evapo-transpiration. Crop water requirements. Design of lined and unlined canals, waterways, head works, gravity dams and spillways.

ENVIRONMENTAL ENGINEERING

Water requirements: Quality standards, basic unit processes and operations for water treatment, Drinking water standards, water requirements, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards.

Air Pollution: Types of pollutants, their sources and impacts, air pollution control, air quality standards and limits.

TRANSPORTATION ENGINEERING

Highway Planning: Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering: Traffic characteristics, theory of traffic flow, intersection design, traffic signs and signal design.

REFERENCE BOOKS:

1. Structural Analysis – R.C. Hibber (Pearson Publication)
2. Structural Analysis – Ghali, A. & Neville, M. (Chapman & Hall Publication. 1974)
3. Properties of Concrete – Neville, A.M., (Pitman Publishing Limited, London)
4. Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand & Bros. Roorkee, 1993)
5. Design of Steel Structures – E.H.Gaylord and C.N. Gaylord (Mc Graw Hill, New York)
6. Steel Structures: Design and Behaviour – C.G.Salmon and J.E.Johnson (Harper and Row, New York)
7. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi)
8. Geotechnical Engineering Principles and Practice – Donald P. Coduto (Prentice Hall of India, New Delhi)
9. Foundation Engineering (2nd Edition) – Peck,R.B., Hanson (W.E. and Thornburn. W.H. Johan Wiley, New York 1976)
10. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
11. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
12. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House) Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
13. Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
14. Principles of pavement Design – Yoder and Witzak
15. Principle and Practices of Highway Engineering – Kadiyali & Lab (Khanna Publishers, Delhi)

SUBJECT: CA/CS/CSE
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

High Performance Computer Architecture: Basic Computer architecture. Performance Analysis, Architectural classification schemes, Memory models, Pipelining, RISC CISC, VLIW architectures, data dependency and interconnection network. Fault Tolerance and Scalability. Modeling Performance. Pipelined Systems. Interconnection Networks. Processor Array. Multi¬computers. Multiprocessors. Systolic Array. Vector Processors. Structured Memory Design for Parallel Systems - Symmetric Shared, Distributed Shared and Synchronization. Grid computing.

Software Systems: Data structures and Algorithms: the notion of abstract data types, stack, queue, list, set, string, tree, binary search tree, heap, graph, tree and graph traversals, connected components, spanning trees, shortest paths, hashing, sorting, searching, design techniques (greedy, dynamic, divide and conquer, Algorithm design by induction), asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes t P, NP, NP-hard, NP-complete.

Concepts of object-oriented programming - Basic Concept of OOP Benefit of OOP Object Oriented language Structure of C++ Program Compiling and Linking Operators and expressions Looping Concepts Arrays and Structure, Functions Class Object Constructor and Destructors Polymorphism Factions Overloading Operators Overloading Inheritance pointer and Virtual Function Life I/O and Templates

Operating Systems : Synchronization Mechanisms. Process Deadlocks. Resource Models. Local and Global states. Distributed Operating Systems. Event Ordering. Timestamps. Distributed Mutual Exclusion. Token and Non-token based Algorithms. Comparative Performance Analysis. Concurrency Control. Shared Memory. File Systems. Agreement Protocols for handling Processor Failures. Coordination of Processes and related Algorithms. Failure Handling and Recovery Mechanisms. Multiprocessor Operating Systems and related Thread Handlings.

Software Engineering: SDLC, planning and managing the project, design, coding, testing, implementation, maintenance. Personal Software Process. Team Software Process. Usability. Agile Methods. Process Models- Iterative, Scrum, XP, and Evo. Requirements Engineering. Advanced UML, Petri net. Domain specific modeling. Systems Modeling Language. Meta modeling. Software architecture and design patterns. Software metrics. Software reliability. Advanced testing techniques.

Database Systems: Review of Database Systems. Web-enabled Database Systems. Storage and File Structures. Indexing and Hashing. Concurrency. Recovery. Query Processing. Query Optimization. Object Oriented DBMS. Extended Relational Model. Spatial databases. Multimedia Databases. Distributed Databases. Active Databases. Temporal Databases. Deductive Databases. Mobile Databases.

Data Communication and Computer Networks: Seven Layer OSI Model. TCP/IP details.IPv4 and IPv6 Protocols and its Applications. Real Time Communication Protocols. High speed local and wide area networks. Virtual networks. Network security. Broadband networks. Introduction to intelligent networking. Performance analysis of networks.

Transmission media, data encoding, Multiplexing, Flow and error control, Network devices switches, Gateways, Routers, Network security cryptography, Digital signature, Firewalls, Routing concepts, ATM, Poisson and other distributions.

REFERENCE BOOKS :

1. Computer System Architecture - M. Morris Mano
2. Software Engineering By Roger Pressmen
3. Software Engineering By Pankaj jalote
4. Oops With C++ - E. Balagurusamy
5. Data Base System Concepts - Mc Graw Hill - Korth, Silber chats
6. Data structure - Seymour Lipchitz
7. Object Oriented Interface and Data Base - Prentice Hall of India
8. Software Engineering By Roger Pressmen
9. Software Engineering By Pankaj jalote
10. Data Communication & Networking - Behrour A. Forougan
11. Computer Networks - Andrew s. Tenenbaum
12. Management And Strategy - Tarun Dhar Diwan

SUBJECT: ELECTRICAL ENGINEERING (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Electric Circuits and Fields: KCL, KVL, node and mesh analysis; sinusoidal steady-state analysis, resonance, Thevenin's, Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits: Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions; Ampere's and Biot-Savart's laws; inductance; dielectrics; capaciiance.

Electrical Machines: Single phase transformer, tests, regulation and efficiency; three phase transformers, parallel operation; autotransforrner; DC machines, armature reaction and commutation, starting and speed control of motors; three phase induction motors, performance characteristics, starting and speed control; synchronous machines, regulation and parallel operation of generaltors, motor starting, characteristics.

Power Systems: Basic power generaltion concepts; transmission line models and performance; cable performance, insulation; corona and radio interference: distribution systems; voltage control; power factor correction; symmetrical components; fault analysis; circuit breakers; system stability concepts, swing curves; HVDC transmission.

Control Systems: Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Niquist techniques: Bode plots: lag, lead and lead-lag compensation; controllability and observability.

Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments, measurement of voltage, current, power, energy; instrument transformers; digital voltmeters and multimeters; phase, time and frequency measurement.

Analog and Digital Electronics: Characteristics of diodes, BJT, FET; amplifiers; oscillators and feedback amplifiers: operational amplifiers - characteristics and applications; timers; combinational and sequential logic circuits; multiplexer; Schmitt trigger; multi-vibrators; sample and hold circuits; A/D and D/A converters.

Power Electronics and Drives: Thyristors, triacs, GT0s, MOSFETs and IGBTs; phase control rectifiers; bridge converters - fully controlled and half controlled; principles of choppers and inverters; basis concepts of adjustable speed dc and ac drives.

Advanced Topics in Electrical Engineering: Artificial Neural Network, Fuzzy systems, Neuro-fuzzy systems and genetic algorithms, Simulation tools used in Electrical Engineering.

TEXT BOOK AND REFERENCE BOOK

1. A course in Electrical and Electronics measurement and Instrumentation: Sawhney. Dhanpat Rai pbs
2. Digital Electronics : A.P. Malvino
3. Control System Engineering : L. Nagrath and Gopal , New age international publications
4. Electric Machinery: P.S. Bhimbra
5. Power System Engineering : Nagrath & Kothari
6. Power Electronics : P.S. Bhimbra

7. Network Analysis : Valkenburg,PHI pbs
8. Engineering Electromagnetics : Hayt, TMH pbs

SUBJECT: ELECTRONICS & COMMUNICATION ENGINEERING
(Ph.D. ENTRANCE EXAM)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Electronic Devices and Circuits: p-n junction diode, BJT, JFET, MOS capacitor, MOSFET, Special diodes,

Advanced Analog Circuits: Differential and operational amplifier and its applications. s. Sinusoidal oscillators; criterion for oscillation; Passive & Active filters, Power supplies.

Advanced Digital circuits: Logic gates; digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinatorial circuits: arithmetic circuits, code converters, multiplexers, decoders, PROMs and PLAs. Sequential circuits: latches and flip-flops, counters and shift-registers. Semiconductor memories.

Microprocessors AND Microcontroller :-(8085, 8086, 8051): architecture, programming, memory and I/O interfacing.

VLSI: INTRODUCTION ,integrated circuits fabrication process, oxidation, diffusion, ion implantation, photolithography, MOSFET,BIMOSFET.

Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation;

Artificial intelligence:- Artificial Neural Network, Fuzzy systems, Neuro-fuzzy systems and genetic algorithms, Simulation tools used in electronics and communication Engineering.

Control Systems: Basic control system components; block diagrammatic description, reduction of block diagrams. Open loop and closed loop (feedback) systems and stability analysis of these systems. Signal flow graphs and their use in determining transfer functions of systems

Communications Techniques: Analog communication systems, SNR calculations for AM and FM for low noise conditions. Digital communication systems: PCM, DPCM, ASK, PSK, FSK

Microwave Communication Engineering: Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas and Wave propagation: Dipole antennas; radiation pattern; antenna gain.

TEXT BOOK AND REFERENCE BOOK

1. Microelectronics
2. Digital fundamentals: Floyd & jain :Pearson education
3. Digital electronics: A.P.Malvino; tmh
4. Automatic Controle System,B.C,Kuo,PHI
5. Control System Engineering,L.Nagrath And Gopal ,New Pearson Education
6. Power electronics,Rashid,PHI
7. Microprocessor And Interfacing-D.Hall,TMH
8. The 8051 Microcontrller and Embedded Systems using Assembly and c.Mazidi,PHI

9. Modern VLSI Design by Wolf,Pearson Education Pub
10. Electromagnetic Waves And Antennas:K.D.Prasad,Khanna Pub

SUBJECT: MECHANICAL ENGINEERING (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Engineering Mechanics: Free body and equilibrium; trusses and frames; virtual work; kinematic and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations; impact.

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

Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains; flywheels; governors. Kinematic & dynamic analysis of planar mechanism, Lams, Gears & Gear traine.

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

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

Thermodynamics: Zeroth, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle; behavior of ideal and real gases, properties of pure substances, calculation of work and heat in ideal processes.

Fluid Mechanics: Fluid properties; fluid statics, manometry, buoyancy; control-volume analysis of mass, momentum and energy, fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; boundary layer; elementary turbulent flow; flow through pipes, head losses in pipes, bends etc.

Power Engineering: Steam Tables, Rankine, Brayton cycles with regeneraltion and reheat, Cogeneraltion & Combined cycles.

Heat Transfer: Modes of heat transfer; one dimensional heat conduction, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors; heat exchanger performance, LMTD and NTU methods.

Refrigeration and air-conditioning: Vapour refrigeration cycle, heat pumps, gas refrigeration, Reverse Brayton cycle; moist air; psychrometric chart, basic psychrometric processes.

Turbo-machinery: Pelton-wheel, flow of stream through nozzles & diffuses, Francis and Kalpan turbines-impulse and reaction principles, velocity diagrams, various types of gas turbines, reciprocating, centrifugal and axial flow compressors, multi-stage compression.

Unconventional Machining: EDM, ECM, AJM, LBM, USM, EMB.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

Operation Research: Linear programming, Graphical & Simplex method transportation, assignment, network flow models, simple queuing models, PERT and CPM, Game Theory.

Value Engineering: Value analysis for cost/value.

Industrial Engineering : Production Planning and Control; Forecasting- moving average, exponential smoothing, operations scheduling, assembly line balancing, product development, break even analysis, capacity planning.

REFERENCE BOOKS:

1. Engineering Mechanics By I.B.Prasad.
2. SOM by M.Ramarutham
3. TOM by S.S.Ratan
4. Vibration by V.B.Singh
5. Machine design by Sundrajan Murthy
6. Engineering thermodynamics by Domkundwar & P.K.Nag
7. Fluid Mechanics by John David Anderson & Cinjel
8. Power plant Engineering by P.K.Nag
9. HMT by Cinjel
10. RAC by R.C.Khurmi
11. Turbo Machine by Cinjel
12. Metrology by
13. O.R.by Hira Gupta
14. Industrial Engineering by Martang Telsang & O.P.Khanna.

SUBJECT: INFORMATION TECHNOLOGY
(Ph.D. ENTRANCE EXAM)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Computer Organization and Architecture-Computer Architecture System Inter Connection Structure Addressing modes Arithmetic Processor Design Control Unit Organism Storage and Memory Hierarchy and I/O Organization Parallel Computer Models and Program Parallelism Classification of Machine SISD, SIMD and MIND Synchronous Parallel Processing .

Soft Computing : Journal Issues and our view of AI Search and Control Strategies Heuristic Search Techniques Knowledge Representation AI Programming Languages LISP Prolog Natural language Processing Parsing Techniques RTN, ATN, Fuzzy System Expert Systems Artificial Neural Network .

Object Oriented Concept and Programming Using C++: Basic Concept of OOP Benefit of OOP Object Oriented language Structure of C++ Program Compiling and Linking Operators and expressions Looping Concepts Arrays and Structure, Functions Class Object Constructor and Destructors Polymorphism Factions Overloading Operators Overloading Inheritance pointer and Virtual Function Life I/O and Templates.

Information Systems and Software Engineering Software Engineering Paradigm Life Models S/W Requirements Design Concepts and Principles Testing and Maintenance S/W project management Internet and Web technology Internet protocol -TCP/IP,UDP,HTTP Telnet,SMTP,FTP,SNTP.Internet addressing IP V4 And IPV6 HTML,DHTML,SGML,XML,JAVA Scripts Internet Security and Firewalls web site planning and hosting.

Database Management System : Type of Data Models , DBMS, Architecture, Object Orientated Database Relationship Model , Storage and File Organization The Relational Data Model database Design Data Replication and Query Processing and Recovery, Security Management, Parallel and Distributed Database.
Telecomm Switching and Computer Network : Basic Concepts of telephony System and Topology, Switching, Wearing and Routing, PHTN, ISDN, DSL, ADSL, Switched Packets Data Services ISDN,ATN, Network, Seven Layer of OSI Model, TCP/IP Protocol Suit Cryptography and Digital Signature GSN,CDMA,Mobile IP Frequency Management and Channel Assignment.

REFERENCE BOOKS :

1. Computer System Architecture - M. Morris Mano
2. Oops With C++ - E. Balagurusamy
3. Data Base System Concepts - Mc Graw Hill - Korth, Silber chats
4. Management And Strategy - Tarun Dhar Diwan
5. Object Oriented Interface and Data Base - Prentice Hall of India
6. Software Engineering By Roger Pressmen
7. Software Engineering By Pankaj jalote
8. Data Communication & Networking - Behrour A. Forougan
9. Computer Networks - Andrew s. Tenenbaum
10. Internet & Internet Engineering - Dahiel , Minoli TMH

Faculty of Humanities and Liberal Arts

SUBJECT: ECONOMICS (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. **Economic Systems -** Capitalism, Socialism and mixed economy.

2. **National Income -**Concept and measurement

3. **Consumer behaviour -** Law of demand , Elasticity of demand, utility analysis and indifference -curve techniques

4. **Producer's behaviour -** Production Function, Laws of Returns, Returns, of Scale cost curves

5. **Price Theory -** Price determination under different maker condition, pricing of factors of production Keynesian and Modern theory of employment Banking objective and instruments of Central Banking , credit policies in a planned developing economy

6. **Types and principles of taxation.** Principles of Public expenditure, objective and instruments of budgetary and fiscal policy in a planned developing economy

7. **International trade-**Theory and policy of international trade , determination of exchange rates ,balance of payment

8. **International Monetary institutions -** I. B.R.D. and I.M.F. Characteristics of under developed economy, human and natural resources, primary,secondary and tertiary sectors in India, mixed economy in India

9. **Agricultural development-** Agricultural Policy. land reforms Green Revolution and its aftermath

10. **Industrial development -** Industrial Policy, Public. and private sectors, Regional distribution of Industries in India Pricing policies for agricultural and industrial outputs. Fiscal and momentary policy in India - Objectives, recent budgetary trends, bank nationalization in India. Reserve Bank and monetary policy in India Recent trends in Inida's foreign trade and balance of payments

11. **Indian Planning -** Objectives and strategies, planned growth and distributive justice eradication of poverty, problems of Indian planning.

BASIC READING LIST:

1. Stigler G. (1996) Theory of Price, 4th Edition, Prentice Hall of India, New Delhi.
2. Sen A. (1999) Microeconomics: Theory and Application, Oxford University Press, New Delhi.
3. Kreps David M. (1990), A Course in Microeconomic Theory, Princeton University Press, Princeton.
4. Samuelson, P.A. and W.O. Nordhaus (1998), Economic s, 16th Edition, Tata McGraw Hill, New Delhi.
5. Verian H. (2000) Microeconomic Analysis, W.W Norton New Yark.
6. Michale Perkin (1996) Economics, 3rd Edition, Addison Westey Publishing company, Inc. U.S.A.
7. Koutsoyiannis, A. (1979), Modern Microeconomics, 2nd edition Macmillan Press, London.

8. Layard, P.R.G. and A.W. Walters (1978) Microeconomic Theory, McGraw Hill, New Yark.
9. Ahuja H.L. (2003) Advanced Economic theory : Microeconomic Analysis, 13th Edition, S.Chand and Co. Ltd. New Delhi.
10. Richard A. Musgrave (1989), Public Finance in Theory and Practice McGraw Hill Book Company, New York.
11. Buchaman J.M. (1960), The Public Finances, Richard D.Irwin, Homewood.
12. Jha H. (1998), Modern Public Economics, Routledge, London.
13. Singh S.K. (1986) Public Finance in Developed and Developing Countries, S.Chand and Company Ltd, New Delhi.
14. Chelliah R.J. (1971), Fiscal Policy in Underdeveloped Countries.
15. Hemlata Rao (2006) Fiscal Federalism -Issues and Policies, New Countury Publications, New Delhi.
16. Atkinson A.B. and J.E. Siglitz (1980). Lectures on Public Economics, Tata MacGraw Hill, New Delhi.
17. Comes R. and T.Sandler (1986) The theory of Externalities, Public Goods and Club Goods, Cambridge University Press, Cambridge.
18. Duff L. (1997), Government and Market, Orient Longman, New Delhi.
19. Friedman A. 91986), Welfare Economics and Social Choice Theory, Martins Nighoff, Boston. Topic: 2 & 3
20. Bird R. And O.Aidman (1967) Reading on Taxation in Developing Countries, The John Hopkins University.

SUBJECT: ENGLISH (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

The paper will cover the study of English literature from Shakespeare to 1950. A first hand reading of the prescribed texts and critical ability is required to be tested.

I **Literary Forms**

Poetry	:	Lyric, Ode, Sonnet, Elegy, Satire, Epic
Drama	:	Tragedy, Comedy, Farce, Melodrama, One Act Play, Masque

II **William Shakespeare** : Generall Questions on the writer and a critical study of the following works Hamlet, The Tempest

III **A critical study of the following poets with reference of the poems shown against each of them Poetry**

Milton	:	Sonnets
Pope	:	Essay of Man
Johnson	:	The Vanity of Human Wishes
Wordsworth	:	Tintern Abbey. Immortality Ode
Keats	:	Odes
Tennyson	:	Ulysses

IV **The works of the following novelists with special reference to the novels mentioned against each.**

Dickens	:	Oliver Twist
Thomas Hardy	:	Tess of the D'urbervilles Poetics
Aristotle	:	Poesie
Longinus	:	On the Sublime
Dryden	:	Essay on Dramatic Poesie
Arnold	:	The Study of Poetry

V (a) **A critical study of the 20th century writers and their works.**

E.M. Forster	:	A Passage to India
D.H. Lawrence	:	Sons and Lovers
G.B. Shaw	:	Saint Joan
W.B. Yeats	:	Byzantium, The Second Coming, A Prayer to My Daughter
T.S. Eliot	:	The Waste Land

V (b) **American Literature**

Emerson	:	The American Scholar
Thoreau	:	Civil Disobedience
Hawthorne	:	The Scarlet Letter
Eugene O'Neill	:	The Hairy Ape.

RECOMMENDED BOOKS:-

1. A History of English Literature - Arthur Compton-Rickett.
2. American Literature - Meenakshi Raman
3. English Language Literature - P.D. Wadgaunkar

SUBJECT: HINDI (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. हिन्दी भाषा का विकास एवं भाषा विज्ञान

अपभ्रंश (अवहट्ट सहित) और पुरानी हिन्दी का सम्बन्ध, काव्यभाषा के रूप में अवधी का उदय और विकास, काव्यभाषा के रूप में ब्रजभाषा का उदय और विकास, साहित्यिक हिन्दी के रूप में खड़ी बोली का उदय और विकास, मानक हिन्दी का भाषा वैज्ञानिक विवरण (रूपगत), हिन्दी की बोलियाँ– वर्गीकरण तथा क्षेत्र, देवनागरी लिपि का विकास और उसका मानककीकरण।

हिन्दी प्रसार के आन्दोलन, प्रमुख व्यक्तियों तथा संस्थाओं का योगदान, राजभाषा के रूप में हिन्दी।

हिन्दी भाषा–प्रयोग के विविध रूप– बोली, मानकभाषा, सम्पर्कभाषा, राजभाषा और राष्ट्रभाषा,संचार माध्यम और हिन्दी।

हिन्दी का भाषिक स्वरूपः हिन्दी की स्वनिम व्यवस्था– खंड्य, खंड्येत्तर। हिन्दी शब्द रचना–उपसर्ग, प्रत्यय, समास। रूपरचना–लिंग, वचन और कारक व्यवस्था के संदर्भ में हिन्दी के संज्ञा, सर्वनाम, विशेषण और क्रियारूप। हिन्दी वाक्य–संरचना, पदक्रम और अन्विति।

2. हिन्दी साहित्य का इतिहास

हिन्दी साहित्य का इतिहास– दर्शन, हिन्दी साहित्य के इतिहास– लेखन की पद्धतियाँ।

हिन्दी साहित्य के प्रमुख इतिहास ग्रन्थ, हिन्दी के प्रमुख साहित्यिक केन्द्र, संस्थाएँ एवं पत्र–पत्रिकाएँ, हिन्दी साहित्य के इतिहास का काल–विभाजन और नामकरण।

आदिकालः हिन्दी साहित्य का आरम्भ कब और कैसे ? रासो–साहित्य, आदिकालीन हिन्दी का जैन साहित्य, सिद्ध और नाथ साहित्य, अमीर खुसरो की हिन्दी कविता, विद्यापति और उनकी पदावली, आरम्भिक गद्य तथा लौकिक साहित्य।

मध्यकालः भक्ति–आन्दोलन के उदय के सामाजिक–सांस्कृतिक कारण, प्रमुख निर्गुण एवं सगुण सम्प्रदाय, वैष्णव भक्ति की सामाजिक–सांस्कृतिक पृष्ठभूमि, आलवार सन्त, प्रमुख सम्प्रदाय और आचार्य, भक्ति आन्दोलन का अखिल भारतीय स्वरूप और उसका अन्तःप्रादेशिक वैशिष्ट्य।

हिन्दी सन्त काव्य : सन्त काव्य का वैचारिक आधार, प्रमुख निर्गुण सन्त कवि कबीर, नानक, दादू, रैदास, सन्त काव्य की प्रमुख विशेषताएँ, भारतीय धर्म साधना में सन्त कवियों का स्थान।

हिन्दी सूफी काव्य : सूफी काव्य का वैचारिक आधार, हिन्दी के प्रमुख सूफी कवि और काव्य– मुल्ला दाऊद (चन्दयान), कुतुबन (मिरगावती), मंझन (मधुमालती) मलिक मुहम्मद जायसी (पद्मावत), सूफी प्रेमाख्यानकों का स्वरूप, हिन्दी सूफी काव्य की प्रमुख विशेषताएँ।

हिन्दी कृष्ण काव्य : विविध सम्प्रदाय, वल्लभ सम्प्रदाय, अष्टछाप, प्रमुख कृष्ण–भक्त कवि और काव्य, सूरदास (सूरसागर), नन्ददास (रास पंचाध्यायी), भ्रमरगीत परम्परा, गीति परम्परा और

हिन्दी कृष्ण काव्य– मीरा और रसखान।

हिन्दी राम काव्य : विविध सम्प्रदाय, रामभक्ति शाखा के कवि आरै काव्य, तुलसीदास की प्रमुख कृतियाँ, काव्य रूप और उनका महत्व।

रीति काल : सामाजिक–सार्ं कृतिक परिप्रेक्ष्य, रीतिकाव्य के मूल स्रोत, रीतिकाल की प्रमुख प्रवृत्तियाँ, रीतिकालीन कवियों का आचार्यत्व, रीतिमुक्त काव्यधारा, रीतिकाल के प्रमुख कवि : केशवदास, मतिराम, भूषण, बिहारीलाल, देव, घनानन्द और पद्माकर, रीतिकाव्य में लोकजीवन।

आधुनिक काल : हिन्दी गद्य का उद्भव और विकास।

भारतेन्दु पूर्व हिन्दी गद्य, 1857 की राज्य क्रान्ति और सार्ंकृतिक पुनुर्जागरण, भारतेन्दु और उनका मण्डल, 19वीं शताब्दी के उत्तरार्द्ध की हिन्दी पत्रकारिता।

द्विवेदी युग : महावीर प्रसाद द्विवेदी और उनका युग, हिन्दी नवजागरण और सरस्वती,

मैथिलीशरण गुप्त और राष्ट्रीय काव्यधारा, राष्ट्रीय काव्यधारा के प्रमुख कवि, स्वच्छन्दतावाद और उसके प्रमुख कवि।

छायावाद और उसके बाद : छायावादी काव्य की प्रमुख विशेषताएँ, छायावाद के प्रमुख कवि : प्रसाद, निराला, पन्त और महादेवी, उत्तर छायावादी काव्य और उसके प्रमुख कवि, प्रगतिशील काव्य और उसके प्रमुख कवि, प्रयोगवाद और नई कविता, नई कविता के कवि, समकालीन कविता, समकालीन साहित्यिक पत्रकारिता।

3. हिन्दी साहित्य की गद्य विधाएँ

हिन्दी उपन्यास : प्रेमचन्द पूर्व उपन्यास, प्रेमचन्द और उनका युग, प्रेमचन्द के परवर्ती प्रमुख उपन्यासकार : जैनेन्द्र, अज्ञेय, हजारी प्रसाद द्विवेदी, यशपाल, अमृतलाल नागर, फणीश्वरनाथ रेणु, भीष्म साहनी, कृष्णा सोबती, निर्मल वर्मा, नरेश मेहता, श्रीलाल शुक्ल, राही मासूम रजा, रांगेय राघव, मन्नू भण्डारी।

हिन्दी कहानी : बीसवीं सदी की हिन्दी कहानी आरै प्रमुख कहानी आन्दोलन।

हिन्दी नाटक : हिन्दी नाटक और रंगमंच, विकास के चरण और प्रमुख नाट्यकृतियाँ : अंधेर नगरी, चन्द्रगुप्त, अंधायुग, आधे–अधूरे, आठवां सर्ग, हिन्दी एकांकी।

हिन्दी निबन्ध : हिन्दी निबन्ध के प्रकार आरै प्रमुख निबन्धकार – रामचन्द्र शुक्ल, हजारी प्रसाद द्विवेदी, कुबेरनाथ राय, विद्यानिवास मिश्र, हरिशंकर परसाई।

हिन्दी आलोचना : हिन्दी आलोचना का विकास एवं प्रमुख आलोचक – रामचन्द्र शुक्ल, नंददुलारे वाजपेयी, हजारी प्रसाद द्विवेदी, रामविलास शर्मा, डॉ. नगेन्द्र, डॉ. नामवर सिंह, विजयदेव नारायण साही।

हिन्दी की अन्य गद्य विधाएँ : रेखाचित्र, सस्ंमरण, यात्रा–साहित्य, आत्मकथा, जीवनी और रिपोर्ताज।

4. भारतीय एवं पाश्चात्य काव्यशास्त्र तथा हिन्दी आलोचना

काव्य लक्षण, काव्य हेतु और काव्य प्रयोजन। प्रमुख सिद्धान्त : रस, अलंकार, रीति, ध्वनि, वक्रोक्ति और औचित्य– सामान्य परिचय।

भरत मुनि का रस सूत्र और उसके प्रमुख व्याख्याकार।

रस के अवयव, स्वरूप।

साधारणीकरण एवं सहृदय की अवधारणा।

शब्द शक्तियाँ और ध्वनि का स्वरूप।

अलंकार – यमक, श्लेष, वक्रोक्ति, उपमा, रूपक, उत्प्रेक्षा, संदेह, भ्रान्तिमान, अतिशयोक्ति, अन्योक्ति, समासोक्ति, अत्युक्ति, विशेषोक्ति, दृष्टान्त, उदाहरण, प्रतिवस्तूपमा, निदर्शना, अर्थान्तरन्यास, विभावना, असंगति तथा विरोधाभास।

रीति, गुण, दोष।

प्लेटो और अरस्तू का अनुकरण सिद्धान्त तथा अरस्तू का विरेचन सिद्धान्त।

वर्ड्सवर्थ का काव्य–भाषा सिद्धान्त।

कालरिज कल्पना और फैन्टसी।

आई.ए. रिचर्ड्स – मूल्य सिद्धान्त तथा काव्य–भाषा सिद्धान्त।

टी.एस. इलिएट – निर्वैयक्तिकता का सिद्धान्त, वस्तुनिष्ठ सह–सम्बन्धी, परम्परा की अवधारणा।

मिथक, फन्तासी, कल्पना, प्रतीक और बिम्ब।

स्वच्छन्दतावाद और यथार्थवाद, संरचनावाद, उत्तर संरचनावाद, आधुनिकता, उत्तर आधुनिकता। समकालीन आलोचना की कतिपय अवधारणाएँ : विडम्बना (आयरनी), अजनबीपन (एलियनेशन), विसंगति (एब्सर्ड), अन्तर्विरोध (पैराडॉक्स), विखण्डन (डीकन्स्ट्रक्शन)।

हिन्दी आलोचना – रामचन्द्र शुक्ल और उनके आलोचनात्मक प्रतिमान।

शुक्लोत्तर समीक्षा और समीक्षक – हजारी प्रसाद द्विवेदी, नन्ददुलारे वाजपेयी, डॉ रामविलास शर्मा, डॉ. नामवर सिंह, विजयदेव नारायण साही, समकालीन आलोचना।

5. प्रयोजन मूलक हिन्दी

अनुवाद विज्ञान : अनुवाद का स्वरूप, क्षेत्र, प्रक्रिया एवं प्रविधि। हिन्दी की प्रयोजनीयता में अनुवाद की भूमिका।

मीडिया लेखन : जनसंचार प्रौद्योगिकी एवं चुनौतियाँ, विभिन्न जनसंचार माध्यमों का स्वरूप– मुद्रण, श्रव्य, दृश्य–श्रव्य, इण्टरनेट।

दृश्य–श्रव्य माध्यम : (फिल्म, टेलीविजन एवं वीडियो) दृश्य माध्यमों में भाषा की प्रकृति। दृश्य एवं श्रव्य सामग्री का सामंजस्य पार्श्व वाचन (वायस ओवर) पटकथा लेखन।

हिन्दी कम्प्यूटिंगं : कम्प्यूटर : परिचय, रूपरेखा, उपयोग तथा क्षेत्र, वेब पब्लिशिंग का परिचय।

पत्रकारिता : स्वरूप एवं प्रकार, हिन्दी पत्रकारिता का संक्षिप्त इतिहास, शीर्षक की सरंचना, लीड इंट्रो एवं शीर्षक–संपादन, संपादन के आधारभूत तत्व।

SUBJECT: HISTORY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

खण्ड–अ

प्राचीन भारतीय इतिहास

स्त्रोत : पुरातात्विक स्त्रोत, खोज उत्खनन, पुरालेखविधा, मुद्राशास्त्र, स्मारक साहित्यिक स्त्रोत

स्वदेशी : प्राथमिक तथा गौण : काल–निर्धारण की समस्याएं मिथक, आख्यान काव्य वैज्ञानिक साहित्य, क्षेत्रीय भाषाओं में साहित्य, धार्मिक साहित्य।

विदेशी विवरण : यूनानी, चीनी तथा अरब लेखक, प्रागैतिहास तथा आद्य इतिहास

मानव तथा पर्यावरण : भौगालिक कारक, आखेट तथा संग्रह, (पुरापाषाण तथा मध्यपाषण) कृषि का प्रारंभ (नव पाषाण तथा ताम्र पाषाण)

सिंधुघाटी की सभ्यता : उद्भम, तारीख, विस्तार, लक्षण, पतन, अवशेष तथा महत्व। लोह युग, द्वितीय शहरीकरण।

वैदिक काल

प्रवास तथा बस्तियां, वैदिक काल निर्धारण, साहित्यिक तथा पुरातात्वीय साक्ष्य, सामाजिक तथा राजनीतिक संस्थाओं का विकास, धार्मिक तथा दार्शनिक विचार, अनुष्ठान तथा पद्धतियां।

महाजनपद काल

राज्यों का (महाजनपद) का निर्माण गणराज्य तथा राज्यतंत्र, शहरी केन्द्रों का उदय, व्यापार मार्ग, आर्थिक संवृद्धि, सिक्कों का प्रचलन, जेन धर्म और बौद्ध धर्म का विस्तार, मगध तथा नन्दों का उदय। ईरान तथा मेसेडोनिया के आक्रमण और उनका प्रभाव।

मौर्य साम्राज्य

मौर्य साम्राज्य की स्थापना, चन्द्रगुप्त, कौटिल्य तथा अर्थशास्त्र अशोक, धर्म की संकल्पना, राजादेश, ब्राम्ही तथा खरोष्ठी लिपियां। प्रशासन, अर्थव्यवस्था, वास्तुकला तथा मुर्तिकला, ब्राम्ही संपर्क। साम्राज्य का विद्यटन, शुंग तथा कण्व।

मौर्यात्तर काल (भारत ग्रीक, शक, कुषाण, पश्चिमी क्षत्रप)

बाहरी, दुनिया से संपर्क, शहरी केन्द्रों का विकास, अर्थव्यवस्था, सिक्का, धर्मो का विकास, महायान, सामाजिक दशाएं कला तथा वास्तुकला, साहित्य तथा विज्ञान।

राज्य तथा समाज की स्थिति –

पूर्वी भारत दक्खन तथा दक्षिण भारत में खारवेल, सात वाहन संगम युग के तमिल राज्य, प्रशासन अर्थव्यवस्था, सिक्के, व्यापार–संघ तथा शहरी केन्द्र, बौद्ध केन्द्र संगम साहित्य, तथा संस्कृतिक, कला तथा वास्तुकला।

गुप्त सम्राट तथा भारत के क्षेत्रीय राज्य

गुप्त और वाकटक, हर्ष, प्रशासन, आर्थिक स्थिति, गुप्त सम्राटों के सिक्के, भू–प्रदान, शहरी केन्द्रों का पतन, भारतीय सामंतवाद, जातिप्रथा, महिलाओं की स्थिति, शिक्षा तथा शैक्षणिक संस्थायें– नालंदा विक्रमशिला, और वल्लभी, पडोसी देशों से संपर्क– मध्य एशिया, दक्षिण–पूर्व एशिया तथा चीन, संस्कृति साहित्य वैज्ञानिक साहित्य, कला तथा वस्तुकला। कदम्ब, गंग, पल्लव और बदामी के चालुक्य–प्रशासन, व्यापार संघ, संस्कृति साहित्य तथा क्षेत्रीय भाषाओं और लिपिओं का विकास, वैष्णव तथा शैव धर्मो का विकास, तमिल भक्ति आंदोलन, शंकाराचार्य–वेदान्त, मंदिर तथा मंदिर

वास्तुकला की संस्थायें। कामरूप के वर्मन, पाल और सेन, राष्ट्रकूट, प्रतिहार कलचुरि के चेदि, परमार गुजरात के चालुक्य, चोल, चेर होसला, पांड्य, प्रशासन तथा स्थानीय सरकार कला तथा वास्तुकला का विकास, धार्मिक पंथ (सम्प्रदाय) मंदिर और मठ संस्था, अग्रहार, शिक्षा तथा साहित्य, अर्थव्यवस्था तथा समाज, श्रीलंका और दक्षिण–पूर्व एशिया से संपर्क।

खण्ड–ब

मध्यकालीन भारतीय इतिहास

स्त्रोत पुरातत्व, पुरालेख और सिक्काशास्त्र, संबंधित सामग्री और स्मारक। इतिवृत।
साहित्यिक स्त्रोत– फारसी, संस्कृत और क्षेत्रीय भाषायें। पुरा लेख सामग्री
विदेशी यात्री– वृतांत।

राजनीतिक विकास

सल्तनत– गौरी, तुर्क, खिलजी, तुगलक, सैयद और लोदी।
मुगल साम्राज्य की नीव–बाबर, हुमायूं और सूरी, अकबर से औरंगजेब तक राज्य विस्तार।
मुगल साम्राज्य का पतन–राजनीतिक, प्रशासनिक तथा आर्थिक कारण। बाद के मुगल और मुगल साम्राज्य का विद्यटन
विजय नगर और बहमनी राज्य– उत्थान, विस्तार और विद्यटन
मराठा आंदोलन – शिवाजी द्वारा स्वराजय की नींव, पेशवाओं के अधीन इसका
विस्तार, मराठा राज्य मंडल पतन के कारण।

प्रशासन

सल्तनत के अधीन प्रशासन– असैनिक, न्यायिक, राजस्व, राजकोषीय और सैनिक।
शेरशाह के प्रशासनिक सुधार, मुगल प्रशासन–भू–राजस्व और आय के अन्य स्त्रोत,
मन सबदारी और जागीरदारी।
दक्खन में प्रशासन पद्धति–विजयनगर, बहमनी राज्य तथा मराठा।

आर्थिक पक्ष

कृषि उत्पादन– ग्रामीण अर्थव्यवस्था, कृषक वर्ग।
शहरी केन्द्र ओर जनसंख्या।
उद्योग–सूती वस्त्र उद्योग, हस्तशिलप, कृषि आधारित उद्योग, संगठन, कारखाना,
प्रौद्योगिकी।
व्यापार और वाणिज्य– राज्य की नीतियाँ, आंतरिक और बाह्य व्यापार
यूरोपीयन व्यापार, व्यापार केन्द्र और पतन, परिवहन और संचार।
वित्तीयन व्यापार, वाणिजय और उद्योग, हुण्डी (विनिमय पत्र) और बीमा। मुद्रा।

सामाजिक धार्मिक आंदोलन

सूफी उनके धार्मिक संघ, विश्वास और पद्धतियां, प्रख्यात सुफी संत।
भक्ति सम्प्रदाय– शैव और उसकी शाखायें, वैष्णववाद और उसकी शाखायें।
मध्यकालीन संत– उत्तर और दक्षिण उनका सामाजिक राजनीतिक और धार्मिक जीवन पर प्रभाव।
सिक्ख आंदोलन – गुरूनानक देव और उनके उपदेश और साधना, आदि ग्रन्थ, खालसा।

समाज

वर्गीकरण– शासक वर्ग, प्रमुख धार्मिक वर्ग, व्यापारी और व्यवसायिक वर्ग,
ग्रामीण समाज– छोटे सामंत, ग्राम कर्मचारी, कृषक और गैर– कृषक वर्ग शिल्पकार।
महिलाओं की स्थिति

सांस्कृतिक जीवन

शैक्षणिक पद्धति और उसकी अभिप्रेरणा।
सहित्य–फारसी, संस्कृत तथा क्षेत्रीय भाषायें।
ललित कलाएं–चित्रकारी के प्रमुख स्कूल, संगीत।
उत्तर तथा दक्षिण भारत का वास्तुपूरक विकास भारतीय इस्लामिक वास्तुकला।

खण्ड–स

आधुनिक भारत का इतिहास

स्त्रोत तथा इतिहासशास्त्र
पुरालेखी सामग्री, जीवनी तथा संस्मरण सामाचार–पत्र।
मौखिक साक्ष्य, सृजनात्मक साहित्य तथा चित्रकला।
आधुनिक भारतीय इतिहासशास्त्र की समस्यायें– साम्राज्यवादी, राष्ट्रवादी, मार्क्सवादी तथा मध्यवर्ती।

ब्रिटिश शक्ति का उदय

17वीं और 18वीं शताब्दी में भारत में यूरोपीय व्यापारी पुर्तगाली, डच, फ्रांसीसी तथा ब्रिटिश।
भारत में ब्रिटिश शासन की स्थापना तथा विस्तार।
भारत की प्रमुख शक्तियों के साथ ब्रिटिश संबंध और उनका आधुनिकीकरण– बंगाल, अवध, हैदराबाद, मैसूर, मराठा तथा सिक्ख।

कम्पनी तथा राजा (क्राउन) का प्रशासन

ईस्ट इंडिया कंपनी के अधीन मध्य तथा प्रांतीय ढ़ांचे का विकास (1773–1853) कम्पनी तथा क्राउन के अधीन परमोझ शक्ति, सिविल सेवा, न्यायिक, पुलिस सेवा तथा सेना।
स्थानीय स्वशासन
संवैधानिक परिवर्तन, 1909–1930

आर्थिक इतिहास

व्यापार का बदलता हुआ संगठन, व्यापार का आयाम तथा दिशा, दि ट्रिब्यूट।
कृषि का विस्तार तथा वाणिणिजयकरण, भूमि संबंधी अधिकार, भूमि बंदोबस्त, ग्रामीण ऋणग्रस्तता, भूमिहीन मजदूर।
उद्योगो का पतन –कारीगरों की बदलती हुई सामाजिक आर्थिक दशाएं, अशहरीकरण।
औद्योगिक नीति– प्रमुख आधुनिक उद्योग, फैक्टरी कानून का स्वरूप, श्रमिक तथा मजदूर संघ के आंदोलन।
मौद्रिक नीति– बैंकिंग, मुद्रा तथा विनिमय, रेलवे तथा सड़क परिवहन नये शहरी केन्द्रों का विकास, शहर आयोजन तथा वास्तुकला की नई विशेषतायें।
दुर्भिक्ष तथा महामारी और सरकार की नीति
आर्थिक विचार– इंग्लिश उपयोगितावादी, भारतीय आर्थिक इतिहासकार निकास सिद्धान्त।

संक्रंमणाधीन भारतीय समाज–

इसाई धर्म से संपर्क, मिशन भारतीय सामाजिक तथा आर्थिक पद्धतियों एवं धार्मिक विश्वासों की समीक्षा, शैक्षणिक तथा अन्य गतिविधियां।
नई शिक्षा सरकारी नीति, स्तर तथा विषय, अंग्रेजी भाषा, आधुनिक विज्ञान, शिक्षा में भारतीय पहल।
राजाराममोहन राय, सामाजिक धार्मिक सुधार, मध्यम वर्ग का उदय, जाति संघ तथा जाति गतिशीलता।
महिलाओं का प्रश्न– राष्ट्रवादी कथन, महिला संगठन, महिलाओं से संबंधित ब्रिटिश कानून, संवैधानिक स्थिति।
मुद्रणालय (प्रिंटिंग प्रेस)– पत्रकारिता संबंधी गतिविधि तथा जनमत।
भारतीय भाषाओं तथा साहित्यिक रूपों का आधुनिकीकरण, चित्रकला का पुनर्विन्यास, संगीत तथा प्रदर्शन कलायें।

राष्ट्रीय आंदोलन

भारतीय राष्ट्रीयता का उदय, राष्ट्रीयता के सामाजिक तथा आर्थिक आधार। 1857 का विद्रोह तथा भिन्न–भिन्न सामाजिक वर्ग जनजातीय तथा किसान आंदोलन। भारतीय राष्ट्रीय कांग्रेस की विचारधारा तथा कार्यक्रम 1885–1920 स्वदेशी आंदोलन का प्रवृत्तियां। भारत तथा विदेश में भारतीय क्रांतिकारियों की विचारधारा एवं कार्यक्रम। वामपंथी राजनीति। दलित वर्ग का आंदोलन। साम्प्रदायी राजनीति तथा पाकिस्तान का उदय। स्वाधीनता तथा विभाजन की ओर।

स्वतंत्रोत्तर भारत (1947–1984)

विभाजन के बाद पुनर्वास
भारतीय राज्यों का एकीकरणः कश्मीर का प्रश्न। भारतीय संविधान का
निर्माण। नौकरशाही तथा पुलिस का ढ़ांचा। जनांकिकीय प्रवृत्तियां आर्थिक नीतियां तथा योजना प्रक्रिया।
राज्यों का भाषा वैज्ञानिक पुनर्गठन। विदेश नीति संबंधी पहल कार्य।

इतिहास में अनुसुसंधान

इतिहास की अवधारणा, इतिहास के क्षेत्र तथा मूल्य, इतिहास में कार्य कारण संबंध, इतिहास में वस्तुनिष्ठता तथा अभिनति, इतिहास और उसके सहायक विज्ञान,

अनुसंधान का क्षेत्र– प्रस्तावित।
अनुसंधान क्षेत्र में स्त्रोत– प्राथमिक/द्वितीयक
अनुसंधान के अनुसंधानकारी क्षेत्र में आधुनिक इतिहास लेखन

SUBJECT: JOURNLISM AND MASS COMMUNICATION
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Unit 1: Introduction to Journalism and Mass Communication

- Concept of journalism and mass communication, Mass communication in India
- History, growth and development of print, electronic and digital media
- Models and theories of communication
- Indian tradition and approaches to communication from Vedic era to 21st century
- Media, culture and society

Unit 2: Media Law and Ethics

- Concept of media law and ethics in India and world
- The constitution of India, its historical evolution and relevance
- Freedom of speech and expression, Defamation, Libel, Right to Information, Contempt of Court, Official Secret Act, Press and Registration of Books, Working Journalists and other Newspaper employees (Conditions of Service) and Miscellaneous Provisions Act, Wage Bords, Miller and Hicklin Test, Prohibition Act, Prevention of Atrocities Act, Parliamentary Privileges, laws of relevance under IPC
- RTI Act, Copyright Act, IPR, Cable Television Network Act, Film Censorship, Press Council Act, ASCI, Regulatory bodies of print, television, digital and other media
- Regulations recommended by PCI, I&B Ministry, and other professional bodies of media and human rights

Unit 3: Communication for Development and Social Change

- Concept and definition of development, Role of media for development
- Theories, models and paradigms of development
- Developmental institutions and organisation on international and national level, Role of NGOs
- Emergence of global civil societies, public sphere, global communication system
- Leading influencers of social reform in India: Raja Rammohan Roy, Pandit Madanmohan Malviya, Bal Gangadhar Tilak, Jyotibha Phule, Mahatma Gandhi, Acharya Vinoba Bhave, Dr. B.R. Ambedkar, Deendayal Upadhyay, Dr. Ram Manohar Lohia

Unit 4: Advertising, Corporate and Marketing Communication

- Concepts, types and nature of advertising, public relation, corporate communication and marketing communication
- Brand management and image building, tools for communication, campaign planning and strategies
- Ethics in advertising, corporate communication and marketing
- Crisis communication management
- Marketing research: need, types, tools and relevance

Unit 5: Communication Research

- Meaning, definition, evolution and types of communication research
- Research process: Literature review, problem identification and defining variables, hypothesis and research questions
- Research methods and tools: Research design, Methodology for research, Sampling
- Data collection and processing
- Ethical consideration in communication research, importance of research in practice for media professionals

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SUBJECT: LIBRARY AND INFORMATION SCIENCE
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

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SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Information, Information Science Information Society. Information Transfer Cycle. Intellectual Property Right - Concept, Copyright, Censorship .Law of Library Science ,Resource Sharing and Networking Library Movement and Library Legislation in India Library Association in India and UK, Library Association at International Level - FID, IFLA, UESCO. Sources of Information - Primary, Secondary and Tertiary Biographical Sources, Reference Sources . E-Documents, E- Journals, E-Books. Databases-Bibliographic and Full Text Reference and information Services. Indexing and Abstracting Services, CAS, SDI. Online Services. Reprographic Services. Library Classification - Canonsand Principles. Library Classification Schemes CC and DDC. Library Cataloguing - Canons and Principles. Library Cataloguing Codes CCC and AACR-11. indexing - Pm-Coordinate and Post-Coordinate. Management - Principles Function School of Thought Planning Organization Structure. Collection Development. Human Resources Management. Financial Management. Total Quality Management TQM Information Technology- Components Impact of IT on Society Telecommunication. Networking. ISDN. Library Automation. Library Networks. National and International Information Systems. Types of Libraries Digital Libraries. Virtual Libraries. Role of UGC in the growth and development of libraries and Information Center.

REFERENCE BOOKS

1. Classification, Krishan Kumar, Ess Publication
2. Descriptive Question NET/SLET ,SM Tripathi, Ess Publication
3. Cataloging , SS Agrawal, Hindi Gtanth Acdmi Bhopal
4. Pralekhan Aum Suchana Vigyan , SP Sood RB Publication Jaipur
5. Library Automation, A R. Nai Ess Publication
6. Library Management, Saxena Suchana aum Sandrabh Sava Ke Nven Ayam , S M Trapathi Ess Publication

SUBJECT: POLTICAL SCIENCE (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. Overview of Indian Political Thought, Genesis and development.
2. The Indian Renaissance- Raja Ram Mohan Roy, Balgangadhar Tilak, Vivekanand.
3. Influences on the Ideas of Mahatma Gandhi.
4. Satya, Dharma, Shanti, Prem, Ahinsa, Asteya, Swadeshi, Roti Ke Liye Shram, Brahmacharya, Savinaya Awagya Andolan.
5. Political ideas of Pandit Jawahar Lal Nehru.
6. Dr. Bhimrao Ambedkar.
7. Political System, Approach and Analysis (David Easton)
8. Why's and where fore's of Marxian approach.
9. Political Elites (View of Pareto, Mosca, Michels, Laswell)
10. Political Socialization (Views of Apter, Almond and Powell)
11. Political Communication (views of Norbert Weiner and Karl Deutsch)
12. Meaning, Nature and Scope of International Politics
13. The concept of Non-Alignment :Bases, Role and Relevance
14. Regional Cooperation SAARC, ASAEAN.
15. Disarmament and Arms Control, CTBT, NPT
16. North –South Dialogue and South, South Dialogue and their major issues
17. Globalization- Meaning, Nature, its advantages and disadvantages, role of the WTO.
18. Evolution of Public "Administration as a discipline.
19. Meaning, Nature and Scope of public administration.
20. New Public Administration -Trends
21. Financial Administration
22. Financial Administration- Importance and Aims
23. Zero base Budgeting and performance budgeting processes, problems and importance.
24. Political Thought of Plato
25. Political Thought of Aristotle
26. Machiavelli, Hobbes, Locke, Rousseau, Montesquieu.
27. Bentham, J.S. Mill, Hegal, Green, Marx

1. भारतीय राजनीतिक विचारों का परिदृश्य, उत्पत्ति तथा विकास
2. भारतीय पुनर्जागरण– राजाराममोहन रॉय, बालगंगाधर तिलक, विवेकानंद
3. महात्मा गांधी के विचारों पर प्रभाव
4. सत्य, धर्म, शांति, प्रेम, अहिंसा, अस्तेय, स्वदेशी, रोटी के लिए श्रम, ब्रहमचर्य, सविनय अवज्ञा आंदोलन
5. पंडित जवाहरलाल नेहरू के राजनीतिक विचार
6. डॉ. भीमराव आंबेडकर
7. राजनीतिक व्यवस्था, उपागम एवं विश्लेषण (डेविड ईस्टन)
8. मार्क्सवादी उपागम के कारण तथा परिप्रेक्ष्य

9. राजनीतिक अभिजात्य (पेरेटो, मोस्का, मिशेल्स, लासवेल के विचार)
10. राजनीतिक संचार (एप्टर, ऑलमंड तथा पॉवेल के विचार)
11. राजनीतिक संचार (नॉर्बर्ट वीमन तथा कार्ल ड्यूस्ट के विचार)
12. अंतर्राष्ट्रीय राजनीति का अर्थ, प्रकृति तथा विस्तार
13. गुटनिरपेक्षता– आधार, भूमिका तथा महत्व
14. क्षेत्रीय सहभागिता– सार्क, आसियान
15. निःशस्त्रीकरण तथा शस्त्रों पर नियंत्रण– सीटीबीटी, एनपीटी
16. दक्षिण–उत्तर संवाद तथा दक्षिण–दक्षिण संवाद तथा इनके महत्वपूर्ण मुद्दे
17. भूमंडीलकरण– अर्थ, प्रकृति, लाभ, हानियां, डब्ल्यूटीओकी भूमिका।
18. लोक प्रशासन का विकास
19. लोक प्रशासन का अर्थ, प्रकृति एवं विस्तार
20. नवीन लोक प्रशासन– प्रवृत्तियां
21. वित्तीय प्रशासन– महत्व तथा उद्देश्य
22. शून्य आधारित बजट तथा पर्फोरमेन्स बजट– प्रक्रिया, कठिनाईयां तथा महत्व
23. प्लेटो के राजनीतिक विचार
24. अरस्तू के राजनीतिक विचार
25. मेकियावली, हॉब्स, लोक, रूसो, मांटेस्क्यू
26. बेंथम, जे.एस. मिल, हीगल, ग्रीन, मार्क्स

Constituent Assembly: Composition and working ; Making of the Indian Constitution, Salient features of the Indian constitution
संविधान सभाः गठन एवं कार्य, भारतीय संविधान का निर्माण, भारतीय संविधान की प्रमुख विशेषताएँ
Preamble; Fundamental Rights and Duties; Directive Principles of State Policy, Amendment Procedure
प्रस्तावना, मौलिक अधिकार एवं कर्तव्य, राज्य के नीति निर्देशक तत्व, संविधान संशोधन
Union Executive: President, Prime Minister and Council of Ministers
संघीय कार्यपालिकाः राष्ट्रपति, प्रधानमंत्री एवं मंत्रीपरिषद
Union Legislature: Lok Sabha and Rajya Sabh; Union Judiciary: The Supreme Court of India
संघीय व्यवस्थापिका : लोकसभा एवं राज्यसभा, संघीय न्यायपालिका : भारत का सर्वोच्च न्यायालय
State Executive: Governor, Chief Minister and Council of Ministers
राज्य की कार्यपालिका : राज्यपाल, मुख्यमंत्री एवं मंत्री परिषद
State Legislature: Vidhan Sabha and Vidhan Parishad
राज्य की व्यवस्थापिका : विधान सभा एवं विधान परिषद
Judiciary : High Court and Subordinate Courts
राज्य की न्यायपालिका : उच्च न्यायलय एवं अधीनस्थ न्यायालय

Problem Areas
1. Increasing Demand for State Autonomy
2. Demand for the creation of new states
3. State politics in the era of Globalization and coalition politics.
4. Inter state river water disputes
5. Factors influencing state politics in India
समस्या के क्षेत्र
1. राज्य स्वायत्तता की बढ़ती मांग
2. नये राज्यों की गठन की मांग
3. भूमंडलीकरण एवं गठबन्धन की राजनीति के युग में राज्य राजनीति
4. अर्न्तराज्यीय नदी जल विवाद
5. भारत में राज्य राजनीति को प्रभावित करने वाले कारक।

Main political issues since 1971 AD.
Nepal- The status of the roots of democracy.
Indo Pak Relation
I. Nature and Evolution of International Organization.
II. The League of Nations: Role in protecting world peace, causes of failure of League of Nations.
III. The United Nations: Structure and Functions, Various organs of the UN Need of reforms in the UN structure. Humanitarian role.
IV. UN's role in Disarmament

- Nature of social Research: Importance and uses, Difference between Pure and applied research, Identification of Research problem, Research Design.
- Hypothesis, Concepts and Variables, Typologies, Hypotheses Formulation and testing, Sampling Methods. Tools and Techniques of Data collection
- Observation: Characteristics of observation, Kinds of observation, Merits and Demerits, Questionnaire, scheduled and interviews.
- Sampling and survey techniques.
- Nature of study : Case study, techniques, Role and importance of case studies, Pilot studies and panel studies.

Theory Formation in Social Sciences- Survey Analysis- Types, Merits, Demerits, Report writing- Purpose and contents of a Report.
Origin and Development of International law, Meaning, Nature, scope and sources of International law.
अंतर्राष्ट्रीय कानून : उद्भव एवं विकास, अर्थ, प्रकृति, क्षेत्र एवं स्रोत
Relationship between international law and national law- Codification and Progressive Development of International law
अंतर्राष्ट्रीय कानून एवं राष्ट्रीय कानून के मध्य संबंध, अंतर्राष्ट्रीय कानून का संहिताकरण एवं क्रमिक विकास
Laws of Air, Land and sea warfares, Treatment of Prinsoners of War, 1949, Genewa Convention.
हवाई युद्ध, थल युद्ध एवं समुद्री युद्ध के नियम, युद्ध बंदियों के साथ व्यवहार,
जेनेवा सम्मेलन

1. Foreign policy: Meaning, nature and determinants
2. Determinants of Indian Foreign Policy: Internal and external
3. Principles and objectives of Indian Foreign Policy.

1. विदेशनीति : अर्थ, प्रकृति और निर्धारक तत्व
2. भारतीय विदेश नीति के निर्धारक तत्व : आन्तरिक एवं बाह्य
3. भारतीय विदेश नीति के सिद्धांत एवं उद्देश्य

1. Indian and the USA
2. India and Russia
3. India and China

1. भारत और संयुक्त राज्य अमेरिका
2. भारत एवं रूस
3. भारत एवं चीन

1. Nature of Indian Federal System
2. Center State Relations in India : Legislative, Administrative and Financial

1. भारती संघीय व्यवस्था की प्रकृति,
2. केन्द्र राज्य संबंध : विधायी, वित्तीय एवं प्रशासनिक

1. Emerging trends in Indian federal system
2. Development of Local- Self Government after Independence, 73rd and 74th constitutional amendments.

1. भारतीय संघीय व्यवस्था की उभरती प्रवृत्तियाँ,
2. स्वतंत्र भारत में स्थानीय स्वशासन का विकास, 73 एवं 74वाँ संविधान संशोधन

Finance and local self Govt.: Bureaucracy and local self Govt; women's reservation in a Panchayat and its effects. Local autonomy and its importance

स्थानीय स्वशासन एवं वित्त, स्थानीय स्वशासन एवं नौकरशाही, पंचायतों में महिला आरक्षण एवं उसके प्रभाव, स्थानीय स्वायत्तता एवं इसका महत्व

Reorganization of States (1956) and Formation of Madhya Pradesh, Division of Madhya Pradesh. Determinants and Characteristics of Madhya Pradesh Politics, Party System and Main Political Parties in Madhya Pradesh.

राज्यों का पुनर्गठन (1956) तथा मध्य प्रदेश का निर्माण। मध्य प्रदेश का विभाजन। मध्यप्रदेश की राजनीति के निर्धारक तत्व एवं विशेषताएँ, मध्य प्रदेश की दलीय व्यवस्था एवं राजनीतिक दल।

Administration in Madhya Pradesh : Secretariat, Chief Secretary, Secretary, Commissioner

मध्यप्रदेश का प्रशासन : सचिवालय, मुख्यसचिव, सचिव तथा आयुक्त। मध्यप्रदेश में जिला प्रशासनः जिलाधीश की भूमिका।

Emerging Trends in Madhya Pradesh Politics : Politics of Tribal, Politics of Dalits, Naxalite problem, Women and Politics, Electoral Politics and voting Behaviour. Politics of Development in Madhya Pradesh.

मध्यप्रदेश राजनीति की उभरती प्रवृत्तियां : जनजातीय राजनीति, दलित राजनीति, नक्सल समस्या, महिलाएं और राजनीति। निर्वाचन की राजनीति एवं मतदान व्यवहार। मध्यप्रदेश में विकास की राजनीति।

Meaning & Objectives of Diplomacy, Relation of Diplomacy with International Relations, Foreign Policy and International law. Historical evolution of diplomatic theory, methods and techniques upto present day. Limitations of Diplomacy.

राजनयः अर्थ एवं उद्देश्य, राजनय एवं अन्तर्राष्ट्रीय संबंध, विदेशनीति एवं अन्तर्राष्ट्रीय कानून राजनयिक सिद्धांत का ऐतिहासिक विकास, राजनय की प्रवृत्तियाँ एवं तकनीक। राजनय की सीमाएं।

Types of Diplomacy, Functions & Duties of a diplomat, Diplomatic procedure, Diplomatic Language.

राजनय के प्रकार, राजनयिक के कार्य एवं कर्तव्य, राजनयिक प्रक्रिया, राजनयिक भाषा।

Meaning and nature of Human Rights, Origin of development of concept of Human Rights. Human Rights : Global and regional scenario. UNO and Human rights, Provisions in UN charter- Universal Declaration of Human Rights.

मानव अधिकार का अर्थ एवं प्रकृति।

मानव अधिकार की अवधारणा की उत्पत्ति एवं विकास, मानवाधिकार– वैश्विक एवं क्षेत्रीय परिदृश्य। संयुक्त राष्ट्र घोषणा पत्र में मानवाधिकारों के प्रावधान। मानवाधिकारों का सार्वभौमिक घोषणा (विश्वव्यापी)

International protection of Human Rights : Civic, Political, Social and Economic Rights, Collective Rights. Basis of self decisions, Problems and solutions.

मानवाधिकारों का अन्तर्राष्ट्रीय संरक्षण, नागरिक, राजनीतिक, सामाजिक एवं आर्थिक अधिकार सामूहिक अधिकार आत्म निर्णय का आधार, समस्याएँ एवं समाधान।

SUBJECT: PSYCHOLOGY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

UNIT 1 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.

Biological basis of behaviour

Sensory systems: Generall 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, degeneraltion techniques, lesion techniques, chemical methods, microelectrode studies. Non-invasive methods – EEG, Scanning methods.

UNIT 2 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

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

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

Thinking, Intelligence and Creativity

Problem solving: Type, Strategies, and Obstacles

Decision-making: Types and models

Metacognition: Metacognitive knowledge and Metacognitive regulation

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

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

UNIT 3 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.
Basic motivational concepts: Instincts, Needs, Drives, Arousal, Incentives, Motivational Cycle. Approaches to the study of motivation: Psychoanalytical, Ethological, S-R Cognitive, Humanistic
Emotions: Physiological correlates Theories of emotions: James-Lange, Canon-Bard, Schachter and Singer, Lazarus, Lindsley.
Conflicts: Sources and types Stress and Coping: Concept, Models, Type A, B, C, D behaviors, Stress management strategies [Biofeedback, Music therapy, Breathing exercises, Progressive Muscular Relaxation, Guided Imagery, Mindfulness, Meditation, Yogasana, Stress Inoculation Training].

UNIT 4 Social Psychology
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]
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.
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.

UNIT 5 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.

SUBJECT: SANSKRIT (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

इकाई 01 वैदिक साहित्य

देवता : अग्नि, सावित्री, विष्णु, इंद्र, रूद्र, बृहस्पति, अश्वनी।

विषय वस्तु : संहिताएँ ब्राह्मण एवं आरण्यक, उपनिषद।

संवाद सूत्र

पुरुरवा- उर्वशी, यम- यमी।

वैदिक साहित्य का इतिहास

वैदिक काल के विषय में विभिन्न सिद्धांत मैक्समूलर, ए. बेबर, जैकोबी, बाल गंगाधर तिलक एवं भारतीय परंपरागत विचार

वेदांग

शिक्षा, कल्प, व्याकरण, निरुक्त, छंद , ज्योतिष।

इकाई 02 दर्शन

ईश्वर कृष्ण की सांख्यकारिका : सत्कार्यवाद, पुरुष स्वरूप, प्रकृति स्वरूप, सृष्टिक्रम।

सदानंद का वेदांतसार

अनुबंध चतुष्टय, अज्ञान, अपवाद, लिंग- शरीर- उत्पत्ति, पंजीकरण, विवर्त, जीवनमुक्ति।

इकाई 03 व्याकरण एवं भाषा विज्ञान

व्याकरण परिभाषाएं : संहिता, गुण, नदी।

कारक सिद्धांत कौमुदी के अनुसार।

समास लघु सिद्धांत कौमुदी के अनुसार।

भाषा विज्ञान

भाषा की परिभाषा एवं प्रकार, भाषाओं का वर्गीकरण, प्रक्रिया एवं ध्वनियों का वर्गीकरण।

इकाई 04 संस्कृत साहित्य एवं काव्यशास्त्र

निम्नलिखित ग्रंथों का सामान्य परिचय।

पद्य: रघुवंश, मेघदूत, शिशुपालवध।

गद्य: दशकुमारचरितम्, हर्षचरितम्।

नाटक: स्वप्नवासवदत्ता, अभिज्ञानशाकुंतलम्, मृच्छकटिकम्, उत्तररामचरितम् ।

इकाई 05 काव्यशास्त्र साहित्य दर्पण

काव्य की परिभाषा ।

काव्य की अन्य परिभाषा ओं का खंडन ।

शब्द शक्ति संकेत ग्रह अभिधा, लक्षणा, व्यंजना ।

रूपक के प्रकार :

नाटक के लक्षण ।

महाकाव्य के लक्षण ।

SUBJECT: SOCIOLOGY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 30 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. **Nature of Sociology:** Definition, Basic Concept, Community, Institution, Culture, Social Structure, Structure and Role Their Interrelationship, Social Group.

2. **Social Institution :** Marriage, Family, Education, religion, Socialization, Theories of Socialization

3. **Social Stratification:** Social Differentiation, Forms of Stratification, Caste, Class, Gender, social mobility, Social Change

4. **Structural:** Radcliffe Brown, Levi Straus Functional- Durkheim, Malinowski, parsons, Interactionist - Social action, Max Weber , Pareto Bulmer Conflict - Karl Marx , Dahrendorf

5. **The Challenges of Globalization:** Globalization and Social Development, Globalization and Woman's Development

6. **Meaning and Nature of Social Research:** The scientific methods , the Problem of the Study of Social Phenomena, Objectivity and Subjectivity Fact & value , Quantitative Methods - Survey , Research Design & its types , Techniques of Data Collection

7. **Qualitative Methods:** Statistics in Social Research, Measures of Central Tendency - Mean Median Mode, etc

REFERENCE BOOKS -

1 Advanced Sociology - Manahan & Manahan
2 Elements of Social Research - Baghel & Pandey
3 Development of Sociology - G.R. Mohan
4 Sociology Thinkers - RavindraNath Mukharji
5 Indian Society - R.V. Badi, N.V. Badi
6 Social change in modern India - M.N. Srinivas
7 Social Change - William F. Ogburn
8 The Concept of Sociology - Farley E Eubank

SUBJECT: SOCIAL WORK (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Evolution of Social Work Profession: Impact of Social Reform Movements: Factors that influenced the emergence of method approach in Social Work Practice; Social Work profession and Human Rights.

Social Work Education: Content, Training, Supervision, Problems and Challenges.
Meaning and Characteristics of Society, Community, Social Group and Social Institution; Social Structure and Social Stratificaticn; theories of Social change and Social Disorganisation.

Concept and Causative Factors of Indian Social Problems- Analysis. Intervention in Social Problems — Government and Voluntary Efforts at Micro- and Micro- levels. Role of the Social Workers in identifying social problems and development of appropriate strategies.

Study of Group Process - Group Dynamics, Member's behavior, leadership and Role of the Worker in various settings.

Community organization as a Para-political process- Networking, conscientisation, planning and organizing, roles and strategies of social movements- types and role of NG0s.

Social Policy- Concept and Scope, Distinction between Social and Economic Policies, Place of Ideology and Values.

Concept of Social Justice- Its relationship with Social Legislation: Civil Rights; Human Rights; and Issues of Social Justice. Global Efforts for human Development Concept of Sustainable Development. Social Work and social Development. Problem of Social Development in India.

SUGGESTED READINGS:

1. An introduction to Social Work- Beatly J. Piccard
2. History and Philosophy of Social Work in India- Prof A.R.Wadia
3. Social Group Work: Principles and Practice- H.B.Treker
4. Community Organization- Dr(Prof.) Banmala
5. Organization of Social Welfare — A.S. Kohli & S.R. Sharma
6. Social Problems in India- Ram Anuja
7. Social Justice and Development of Weaker Section- Bindheswar Pathak

SUBJECT: THEATRE
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This Section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

इकाई 1: नाट्य सिधान्त : भारतीय तथा पाश्चात्य

- नाटक की अवधारणा भारतीय और पाश्चात्य
- भारतीय नाट्यकला के तत्व और संरचना
- पाश्चात्य नाटकों के रूपों का अध्ययन – त्रासदी, कामदी, मेलो ड्रामा और फार्स
- नाटक से सम्बंधित वादों का अध्ययन – यथार्थवाद, प्रकृतिवाद, प्रतीकवाद, अभिव्यक्तिवाद
- नाटककारों का अध्ययन – भारतेंदु हरिश्चंद्र, जयशंकर प्रसाद, मोहन राकेश, गिरीश कर्नाड, विजय तेन्दुलकर, भीष्म साहनी
- भारतीय शास्त्रीय रंगमंच, आधुनिक भारतीय रंगमंच एवं पारसी रंगमंच का इतिहास

इकाई 2: पाश्चात्य रंगमंच

- ग्रीक रंगमंच का उद्भव एवं विकास
- अरस्तु के काव्यशास्त्र का अध्ययन
- रोमन, धार्मिक एवं मध्यकालीन रंगमंच, एलिज़बेथन थियेटर
- शेक्सपीयर एवं समकालीन नाटककार
- नाटककारों का अध्ययन – सोफोक्लीज़, यूरिपिडीज़, मौलियर, अन्तोन चेखव, हेनरिक इब्सन, बर्नार्ड शॉ

इकाई 3: भारतीय एवं एशियन लोक रंगमंच

- लोक रंगमंच का उद्भव एवं विकास
- लोक रंगमंच की अवधारणा, शैली एवं विशेषताएं
- दक्षिण भारत के लोक रंगमंच – केरल, तमिलनाडु, कर्नाटक, आंध्र प्रदेश
- पूर्वोत्तर लोक रंगमंच – असम, मणिपुर, नागालैंड
- मध्य प्रदेश, छत्तीसगढ़, महाराष्ट्र, गुजरात, राजस्थान, पंजाब, उत्तर प्रदेश, बिहार
- जापान, इंडोनेशिया, बाली, श्रीलंका

इकाई 4: अभिनय और निर्देशन

- अभिनय की विभिन्न शैलियाँ – पूर्वी एवं पश्चिमी
- आरंभिक काल - ग्रीक, रोम, एलिजबेथियन, कोमेदिया डेल आर्ते
- आधुनिक काल – स्तानिस्लावस्की, मेयरहोल्ड, ब्रेख्त, ग्रोतोव्सकी
- अभिनेता के प्रशिक्षण में मुकाभिनय, कंठ, वाक्, आशु रचना, एवं शारीरिक रंगमंच की भूमिका
- नाटक निर्देशन के मुलभुत सिधान्त – संतुलन, बल, रचना, चित्रांकन, गति, लय एवं छंद
- प्रस्तुति प्रक्रिया – नाट्यालेख से प्रदर्शन तक

इकाई 5: रंग विन्यास एवं तकनीक

(A)

- रंग स्थापत्य – ग्रीक, रोमन, एलिजबेथियन,
- विकृष्ट, चतुरस्त्र एवं त्रयस्त्र प्रेक्षागृह

(B)

- मंच शिल्प : दृश्य बंध, प्रकाश, वेश-भूषा, रूप सज्जा, मंच सामग्री
- रंग संगीत का नाट्य प्रस्तुति में प्रयोग

(C)

- रंगमंच प्रबंधन एवं आयोजन

(D)

- बाल रंगमंच, अनुप्रयुक्त रंगमंच, सामुदायिक रंगमंच, शिक्षा में रंगमंच, थियेटर ऑफ़ ओप्रेस्ड, रंगमंच में नारी विमर्श

Faculty of Law

SUBJECT: LAW (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

LAW AND SOCIAL TRANSFORMATION IN INDIA

1. Law and social change
1.1. Law as an instrument of social change.
1.2. Law as the product of traditions and culture. Criticism and evaluation in the light of colonization and the introduction of common law system and institutions in India and its impact on further development of law and legal institutions in India.
2. Religion and the law
2.1. Religion as a divisive factor.
2.2. Secularism as a solution to the problem.
2.3. Reform of the law on secular lines: Problems.
2.4. Freedom of religion and non-discrimination on the basis of religion.
2.5. Religious minorities and the law.
3. Language and the law
3.1. Language as a divisive factor: formation of linguistic states.
3.2. Constitutional guarantees to linguistic minorities.
3.3. Language policy and the Constitution: Official language; multi-language system.
3.4. Non-discrimination on the ground of language.
4. Community and the law
4.1. Caste as a divisive factor
4.2. Non-discrimination on the ground of caste.
4.3. Acceptance of caste as a factor to undo past injustices.
4.4. Protective discrimination: Scheduled castes, tribes and backward classes.
4.5. Reservation; Statutory Commissions., Statutory provisions.
5. Regionalism and the law
5.1. Regionalism as a divisive factor.
5.2. Concept of India as one unit.
5.3. Right of movement, residence and business; impermissibility of state or regional barriers.
5.4. Equality in matters of employment: the slogan "Sons of the soil" and its practice.
5.5. Admission to educational institutions: preference to residents of a state.
6. Women and the law
6.1. Crimes against women.
6.2. Gender injustice and its various forms.
6.3. Women's Commission.
6.4. Empowerment of women: Constitutional and other legal provisions
7. Children and the law
7.1. Child labour.
7.2. Sexual exploitation.
7.3. Adoption and related problems.
7.4. Children and education.

8. Modernisation and the law
8.1. Modernisation as a value: Constitutional perspectives reflected in the fundamental duties.
8.2. Modernisation of social institutions through law.
8.2.1. Reform of family law
8.2.2. Agrarian reform - Industrialisation of agriculture.
8.2.3. Industrial reform: Free enterprise v. State regulation - Industrialisation v. Environmental protection.
8.3. Reform of court processes.
8.3.1. Criminal law: Plea bargaining; compounding and payment of compensation to victims.
8.3.2. Civil law: (ADR) Confrontation v. consensus; mediation and conciliation; Lok adalats.
8.3.3. Prison reforms.
8.4. Democratic decentralisation and local self-government.
9. Alternative approaches to law
9.1. The jurisprudence of Sarvodaya- Gandhiji, Vinoba Bhave; Jayaprakash Narayan Surrender of dacoits; concept of grama nyayalayas.
9.2. Socialist thought on law and justice: An enquiry through constitutional debates on the right to property.
9.3. Indian Marxist critique of law and justice.
9.4. Naxalite movement: causes and cure.

INDIAN CONSTITUTIONAL LAW: THE NEW CHALLENGES.

1. Federalism
1.1. Creation of new states
1.2. Allocation and share of resources - distribution of grants in aid
1.2.1. The inter-state disputes on resources
1.3. Rehabilitation of internally displaced persons.
1.4. Centre's responsibility and internal disturbance within States.
1.5. Directions of the Centre to the State under Article 306 and 365
1.6. Federal Comity : Relationship of trust and faith between Centre and State.
1.7. Special status of certain States.
1.7.1. Tribal Areas, Scheduled Areas

2. "State" : Need for widening the definition in the wake of liberalisation.
3. Right to equality: privatisation and its impact on affirmative action.
4. Empowerment of women.
5. Freedom of press and challenges of new scientific development
5.1. Freedom of speech and right to broadcast and telecast.
5.2. Right to strikes, hartal and bandh.
6. Emerging regime of new rights and remedies
6.1. Reading Directive Principles and Fundamental Duties into Fundamental Rights
6.11. Compensation jurisprudence
6. 1.2. Right to education
6.1.2.1. Commercialization of education and its impact.
6.1.2.2. Brain drain by foreign education market.
7. Right of minorities to establish and administer educational institutions and state control.
8. Secularism and religious fanaticism.
9. Separation of powers: stresses and strain
9.1. Judicial activism and judicial restraint.
9.2. PIL: implementation.
9.3. Judicial independence.

9.3.1. Appointment, transfer and removal of judges.
9.4. Accountability: executive and judiciary.
9.5. Tribunals
10. Democratic process
10.1. Nexus of politics with criminals and the business.
10.2. Election
10.3. Election commission: status.
10.4. Electoral Reforms
10.5. Coalition government, 'stability, durability, corrupt practice'
10.6. Grass root democracy.

Select bibliography

JUDICIAL PROCESS

1. Nature of judicial process
1.1. Judicial process as an instrument of social ordering
1.2. Judicial process and creativity in law - common law model – Legal Reasoning and growth of law - change and stability.
1.3. The tools and techniques of judicial creativity and precedent.
1.4. Legal development and creativity through legal reasoning under statutory and codified systems.
2. Special Dimensions of Judicial Process in Constitutional Adjudications.
2.1. Notions of judicial review
2.2. 'Role' in constitutional adjudication - various theories of judicial role.
2.3. Tools and techniques in policy-making and creativity in constitutional adjudication.
2.4. Varieties of judicial and juristic activism
2.5. Problems of accountability and judicial law-making.
3. Judicial Process in India
3.1. Indian debate on the role of judges and on the notion of judicial review.
3.2. The "independence" of judiciary and the "political" nature of judicial process
3.3 Judicial activism and creativity of the Supreme Court - the tools and techniques ofcreativity.
3.4. Judicial process in pursuit of constitutional goals and values – new dimensions of judicial activism and structural challenges
3.5. Institutional liability of courts and judicial activism - scope and limits.
4. The Concepts of Justice
4.1. The concept of justice or Dharma in Indian thought
4.2. Dharma as the foundation of legal ordering in Indian thought.
4.3. The concept and various theories of justice in the western thought.
4.4. Various theoretical bases of justice: the liberal contractual tradition, the liberal utilitarian tradition and the liberal moral tradition.
5. Relation between Law and Justice
5.1. Equivalence Theories - Justice as nothing more than the positive law of the stronger class
5.2. Dependency theories - For its realisation justice depends on law, but justice is not the same as law.
5.3. The independence of justice theories - means to end relationship of law and justice - The relationship in the context of the Indian constitutional ordering.
5.4. Analysis of selected cases of the Supreme Court where the judicial process can be seen as influenced by theories of justice.

LEGAL EDUCATION AND RESEARCH METHODOLOGY

1. Objectives of Legal Education
2. Lecture Method of Teaching - Merits and demerits
3. The Problem Method
4. Discussion method and its suitability at postgraduate level teaching
5. The Seminar Method of teaching
6. Examination system and problems in evaluation - external and internal assessment.
7. Student participation in law school programmes - Organisation of Seminars, publication

of journal and assessment of teachers

8. Clinical legal education - legal aid, legal literacy, legal survey and law reform
9. Research Methods
9.1. Socio Legal Research
9.2. Doctrinal and non-doctrinal
9.3. Relevance of empirical research
9.4. Induction and deduction
10. Identification of Problem of research
10.1. What is a research problem?
10.2. Survey of available literature and bibliographical research.

10.2.1. Legislative materials including subordinate legislation, notification and policy statements

10.2.2. Decisional materials including foreign decisions; methods of discovering the "rule of the case" tracing the history of important cases and ensuring that these have not been over-ruled; discovering judicial conflict in the area pertaining to the research Problem and the reasons thereof.

10.2.3. Juristic writings - a survey of juristic literature relevant to select problems in India and foreign periodicals.

10.2.4. Compilation of list of reports or special studies conducted relevant to the problem.

11. Preparation of the Research Design
11.1. Formulation of the Research problem
11.2. Devising tools and techniques for collection of data : Methodology

11.2.1. Methods for the collection of statutory and case materials and juristic literature

11.2.2. Use of historical and comparative research materials

11.2.3. Use of observation studies

11.2.4. Use of questionnaires/interview

11.2.5. Use of case studies

11.2.6. Sampling procedures - design of sample, types of sampling to be adopted.

11.2.7. Use of scaling techniques

11.2.8. Jurimetrics

11.3. Computerized Research - A study of legal research programmes such as Lexis and West law coding
11.4. Classification and tabulation of data - use of cards for data collection - Rules for tabulation. Explanation of tabulated data.
11.5. Analysis of data

Faculty of Management

SUBJECT: MANAGEMENT (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Management Process & Organizational Behavior-Overview : Functions and Principles of management; Management Thought and Concepts; Management Decision Making Processes and Types. Overview of Organizational Behaviour; Understanding and managing Individual Behavior-personality, Perception, Values, Attitudes, Learning and Motivation; Group Dynamics and Team Work. Leadership; Overview of Organizational Development: Organizational structure; Organizational design; OD Interventions &Change Management.

SUGGESTED READINGS:

1. Stoner and Freeman, Management, Prentice Hall, N. Delhi.
2. Koontz, O' Donnell Wechrich, Principles of Management, McGraw Hill, New York.
3. Peter F. Drucker, The Practice of Management, Allied Publishers.
4. Robbins S.P., Organisational Behaviour, New Delhi, PHI.
5. Luthans Fred: Organizational Behaviuor, TMH New Delhi
6. Singh, Dalip, Emotional Intelligence at Work, Response Books, Sage Publications, Delhi.
7. Management And Strategy - Tarun Dhar Diwan

Managerial Economics-Overview of Micro-Economics : Basic Concepts of Demand and Supply; Demand Analysis; Production Function; Cost-Output Relations; market Structures; Pricing theories; Overview of macro-Economics; National Income Concepts; Budgeting.

SUGGESTED READINGS:

1. Adhikary,M. Business Economics., New Delhi, Excel Books.
2. Baumol, W.J. Economic Theory and Operations Analysis, New Delhi, Prentice Hall Inc.
3. Chopra, O.P., Managerial Economics, New Delhi, Tata Mcgraw Hill.
4. Keat Paul G & Philips K.Y. Young, Managerial Economics, Prentice Hall, New Jersey.
5. Koutsoyiannis, A. Modern Micro Economics, New York, Macmillan.
6. Milgrom, P and Roberts J. Economics, Organisation and Management. Englewood Cliffs, New Jersey, Prentice Hall Inc.

Quantitative Techniques Overview of Probability: Types of Probability distributions (e.g. Binomial, Poisson, Normal and Exponential). Co-relation & Regression Analysis; Overview of Sampling: Sampling distributions; Tests of Hypothesis; Large and small samples. Univariate and Bivariate Data Analysis: t-test, z-test, Chi-square tests; ANOVA.

SUGGESTED READINGS :

1. Richard I.Levin and David S.Rubin, Statistics for Management (Seventh Edition), Prentice Hall of India, New Delhi.
2. Gupta, S. P. and Gupta, M.P, Business Statistics, Sultan Chand and Sons, New Delhi, 1997.
3. Kapoor, V. K., Essentials of Mathematics for Business and Economics, Sultan Chand and Sons, New Delhi,1999.
4. Kazmier, L. J and Pohl, N. F, Basic Statistics for Business and Economics, McGraw Hill, New York.
5. Gupta S. P. and Gupta, M. P., Business Statistics, Sultan Chand and Sons, New Delhi, 1997.

6. C.R.Kothari Research Methodology,

Strategic Management- Overview of Strategic Management: Concept of Corporate Strategy; BCG Model; GE-9 Cell Model ; Value Chain Analysis;SWOT & TOWS Analysis; Porter's Generic Strategies; Competitor Analysis. Overview of Strategy Formulation and Implementation at Corporate and Business level. Strategic Control.

SUGGESTED READING

1. A A Thompson Jr., A J Strickland III, J E Gamble, Crafting & Executing Strategy - The Quest for Competitive Advantage, Tata McGraw Hill, 4th ed., 2005.
2. Ranjan Das, Crafting the Strategy: Concepts and Cases in Strategic Management, Tata McGraw Hill, 2004.
3. Henry, Mintzberg, Bruce, Ahlstrand and Joseph, Lampel (1998). Strategy Safari. Free Press, New York.
4. Gary, Hamel and Prahalad, C. K. (1999). Competing for the Future. HBS Press.
5. Ed. C.A. Montgomery, M.E. Porter, Strategy - Seeking and Securing Competitive Advantage, Harvard Business Review Publications, 1991.
6. Peter F. Drucker, Managing in a Time of Great Change, Truman Talley Books /Plume Penguin Group, 1998.
7. Strategic management and business policy, C Appa Rao
8. Management And Strategy - Tarun Dhar Diwan

Ethics in Business Overview of Ethical issues in Business: Value Based Organizations; Ethical Issues on Individual in Organizations; Gender Issues; Ecological Consciousness; Environmental Ethics; Social Responsibilities of Business; Corporate Governance and Ethics; Benefits of Corporate Social Responsibility.

SUGGESTED READING

1. Laura P. Hartman & Joe DesJardins, Business Ethics:
2. Business Ethics and values, Francis Cherunilum

Human Resource management Overview of HRM: Concepts and Perspectives in HRM; HRM in Changing Environment, Overview of HR Planning: Objectives Process and Techniques; Job Analysis ;Recruitment and Selection, Induction;Training and Development; Performance & Potential Appraisal, Overview of Industrial Relations: Wage Policy and Determination; Trade Unions; Dispute Resolution and Grievance Management; Labour Welfare .Overview of e-HRM.

SUGGESTED READING

1. Dessler, Gary; Human Resource Management, 7th International Edition, Prentice Hall, New Jersey,1997.
2. Fisher, Schoenfeldt and Shaw; Human Resource Management, 4th Edition, Houghton Mifflin, Boston,1999.
3. Leap, Terry L., andMicheal D. Crino; Personnel/Human Resource Management, MacMillan, NewYork, 1990.
4. Teboul, James; Managing Quality Dynamics, Prentice Hall, New Jersey, 1991.
5. De Cenzo, D. A. and Robbins, S. P., Human Resource Management, 5th ed., John Wiley, 1994.
6. Monappa, A. and Saiyadain, M., Personnel Management, Tata McGraw-Hill, New Delhi,1966.

Finance- Overview of Financial Accounting; Analysis of Balance Sheet Statement, Overview of Cost Accounting: Costing Methods and Techniques, Overview of Financial Management: Fund Flow Analysis; Management of Working Capital, Overview of Capital Budgeting: Capital Budgeting Decisions; Capital Structure and Cost of Capital. Overview of Dividend Policy: Determinants; Long-term and Short-term Financing Instruments; Mergers and Acquisitions.

SUGGESTED READINGS:

1. Hampton , john . Financial Decision Making. Englewood Cliffs, New Jersey, Prentice Hall Inc.
2. Van Horner, James C. Financial Management and Policy , New Delhi, Prentice Hall of India.
3. Winger, Bornard and Mohan, Nancy, Principles of Financial Management, New York, Macmillan Publishing Company.
4. J.C. Van Horne, Fundamentals of Financial Management, PHI , New Delhi.
5. Weston Brigham, Managerial Finance, McGraw Hill , New York.

6. I.M. Pandey, Financial Management Vikas Pub. House, New Delhi. VII. P. Chandra, Financial Management, TMH, New Delhi .
7. S.C. Kuchhal, Financial Management, Chaityna Publishing House, Aligarh.

Marketing Management: Overview of Marketing: Marketing Mix, Market Segmentation, Targeting and Positioning; Overview of Product Management; Product Mix Decisions; Product Life Cycle, New Product Development, Branding; Pricing Methods and Strategies. Overview of Promotional Management: Promotion Mix; Advertising; Personal selling; Supply Chain Management; Viral & Niche Marketing; Customer Relation management. Overview of e-Marketing: Uses of Internet as Marketing Medium; Issues in Branding, Market Development, advertising and Retailing on Internet.

SUGGESTED READINGS:

1. Baker, Michael J., Marketing : An Introductory Text, McMillan Press Ltd., 1996.
2. Czinkota, Michael R., Massaki, Kotabe and David Mercer B., Marketing Management :Text and Cases, Blackwell Publishers, Massachusetts, 1997.
3. Kotler, Philip, Marketing Management : Analysis Planning, Implementation and Control, 9th Ed., Prentice Hall of India Pvt. Ltd. , New Delhi, 1997.
4. Kotler, Philip and Armstrong, Gary, Principles of Marketing, 6th ed., Prentice Hall of Indi, Pvt. Ltd., New Delhi, 1995.
5. Mc Carthy, E.Jerome and Pessault, William D. Jr., Basic Marketing, Richard D. Irwin Inc. , Homewood, Illinois, 1994.
6. Saxena, Rajan, Marketing Management, Tata McGraw Hill Publishing Company, New Delhi, 1997.

Production Management: Overview of Production management: Demand Forecasting for Operations; Production Scheduling; Work Measurement; time and Motion Study;Statistical Quality Control; Facility Location; Layout Planning. Overview of Operations Research: Linear programming; Transportation model; Inventory control; Queuing theory; Decision theory; PERT/CPM.

SUGGESTED READINGS:

1. Adam, E E & Ebert, RJ. Production & Operation Management, New Delhi , PHI.
2. Amrine Harold T. etc. Manufacturing Organization and management. Englewood Cliffs, New Jersey, PHI Inc.
3. Buffa, E.S. Modern Production Management, John Wiley (New York.)
4. Dobler, Donald. W & Lee Lamar Purchasing & Materials Management, New York, Mc Graw Hill.
5. Mayor R, Production and Operation management,
6. Telsong, Industrial & Production Management

Information System-Overview of MIS: Application of Information Systems in management; MIS and Decision Making; System Analysis and Design.Overview of Database Management System;Overview of E-Commerce:

SUGGESTED READINGS:

1. Laudon, Kenneth C, & Jane P.Laudon, Management Information System : Organisation and Technology ,PHI Publication
2. Narayan B. Management Information System , APH , New Delhi 1998
3. Senn, James A., Analysis and Design of Information Systems , McGraw Hill Publication
4. Applegate Lynda M., et. al., Corporate Information Systems Management: Text and Cases, McGraw Hill, New York, 1999.
5. Malcolm Pettu, Introducing Information System Management, Baldwell Publications, London, 1990.
6. Mensching James R., & Dennis A.Adams, Managing an Information System, Prentice Hall, New Jersey,

Faculty of Medical Science

SUBJECT: NURSING (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test Research Methodology, Nursing Education, Nursing Administration and Management etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Clinical Speciality (Medical Surgical Nursing, Child Health Nursing, Mental Health Nursing, Community Health Nursing, Midwifery and Obstetrical Nursing).

Note: M. Sc (N) curriculum will refer for questions of Ph. D (N) Entrance Test.

SUBJECT: PHYSIOTHERAPY (Ph.D. ENTRANCE TEST)

SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test Research Methodology, Biostatistics, Physiotherapy Administration and Management etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Clinical Speciality (Neurology & Neurosurgery, Cardiothoracic medicine & Surgery, Sports injuries & Rehabilitation, Orthopaedic conditions & Management, Obstetrics & Gynaecology)

Note: Masters in Physiotherapy curriculum will refer for questions of Ph.D. (Physiotherapy) Entrance Test.

SUBJECT: PUBLIC HEALTH
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This Section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Unit 1: Concepts in Public Health

i. Concept of Disease control strategies.
ii. Public Health importance of the Health Promotion Approach.
iii. Concept of Health for All, Millennium development goals.
iv. Multi-sector approach in Health care programs.
v. Health Care as part of Community Development Community Participation in health care programs.

Unit 2: Principles of Basic Research Methodology

i. Research Methodology: An Introduction.
ii. Defining the Research Problem.
iii. Research Design.
iv. Sampling Design.
v. Measurement and Scaling Techniques.
vi. Methods of Data Collection.
vii. Processing, Statistics and Analysis of Data.

Unit 3: Principles and Application of Epidemiology.

i. Principles of Epidemiology.
ii. Types and detailed methodologies of Epidemiological studies such as Descriptive, Analytical, Experimental and importance of Multi-Centric studies.
iii. Appropriate choice of epidemiological approach for given situations.
iv. Interpretation of Epidemiological studies.
v. Community diagnosis.
vi. Meta-analysis and systematic review

Unit 4: Biostatistics

i. Collection / Organisation of data / Measurement scales.
ii. Presentation of data and Record keeping.
iii. Measures of central tendency.
iv. Measures of variability.
v. Sampling and Planning of health survey.
vi. Probability, Normal distribution and inductive statistics.
vii. Estimating population values.
viii. Tests of significance (Parametric / Non-parametric).
ix. Analysis of variance.

x. Multi-Variate Analysis and Meta-analysis.
xi. Association and correlation and Regression.
xii. Vital Statistics.
xiii. Evaluation of health and measurement of morbidity / mortality.
xiv. Life table and its uses, survival analysis.
xv. Use of computers.
xvi. Census.
xvii. Qualitative Research methodologies.
xviii. Evaluation methodologies

Unit 5: Public Health - Management Principles and Practices

i. Introduction to health systems
ii. Challenges and evolution of the health system in India
iii. The public healthcare system in India
iv. The private healthcare system in India
v. Voluntary health agencies
vi. Health planning in India
vii. Healthcare legislation in India

Unit 6: Public Health Surveillance

i. Introduction to India's healthcare surveillance system including Ayushman Bharat
ii. Health surveillance systems - Planning, evaluation, and implementation
iii. Importance of focus on communicable and non-communicable diseases

Unit 7: Role of Social sciences in Health

i. Need and Importance and Role of Medico- Social work in Public Health Behavioural sciences. Need and importance of Health - Seeking Behaviour in implementing Health care programs.
ii. Meaning and relationship of Behavioural Sciences to Health.
iii. Principles of Social Psychology as applicable to Health.
iv. Principles of social Anthropology as applicable to Health

Book references:

- Goel, SL, Public Health Policy and Administration, Deep & Deep
- Principles & Practices of Management – Saxena
- Demography of health and health care, Pol, LG- Plenum Publication.
- Hubley , John (1994) : Communicating Health – an action guide to health education and health promotion
- W. Daniel wayne (1991):Bio-Statistics A foundation for analysis in the health science fifth edition
- Health research methodology (1992): A Guide for Training in research methods WHO regional publication
- Management Information Systems - Jayant Oke
- Environmental Epidemiology: Paul Wilkinson. Tata McGraw-Hill Publishing Company Ltd.
- Govt. of India, National five years plans, Govt. of India publications.
- Women Welfare Programmes: G Madhavi
- Grant,Eugene L. and Leavenworth Richards. Statiscal Quality Control, TMH
- NGO Management (with case studies): B.R. Nanda
- R.K sharma ; Legal aspects of patient Care : modern Publishers , New delhi 200

SUBJECT: YOGA (PH.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. Foundations of Yoga : History, Evolution of Yoga and Schools of Yoga

Origin of Yoga, History and Development of Yoga; Etymology and Definitions, Misconceptions, Aim and Objectives of Yoga, True Nature and Principles of Yoga

Introduction to Vedas, Upanishads, Prasthanatrayee and Purushartha Chatushtaya

Generall introduction to Shad-darshanas with special emphasis on Samkhya and

Yoga Darshana, Yoga in Vedanta

Introduction to Epics - (Ramayana, Mahabharata), Yoga in Ramayana, Yoga in Mahabharata

Introduction to Smritis and Yoga in Smritis; Generall introduction to Agamas and Tantra, Yoga in Tantra; Concepts of Nadi and Prana in Tantra, Kundalini, Effects of Kundalini Shakti and Shatchakra Sadhana

Yoga in Medieval Literature, Bhakti Yoga of Medieval Saints, Yoga in Narada Bhakti Sutras.

Yoga in Modern Times: Yogic Traditions of Ramakrishna and Swami Vivekananda, Shri Aurobindo; Yoga traditions of Maharshi Ramana and Swami Dayanand Saraswati

Yoga in Contemporary Times: Brief Introduction to important Yoga Paramparas (lineages) Yoga Parampara of Sri T. Krishnamacharya, Yoga Parampara of Swami Shivanada Saraswati, Swami Rama of Himalayas, Maharshi Mahesh Yogi and their contributions for the development and promotion of Yoga.

Introduction to Schools (Streams)of Yoga: Yoga Schools with Vedanta Tradition (Jnana, Bhakti,Karma and Dhyana), Yoga Schools with Samkhya-Yoga Tradition (Yoga of Patanjali) and Yoga Schools with Tantric Tradition (Hatha Yoga, Swara Yoga and Mantra Yoga)

Elements of Yoga and Yogic practices in Jainism, Buddhism and Sufism

2. Basic Yoga Texts :: Principal Upanishads Bhagavad Gita, Yoga Vasishtha Principal Upanishads

Brief Introduction of Ten principal Upanishads as the basis of Yogic contect; **Ishavasyopanishad:** Concept of Karmanishta; Concept of Vidya and Avidya; Knowledge of Brahman; Atma Bhava;

Kena Upanishat: Indwelling Power; Indriya and Antahkarana; Self and the Mind; Intutive realization of the truth; Truth transcendental; Moral of Yaksha Upakhyana;

Katha Upanishad: Definition of Yoga; Nature of Soul; Importance of Self Realization; **Prashna Upanishad**: Concept of Prana and rayi (creation); Pancha pranas; The five main questions;

Mundaka Upanishad: Two approaches to Brahma Vidya-the Para and Apara; The greatness of Brahmavidya, The worthlessness of Selfish-karma; Tapas and Gurubhakti, The origin of creation, Brahman the target of Meditation

Mandukya: Four States of Consciousness and its relation to syllables in Omkara.

Aitareya: Concept of Atma, Universe and Brahman.

Taittiriya Upanishad Concept of Pancha Kosha; Summary of Shiksha Valli; Ananda Valli; Bhruguvalli.

Chandogya Upanishad: Om (udgitha) Meditation; Sandilyavidya,

Brihadaryanaka Upanishad : Concept of Atman and Jnana Yoga. Union of Atman and Paramatman

Bhagavad Gita

Generall Introduction to Bhagavad Gita (B.G.). Definitions of Yoga in B.G. and their relevance & Scope; Essentials of B.G - the meanings of the terms Atmaswrupa, Stithaprajna, Sankhya Yoga (Chpt.II), Karma Yoga (Chpt.III), Sanyasa Yoga and Karma Swarupa (Sakama and Nishkama) etc; Samnyasa, Dhyana Yogas (Chpt. VI); Nature of Bhakti (Chpt.XII), Means and Goal of Bhakti-Yoga; The Trigunas and modes of Prakriti; Three Kinds of Faith. Food for Yoga Sadhaka, Classification of food (Chpt.XIV & XVII) Daivasura-Sampad-Vibhaga Yoga (Chpt.XVI); Moksa- Upadesa Yoga (Chpt. XVIII)

Yoga Vasishtha

Highlights of Yoga Vashitha, Concept of Adhis and Vyadhis; Psychosomatic Ailments; The four Gatekeepers (Pillars) to Freedom; How Sukha is attained the Highest State of Bliss; Practices to overcome the Impediments of Yoga; Development of Satvaguna; Eight limbs of Meditation; Jnana Saptabhumika.

3. **Patanjala Yoga Sutra**

Introduction: Yoga, it's meaning & purpose & Nature of Yoga; Concept of Chitta, Chitta-Bhumis, Chitta-Vrittis, Chitta-Vritti nirodhopaya Abhyasa and Vairagya as the tools Chitta-Vikshepas (Antarayas), Chitta-prasadanam, Prakriti and its evolutes. **SAMADHI PADA** : Types and nature of Samadhi: Ritambharaprajna and Adhyatmaprasada; Samprajnata, Asamprajnata, Sabeeja & Nirbeeja Samadhi, Difference between Samapattis and Samadhi; Concept of Ishvara and qualities of Ishvara.

SADHANA PADA : Concept of Kriya Yoga of Patanjali, theory of Kleshes; Concept of Dukhavada; Drishyanirupanam, Drasthanirupanama, PrakritiPurushaSamYoga; Brief Introduction to Ashtanga Yoga; Concept of Yama, Niyama, Asana, Pranayama, Pratyahara and their usefulness in ChittavrittinirodhopayaH.

VIBHUTI & KAIVALYA PADA: Introduction of Dharana, Dhyana and Samadhi, Samyama and Siddhis; Four types of Karmas; Concept of Vasana;

Vivek Khyati Nirupanam, Kaivalya.- Nirvachana.

4. **Hatha Yoga texts**

Introduction to Hatha Yoga and Hatha Yoga Texts. Siddhasiddhanta paddhati, Hatha Pradeepika, Gheranda Samhita, Hatha Ratnavali and Shiva Samhita. Aim & objectives, misconceptions about Hatha Yoga, prerequisites of Hatha Yoga (dasha yama and dasha niyama), Sadhaka and Badhaka tattvas in Hatha Yoga; Concept of Ghata, Ghatashuddhi, Concept and importance of Shodhana kriyas in Hatha Yoga; Importance of Shodhana kriyas in health and disease; Concept of Mattha, Mitaahara, Rules & Regulations to be followed by Hatha Yoga Sadhakas;

Asanas in Hatha Texts: Definition, pre requisites and special features of Yoga-asana; Asanas in Hatha Pradeepika, Hatha Ratnavali, Gheranda Samhita; Benefits, precautions, and contraindications of different Asanas;

Pranayama in Hatha Texts: - Concept of Prana & Ayama, Pranyama; Pranayama its phases and stages; Prerequisites of Pranayama in Hatha Yog Sadhana; Pranayama in Hatha Pradeepika, Hatha Ratnavali & Gheranda Samhita; Benefits, precautions and contraindications of Pranayama.

Bandha, Mudra and other practices: Concept, definition of Bandha and Mudras, in Hatha Pradeepika, Hatha Ratnavali and Gheranda Samhita; Benefits, precautions and contraindications. Concept, definition, benefits and Techniques of Pratyahara, Dharana and Dhyana in Gheranda Samhita; Concept and benefits of Nada and Nadanusandhana in Hatha Pradeepika, Four Avasthas (stages) of Nadanusandhana; Relationship between Hatha Yoga and Raja Yoga; Goal of Hatha Yoga. Relevance of Hatha Yoga in contemporary times.

5. **Allied Sciences – Generall Psychology, Essential Anatomy and Physiology;**

Dietetics and Nutrition

Generall Psychology

INTRODUCTION:

Brief History of modern Psychology

Major Perspectives in Modern Psychology

Key data collection methods in Psychology

Introduction to Altered States of Consciousness

Sleep: Stages of Sleep, Circadian Rhythm, Sleep Disorders; Dreams: The Content of Dreams; Hypnosis, Biofeedback

Behavioral Psychology: Psychology as a Science of Behavior; Definition of Behavior; Psychic forces and human behavior, behavior and Consciousness, Psychological basis of behavior;

Personality: Nature and Types of Personality; Determinants of Personality: Heredity and Environment; Facets and Stages of Personality Development; Personality Theories of Sigmund Freud, Alfred Adler and C.G. Jung, Carl Rogers; Assessment of Personality:

Cognitive Psychology: Sensation, Perception, Attention, Memory, Learning, Feeling etc.; Their definitions and types, Intelligence and its' measurements; Emotional Intelligence and Social Intelligence.

Mental Health; Means of mental health; Positive Mental Health; Causes and Consequences of Conflicts and Frustrations; Introduction to Common mental disorders; Depressive disorders; Anxiety disorders; Serious mental disorders; Sleep disorders; Mental retardation; Alcohol and drug abuse; Suicide, attempted suicide and suicide prevention.

Introduction to Human Anatomy and Physiology

Introduction to cell, tissue, organs and systems; Basic cell physiology-Cell- Introduction, Cell Organelles, Cell membrane, Movement of the substances and water through the cell membrane, Bioelectric potentials.

Musculoskeletal systems: Skeleton - names of all bones, joints and muscles, cartilage, tendon and ligaments, types of bone, joints and their functions; spine, muscles and their functions; Skeletal muscles - Properties of skeletal muscles, Muscular contraction and relaxation, Neuromuscular junction, Sarcotubular system, Smooth muscle- mechanism of contraction

Digestive and excretory system: Anatomy of digestive system, excretory system
(component organs) and their functions; Gastro intestinal system- Generall
structure of alimentary canal, Gastric secretion, Pancreatic secretion, Gastric
motility-digestive peristalsis Gastrointestinal hormones.

Renal physiology- Structure of kidney, Nephrones, Juxtra glomerular filtrate, Reabsorption, Secretion-mechanism of secretion, Concentrating and diluting mechanism of urine, Dialysis

Nervous system and glands: Structure and properties of neurons, subdivisions of nervous system and their functions, types of glands (endocrine and exocrine
glands), important endocrine and exocrine glands and types of hormones their functions.Sensory nervous system, Motor nervous system, Higher functions of the nervous
system, Synapse, Reflexes Cerebrospinal fluid, Blood brain and blood CSF barrier

Cardiovascular and respiratory system: Components of cardiovascular and respiratory system; functions of cardiovascular and respiratory system; Circulatory system- Functional anatomy of the heart, Properties of cardiac muscles, Conducting system of the heart, Pressure changes during cardiac cycles, Capillary circulation, Arterial and venous blood pressure; Respiratory system-Mechanism of breathing, Ventilation, Regulation of respiration, Transport of gases, Hypoxia, Artificial ventilation, Non respiratory functions of the lungs

Immune system: Component organs of immune system, Functions of immune system; Endocrinology-Endocrine glands, hormones, their functions;

Reproductive system: Anatomy of male and female reproductive systems

Stress physiology- how acute and chronic stress disturbs the normal physiology

Dietetics and Nutrition

Basic concepts and components of food and nutrition Understanding Nutrition, Basic Terminology in Relation to Nutrition Requirement, Human Nutritional Requirements; Concept of food, Acceptance of Food, Functions of Food; Components of Food & their Classification; Macro Nutrients –Sources, Functions and Effects on the

Body; Micro Nutrients - Sources, Functions and Effects on the Body; Fat Soluble Nutrients - Sources, Functions and Effects on the Body; Water soluble Nutrients - Sources, Functions and Effects on the Body; Significance of Carbohydrate, Proteins, Lipids, Vitamins, Minerals and water in the body; Antioxidants and their Role;
Yogic concept of diet and its relevance in the management of lifestyle
Nutrients, proximate principles of diet, balanced diet concept; Carbohydrates, proteins, fats – sources, nutritive values, importance; Minerals-calcium, iron, phosphorus etc. Vitamins – sources, roles, requirements
Food groups.
Cereals & Millets –Selection, Preparation and Nutritive Value; Pulses, Nuts and Oil Seeds- Selection, Preparation and Nutritive Value; Milk and Milk Products- Selection, Preparation and Nutritive Value; Vegetables and Fruits- Selection, Preparation and Nutritive Value, Fats, Oils and Sugar, Jaggery- Selection, Preparation and Nutritive Value
Food and metabolism. Energy- Basic Concepts, Definition and Components of Energy Requirement, Energy Imbalance Concept of Metabolism, Anabolism, Catabolism, Calorie Requirement-BMR, SDA, Physical Activity; Metabolism of Carbohydrates, Lipids and Protein; Factors Affecting Energy; Requirement and Expenditure, Factors affecting BMR.

6. Yoga and Health

Definition & Importance of Health According to WHO; Dimensions of Health: Physical, Mental, Social and Spiritual;
Concept of Health and Disease in Indian Systems of Medicine i.e. Ayurveda, Naturopathy
Yogic Concept of Health and Disease: Concept of Adhi and Vyadhi; Meaning and definitions,
Concepts of Trigunas, Pancha-mahabhutas, Pancha-prana and their role in Health and Healing; Concept of Pancha-koshas & Shat-chakra and their role in Health and Healing;
Role of Yoga in preventive health care – Yoga as a way of life, Heyam dukham anagatam; Potential causes of Ill-health: Tapatrayas and Kleshas, Physical and Physiological manifestation of Disease: Vyadhi, Alasya, Angamejayatva and Ssvasa- prashvasa.
Mental and Emotional ill Health: Styana, Samshaya, Pramada, Avirati, Bhranti- darsana, Alabdha-bhumikatva, Anavasthitatva, Duhkha and Daurmanasya
Yogic Diet - Generall Introduction of Ahara; Concept of Mitahara; Classification in Yogic diet according to traditional Yoga texts;; Diet according to the body constitution (Prakriti) – Vata, Pitta and Kapha as also Gunas.
Concepts of Diet Pathya and Apathya according to Gheranda Samhita,Hatha Pradeepika and Bhagavad Gita; Importance of Yogic Diet in Yoga Sadhana and its role in healthy living; Diet according to the body constitution (Prakriti) – Vata, Pitta and Kapha as also Gunas.
Yogic Principles of Healthy Living: Ahara, Vihara, Achara and Vichara; Role of Yogic Positive Attitudes (Maitri, Karuna, Mudita and Upeksha) for Healthy Living, Concept of Bhavas and Bhavanas with its relevance in Health and well-being

7. Therapeutic Yoga – Disease Wise and Evidence based

Yogic Practice*- Management of the disease through suitable yogic practices - Yogic diet, Asanas, Shatkarmas; Pranayama; Meditation; Notional corrections through yogic scriptures and counseling; Yama and Niyama; Stress(emotions management) Life style prescriptions - Moderation in Ahara, Vihara, Achara and Vichara.
Integrated approach of Yoga Therapy in the treatment of diseases ** Systemic anatomy, physiology of the related System; Pathophysiology, Stress and disease; Medical Management; Mechanism of imbalances at psychological, pranic, physical, endocrinal, autonomic levels;psyhocneuroimmunological aspect of the disease model; Disease specific parameter; what, why and how of each **Yogic practice***; Prevention. Evidence research done on the particular disease;
Generall Parameters and questionnaires to evaluate Health status - GHQ, Prakriti, Guna, PSS, STAI.
Integrated Approach of Yoga therapy for the following Common Ailments:

Respiratory disorders - Allergic Rhinitis & Sinusitis: COPD: Chronic Bronchitis, Tuberculosis: Evidence research done on the particular disease

Cardiovascular disorders: Hypertension:, Atherosclerosis / Coronary artery disease: Ischemic Heart disease – Angina pectoris / Myocardial Infarction/ Post CABG rehabilitation: Congestive Cardiac failure, Cardiac asthma:

Endocrinal and Metabolic Disorder - Diabetes Mellitus (I&II); Hypo and Hyper- Thyroidism; Obesity: Metabolic Syndrome

Obstetrics and Gynecological Disorders, Menstrual disorders: Dysmenorrhea, Oligomenorrhea, Menorrhagia: Premenstrual Syndrome: Menopause and peri- menopausal syndrome: Yoga for Pregnancy and Childbirth: Complicated pregnancies: PIH, Gestational DM, Ante-natal care, Post-natal care; PCOS:

Gastrointestinal disorders APD: Gastritis – Acute & Chronic, Dyspepsia, Peptic Ulcers, Constipation, Diarrhoea, Irritable Bowel Syndrome: Definition, Etiopathogenesis, Inflammatory Bowel Disease, Ulcerative colitis

Cancer: types, clinical features, Side effects of Chemotherapy, radiotherapy

Musculo-Skeletal Disorders: Back Pain: Lumbar Spondylosis, Intervertebral disc prolapse (IVDP), Spondylolisthesis, Spondylitis, Psychogenic- Lumbago, Neck pain: Cervical Spondylosis, radiculopathy, Functional neck pain, All forms of Arthritis: Rheumatoid Arthritis, Osteoarthritis

Neurological Disorders: Headaches: Migraine, Tension headache; Cerebro vascular accidents: Epilepsy; pain; Autonomic dysfunctions; Parkinson's disease

Psychiatric disorders: Psychiatric disorders: Neurosis, Psychosis: Neurosis: Anxiety disorders: Generallized anxiety disorder, Panic Anxiety, Obsessive Compulsiv Disorder, Phobias: Depression: Dysthymia, Major depression, Psychosis: Schizophrenia, Bipolar affective disorder.

8. Applications of Yoga

Yoga in Education: Salient features of Yoga Education, Factors of Yoga Education; Teacher, Student and Teaching, Guru-shishya parampara and its importance in Yoga Education; Value Education, its meaning and definitions, types of values, value- oriented education and modes of living, role of value oriented education; contribution of Yoga towards development of values; Salient features of ideal Yoga teacher, role of Yoga teacher in value-oriented education, role of Yoga in development of human society; Yogic Concepts for the Development of Four Fold Consciousness - Civic Sense, Patriotic Urge, Service Zeal and Spiritual Growth;

Yoga for Stress Management: Introduction to Stress, Concept of Stress; Solutions through Mandukya karika - Relaxation and stimulation combined as the core for stress management; Practice of Stimulation and relaxation; Yoga and Stress Management; Concepts and Techniques of Stress Management in Ashtanga Yoga of Patanjali and Bhagavad Gita, specific practices for stress management, breath awareness, shavasana, Yoganidra, pranayama and meditation, imapct of yogic lifestyle on stress management.

Yoga for Personality Development - Yogic attitudes for personality development, Ashtanga Yoga and personality development, personality development with spcial emphasis on Panchakosa. Memory and Concentration; Short-term, long-term memory, stages of memory foundation and maintenance; Yoga modules to improve memory; Barriers to concentration; creativity eastern concept, silence and creativity; yogic approach to creativity; yogic practices for creativity development; Facets of intelligence; concept of intelligence according to Yoga; Yoga practices for IQ development; Practices for Anger Management;

9. Practical Yoga

Yogic Practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskara (Techniques, Salient Features, Benefits)

Shatkarmas Dhauti (Kunjal), Vastra dhauti, Danda dhauti, Laghoo and Poorna sankhaprakshalana, Neti (Sutra and Jala), Kapalbhati, Agnisara, Nauli

Suryanamaskar- Suryanamaskar must be practiced traditionally and the variation in Suryanamskar may be taken into consideration based on the convenience of patients for therapy.

Asnas (yogic postures) Standing Postures Ardhakati chakrasana, Hastapadasana, Ardhachakrasana, Trikonasana, Parivritta trikonasana, Parsvakanasana, Veersana, Sitting postures Paschimottanasana, Suptavajrasana, Ardhamatsyendrasana, Vakrasana, Marichasana, Malasana, Badhakanasana, Merudandasana, Akarna dhanurasana, Gumukhasana, Prone postures Bhujangasana, Salabhasana,

Dhanurasana, Urdhvamukhosvanasana, Makarasana, Supine postures Halasana, Chakrasana, Sarvangasana, Matsyasana, Shavasana, Setubandhasana, Balancing postures Vrikshasana, Garudasana, Namaskarasana, Tittibhasana, Natrajasana

Pranayama Breath awareness, Sectional breathing, Nadishuddhi, Bhastrika, Ujjai, Cooling pranayama (Sitali, Sitkari and Sadanta), Bhramari, Pranayama (with Antar & Bahya Kumbhaka)

Practices leading to Meditation: Pranav and Soham Japa, Yoga Nidra (1,2,3), Antarmauna, Ajapa Dharana (Stage 1,2,3), Practices leading to Breath Meditation, Practices leading to Om Meditation, Practices leading to Vipassana Meditation, Practices leading to Preksha Meditation

Bandhas and Mudras: Jivha Bandha, Jalandhara Bandha, Uddiyana Bandha, Mula Bandha, Maha Bandha, Yoga Mudra, Maha Mudra, Shanmukhi Mudra, Tadagi Mudra, Vipareet Karni Mudra

Contemporary Yogic Practices - Yogic Sukshma Vyayama, Cyclic Meditation (S- VYASA); Mindfulness based Stress Reduction Technique (Kabatzin); Mind Sound Resonance Technique (S-VYASA); Raja Yoga Meditation (Brahmakumaris); Transcendental Meditation (Mahesh Yogi); ZEN Buddhist Meditation; Yoga Nidra (BSY); Savita Ki Dhyan Dharana (DSVV)

10. Methods of Teaching Yoga

Teaching and Learning: Concepts and Relationship between the two; Principles of Teaching: Levels and Phases of Teaching, Quality of perfect Yoga Guru; Yogic levels of learning, Vidyarthi, Shishya, Mumukshu; Meaning and scope of Teaching methods, and factors influencing them; Sources of Teaching methods; Role of Yoga Teachers and Teacher training Techniques of Individualized; Teaching Techniques of group teaching; Techniques of mass instructions; Organization of teaching (Time Management, Discipline etc)

Essentials of Good Lesson Plan: concepts, needs, planning of teaching Yoga (Shodhanakriya, Asana, Mudra, Pranayama & Meditation);

Models of Lesson Plan; Illustration of the need for a lesson plan; Illustration of the need for a content plan; Eight Step method of Introduction as developed in Kaivalyadhama.

Evaluation methods of an ideal Yoga class; Methods of customizing Yoga class to meet individual needs. The student will have demonstrations and training in the above mentioned aspects of teaching methods.

Yoga classroom: Essential features, Area, Sitting arrangement in Yoga class

Student's Approach to the teacher: Pranipaata; Pariprashna; Seva; (BG 4.34)

Faculty of Science

SUBJECT: BIOTECHNOLOGY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Unit 1

Biomolecules, metabolism, primary and secondary metabolic pathways, membrane transport, structure and regulation of prokaryotes and eukaryotes genes, transcription, translation, post-transcriptional and translational modifications. Molecular markers, genetic and physical mapping, population genetics, DNA Fingerprinting, PCR, blotting techniques. DNA sequencing, whole genome sequencing & annotation. Nanobiotechnology, Genomics and proteomics.

Unit 2

Microbial taxonomy and diversity (bacteria, fungi, virus); Microbial nutrition, growth and control, microbial genetics, Plant-microbe interactions, types of bioreactors, application of microbes and microbial processes in food and healthcare industries, recombinant proteins. Environmental application of microbes, waste water treatment, bioremediation, xenobiotics, biotransformation and biodegradation, biosorption, bioleaching.

Unit 3

Immuno-technology, antigen antibody interactions, antibody engineering, vaccines and the associated manufacturing processes, molecular and immuno diagnostics methods and their applications, hypersensitivity and autoimmune diseases, tolerance. Concept of plant cellular totipotency; clonal propagation; organogenesis and somatic embryogenesis, haploid production, artificial seed, soma-clonal variation, embryo culture, in-vitro fertilization, cryopreservation.

Unit 4

Genetic engineering: Cloning and expression vectors, rDNA technology, gene cloning approaches in prokaryotes and eukaryotes: Gene transfer technologies, methods for screening and selection of recombinant clones. Plant transformation technology: Features of Ti and Ri plasmids, mechanism of DNA transfer. Cloning in animal system: Animal system as model host, methods of introduction of foreign DNA in animal system.

Unit 5

Chromatography: HPLC; gas; ion exchange and gel filtration chromatography, centrifugation: principal; types and application, electrophoresis: principal; types and application, photometry: Principle; instrumentation and application of UV-visible spectrophotometry. Major bioinformatics resources (NCBI, EBI, ExPASy); sequence and structure databases and analysis, sequence analysis, phylogeny, comparative genomics; basics of database management system

SUBJECT: BOTANY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. **Microbiology -** Viruses and Bacteria Structure, classification and reproduction. Generall Account of infection, immunity and serology: Microbes in industry and agriculture.

2. **Pathology -** Knowledge of important plant disease in India caused by fungi. Modes of infection and methods of control.

3. **Plant Groups -** Structure, reproduction, life- history, classification, evolution, ecology and economic importance of algae, fungi, bryophytes, pteridophytes and gymnospems.

4. **Morphology, anatomy and embryology of Angiosperms -** Tissues and tissue systems. Morphology and anatomy of stem, root and leaf (including development aspects and anomalous growth), Morphology of flower Structure of anther and ovule, fertilization and Development of seed.

5. **Taxonomy -** Principles of nomenclature and classification of angiosperms. Modem trends in Taxonomy. A generall knowledge of the more important families of angiosperms.

6. **Cell Biology -** Cell as unit of structure and functions. Ultra structure function and interrelationships of plasma membranes endoplasmic reticulum, mitochondria, ribosomes chlorplasts and nucleus, Chromosomes- chemical and physical nature behaviour during mitosis and meosis.

7. **Genetics and Evolution -** Mendelian concept of genetics. Development of the gene concept Nucleic acids their structure and role in reproduction and protein synthesis. Genetic code and regulation. Mechanism of microbial recombination. Organic evolution evidences, mechanism and theories.

8. **Physiology -** Photosynthesis history, factors, mechanism and importance. Absorption and conduction of water and salts. Transpiration, Major and minor essential elements and their role in nutrition, Nitrogen fixation and nitrate reduction Enzymes, Respiration and fermentation. Generall account of growth. Plant harmones and their functions. Photoperiodism. Seed dormancy and germination.

9. **Ecology -** Scope of ecology, structure, function and dynamics of ecosystems, Plant communities and succession. Ecological factors. Applied aspects of ecology including conservation and control of pollution.

10. **Economic Botany -** Generall account of important sources of food fiber, wood and drugs.

SUGGESTED READING MATERIAL:

1. Basra, KS. & Basra, R.K. 1997. Mechanisms of environmental stress resistance in plants, Hartivood Academic Publishers, The Netherlands.

2. Chopra, V.L. & Pagoda, R.S. 1988. Approaches for incorporating drought and salinity resistance in crop plants, Oxford & IBH Publishing Co. Pvt. Ltd., ND
3. Gupta, U.S. 1985. Physiological aspects of dry land farming, Oxford & IBH
4. Journal of Bioscience, Special issue' Cellular Stress Response, 1998 23(4):Oct. The Indian Academy of Sciences, Bangalore
5. Kramer, P.J. 1983. Water relations of plants, Academic Press Inc., NY
6. Levitt, 1972, 1980.
7. Nilsen, L. & Orcutt, 1998. Physiology of plants under stress :Abiotic factors Orcutt
8. Paleg, L.G. & Aspinall, D. 1981. Physiology and biochemistry of drought resistance in plants, Academic Press, NY.
9. Singh, Randhir & Sawhney, S.K. 1988. Advances in frontier areas of plant biochemistry, Prentice-Hall of India Pvt, Ltd., New Delhi

SUBJECT: ENVIRONMENTAL SCIENCE (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Unit I Earth and Environment:
Earth as a System of Interacting Components, Materials of the earth, Lithosphere, Atmosphere, Hydrosphere and Biosphere, Hydrologic cycle and groundwater, Hydrogeology and Geology and of Kerala Introduction, Ecosystems, Biodiversity and its significance, Biogeography of India, Critical eco- systems and landscape-level conservation, Laws and Policies of Govt. of India for biodiversity conservation. Case studies: Biodiversity of Western Ghats, Human-Animal Conflict and resource sharing, Participatory forest management.

Unit II: Environment Management
Environment Management: Principles, tools- EIA, LCA, Environment audit, Environment Management Systems, Environmental Planning and Management. Case studies – EIA Resource Conservation - Renewable and non-renewable resources, Tools for the management of natural resources. Conservation strategies - policies and laws of GOI. Disaster management – case studies

Unit III : Environmental Chemistry
Chemistry and environment (fundamentals), Thermodynamics (concepts of first and second laws in environment), fundamentals of green chemistry, Atmospheric chemistry, Air, water and soil pollution, Ecotoxicology, Toxicity of metals, pesticides, radioactive minerals, flourides etc, Interaction of toxicants with environment, bioaccumulation and magnification, biomarkers, Role of microbes in biogeochemical cycles, Water treatment, recent advances in water purification , Casestudies – air pollution, water pollution, soil pollution

Unit IV : Analytical Techniques and Instrumentation
Chromatographic techniques, TLC, GC, HPLC, GC-MS, LC-MS, Electrophoresis, Microscopy, Fluorescence microscopy, SEM, AFM, TEM, Basics and applications of spectroscopy, UV, IR, Raman, NMR, AAS Remote sensing & GIS: Mapping concepts; Satellite remote sensing - EMR, platforms, sensors, visual interpretation and elements, digital image processing; Aerial photography; Global positioning system; Geographic Information System - components, data structures, spatial analysis and modelling; applications in environment science and management.

Unit V: Environmental Biotechnology and Waste Management
Environmental Biotechnology: an overview, Biotechnological solutions to Environmental Pollution, Air, Water and Soil, Emerging trends in – Agrobiotechnology, Ecological Engineering, Biodegradable plastics, Biotechnological methods in solid waste management, processing /treatment of hazardous wastes.

Reference
1. Stanley E. Manahan, Environmental Chemistry, CRC press, 2005
2. Gary W.V. & Stephan J.D (2000), Environmental Chemistry a Global Perspective, Oxford University Press, New York
3. Skoog, D.A and Leary, J.J. (1992), Principles of Instrumental Analysis, 4th ed., Saunder's College Publishing, Fortworth
4. Wathern Peter. Environmental impact assessment: theory and practice. Routledge London

5. Anjaneyulu Y . Environmental Impact Assessment Methodologies. B S Publications Delhi
6. Abbasi S A Arya D S. Environmental Impact Assessment. Discovery New Delhi
7. Rao Sasi Bhushana. Environment Management. Regal Publications New Delhi
8. Kluge Heiner. Environment Management. Univeirsity of Technology and the institute of Scientific Co-Operation Dresden.
9. Sheldon Christopher Yoxon Mark. Environmental management systems. Earth Scan London
10. Kulkarni Vijay Ramachandra T V. Environmental Management. Capital Publishing Co Newdelhi
11. Newman Michael C Clements William H. Ecotoxicology a Comprehensive treatment. CRC Press Florida
12. Scragg Alan. Environmental biotechnology. Pearson Education Ltd England
13. Kluge Heiner Bittner Alfred Hohnholz Jurgen. Waste management, University of Technology and the Institute for Scientific Co-Operation Dresden
14. Schneid Thomas D Collins Larry. Disaster management and preparedness, Lewis Publishers London
15. Singh Tej. Disaster management approaches and strategies, Akansha Publishing New Delhi
16. Mckinney Michael L Schoch Robert M. Environmental science, Systems and solutions, Jones and Bartlett Publishers London
17. Morgan Michael D Moran Joseph M Wiersma James H. Environmental Science, Managing Biological and physical Resourses, W M C Brown Publishers Newyork.
18. Bhatta B. Remote sensing and GIS, Oxford NewDelhi
19. Wise Stephen. GIS Basics, Taylor and Francis London..

SUBJECT: MICROBIOLOGY
(Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This Section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Unit-1 General Microbiology:

Bacteria: Origin of life and Structure of bacteria, Isolation of pure culture and its characteristics, culture media, Strategies of cell division, growth kinetics, generation time, asynchronous, synchronous, batch, continuous culture, measurement of growth and factors affecting growth. Control of bacterial growth, Study of bacterial growth, kinetics, effect of inhibitors and stimulators on growth, Characterization of bacteria: shape, Gram stain, endospore stain, capsule stain, acid fast stain, flagella stain, Assay of antibiotic, Virus: Nomenclature and classification, Genome: types and structures. Virus subviral particles, Lytic and Lysogenic Cycle. Fungi: General characteristics of Algae, Asexual and sexual reproduction of fungi, Growth and its measurement, Mycorrhiza - ecto, endo-, and VA mycorrhiza. Algae: Classification, algal pigments, thallus structure, nutrition, ecology, sexual and asexual reproduction and their importance, SCP, biofuels, food, chemical and pharmaceutically important products. Fermentation Technology & Industrial microbiology, Environmental Microbiology: Food & Agricultural Microbiology: Microbial spoilage of foods, fruits and vegetables. Preservation of foods, Soil, Rhizosphere and phyllosphere microflora, Microbial plant interaction, carbon, nitrogen and phosphorus cycles. Integrated pest management, viral control of phytopathogens.

Unit-2 Biochemistry:

Structure and function of biomolecules, Enzyme kinetics, enzyme inhibition, Allosteric enzyme, Rate limiting enzymes in multistep reaction, ribozyrne and abzyme, electron transport chain and oxidative phosphorylation, Pathway and regulation of major metabolism Biological transport-active and passive, Biosignalling.

Unit -3 Cell Biology and Molecular biology:

Prokaryotic Cells: Eukaryotic cell organelles, DNA replication, Recombination, Transcription process and inhibitors of transcription, Protein synthesis and processing : operon concept, role of chromatin in gene, Types of mutation; Bacterial genetic system: transformation, conjugation, transduction, recombination, plasmids, transposons, RNA interference, Principles and procedures of protein and nucleic acid sequencing, blotting

technique, polymerase chain reaction, mutagenesis, gel eiectrophoresis, Nucleic acid sequencing, RFLP and RAPD, SNP, VNTR analysis..

Unit-4 Immunology and Medical Microbiology:

Cells and molecules involved in innate and adaptive immunity, antigens, antigenicity and imrnunogenicity, Epitope and paratope, structure and function of antibody molecules. MHC molecules, activation and differentiation of B and T cells, B and T cell receptors, humoral and cell mediated immune responses, primary and secondary immune response, the complement system, inflammation, hypersensitivity and autoimmunity, immunity to infections. Medical and Diagnostic Microbiology: Epidemiology, symptomatology. General description of microbial pathogens, Types of vaccine:

SUBJECT: CHEMISTRY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

INORGANIC CHEMISTRY

Main Group Elements : S-N compounds Sulphur-phosphorus compounds: Molecular sulphides such as P4S3, P4S7, P4S9 and P4S10. Phosphours-nitrogen compounds: Phosphazines. Other P-N compounds. Boron-nitrogen compounds:

Metal Complexe: Valence bond theory and its limitations. Ligand field theory: Splitting of d orbitals in different ligand fields Jahn-Teller effect MO diagrams of complexes with and without n bonds. Spectral&Magnatic properties of complexes.

Nuclear Chemistry: . Nuclear reactions: . Types of nuclear reactions. Spontaneous and reduced fission. Principles of working of the reactors of nuclear power plants. Breeder reactor. Nuclear fusion reaction.

Analytical Principles: Volumetric methods:Theories of indicators:Acid-base, redox, metallochromic, indicators. Complexation Precipitation Redox titrations. Gravimetric methods: Mechanism of precipitate formation. Aging of precipitates. Precipitation from homogeneous solutions. Coprecipitation and postprecipitation. Contamination of precipitates.Washing, drying and ignition of precipitates.

Water treatment: Hardness, Alkalinity, Domestic water treatment Chemical analysis of water, D.O., B.O.D, C.O.D., T.D.S.

PHYSICAL CHEMISTRY

Quantum Mechanics: Introduction to Classical Mechanics: The blackbody radiation, photoelectric effect, Compton Effect and atomic spectra. Failure of classical mechanics to explain these phenomena. Quantum mechanical explanations.

Chemical Kinetics: Theories of reaction rate: Influence of temperature on reaction rate. Arrhenius equation and its limitations, activation energy. Collision theory and absolute reaction rate theory. Free energy of activation and volume of activation. Thermodynamic formulation of reaction rate. Effects of pressure and voulume on the velocity of gas reaction.

Surface Chemistry: The colloidal state: Multimolecular, macromolecular and associated colloids. Stability of collids. The zeta potential. Kinetic, optical and electrical properties of colloids: Electrophoresis, electroosmosis, sedimentation potential and streaming potential Catalysis: Mechanism and theories of homogeneous and heterogeneous catalysis. Acid-base and enzyme catalysis.

Thermodynamics: Intensive and extensive properties. Exact differentials. Intrinsic energy, enthalpy, entropy, free energy and their relations and significances. . Maxwell relations. Thermodynamic equations of state. Joule- Thomson effect. Joule-Thomson coefficient for van der Waals' gas. The third law of thermodynamics. .
Spectroscopy: Energy levels in molecules, rotational, vibrational, electronic NMR and ESR spectroscopy.

ORGANIC CHEMISTRY

Principles of organic chemistry: Inductive, mesomeric, electromeric effect. Carbocations, carbanions, carbens. Addition, Elimination, Substitution reactions

Chemistry of Polymers: Types and mechanism of polymerization reactions. Step-growth, free radical, addition, ionic polymerizations. Copolymers. Characterization of polymers. Manufacture and applications of polyolefins, thermoplastics, polyamides, polyesters, polyurethanes, epoxies and industrial polymers.
Chemistry of natural products- Biosynthesis of terpenes and alkoloids. Carbohydrate protein and nucleic acid.

Organic Photochemistry: Photochemical processes. Energy transfer, sensitization and quenching. Singlet and triplet states and their reactivity. Photoreactions of carbonyl compounds, enes, dienes, and arenes. Norrish reactions of acyclic ketones. Applications of photoreactions in laboratory and industrial synthesis.

Separation Techniques: Chromatographic methods: Classification of chromatographic separations. Theory of chromatography. Applications of chromatographic mehtods: Adsorption and partition chromatography. Paper, thinlayer and column chromatographic methods.

REFERENCE BOOKS:

1. F.A.Cotton and G.Wilkinson, "Advanced Inorganic Chemistry", John Wiley & Sons
2. J.March, "Advanced Organic Chemistry", Wiley
3. Gurdeep Raj , "Advanced Physical Chemistry
4. I.L.Finar, "Organic Chemistry" Vol 2, Longman

SUBJECT: PHYSICS (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Mathematical Physics: Dimensional analysis, Vector algebra and vector calculus, Linear algebra, Matrices, Linear differential equations, Elementary probability theory, Binomial, Poisson and normal distributions, Fourier series, Fourier and Laplace transforms, Elements of complex analysis.

Classical Mechanics: Newton's law, central forces, Kepler's law and planetary, motion, Lagrange and Hamilton's formalisms, Special theory of relativity – Lorentz transformations, time dilation, Length contraction, Relativistic kinematics, Variation of mass with velocity, Mass – Energy equivalence, Relation between energy and momentum.

Electromagnetic Theory & Acoustic wave: Gauss's Law and its applications, Laplace and Poisson equations, Magnetostatics : Bio-Savart's law, Ampere's theorem, Electromagnetic induction, Faraday's law, Maxwell's equations, Scalar and vector potentials, Electromagnetic waves and their reflection , Refraction, Interference, diffraction,polarization,Poynting vector, Energy and momentum ;electromagnetic waves, acoustics, acoustical holography, acoustic radiation, acoustic transmission.

Quantum Mechanics: Physical basis of quantum mechanics, Wave – Particle duality, De-Broglie hypothesis, Wave packet and group velocity, , Heisenberg's uncertainty principle, Schrodinger equation (time dependent and time independent), Eigen value problems such as particle- in- a- box, Harmonic oscillator etc.

Thermodynamics and Statistical Physics: Law of thermodynamics and their consequences, Macro state and microstates, Phase space, Probability ensembles, Partition function, Free energy, Calculation of thermodynamic quantities, Classical and quantum statistics, Degeneralte Fermi gas, Black body radiation and Planck's distribution law, Bose- Einstein condensation, First and second order phase transitions.

Atomic and Molecular Physics: Quantum states of an electron in an atom, Electron spin, Spectra of one-and manyelectron atoms, Relativistic corrections for energy levels of hydrogen, Hyperfine structure and isotopic shift, Width of spectral lines, LS & JJ coupling, Zeeman, Paschen Back and Stark effect, X-ray spectroscopy, Electron spin resonance, Nuclear magnetic resonance, lasers.

Solid State Physics: Atomic structure and bonding in materials. Crystal structure of materials, unit cell and space lattices, Miller indices of planes and directions, Concept of amorphous, Single and polycrystalline structures and their effect on properties of materials, Crystal growth techniques, Free electron theory, Band theory of solids; metals, semiconductors and insulators, Hall effect, superconductivity, Fermi level, energy gap.

Nuclear and Particle Physics: Basic nuclear properties, Size, Shape, Charge distribution, Spin and Parity, Mass defect, Binding energy, semi-empirical mass formula, Liquid drop model, Nature of nuclear force, Nuclear shell model, Alpha decay, Beta decay, Gama decay, Laws of radioactivity, Nuclear reactions, Compound nuclei and direct reactions, Controlled and uncontrolled chain reaction, critical mass, fission and fusion, Nuclear reactor, Elementary particles.

Electronics: Semiconductor devices & physics P-N-Jn.depletion region, barrier potential, Transistors, Bipolar junction Transistors, Field effect transistors, UJT,SCR, Rectifier circuits, , Logic gates and symbols, Boolean algebra & Karnaugh map, DeMorgan's theorem, Basic digital logic circuits, Optoelectronic devices including solar cells; photonic devices;

Photo detectors and LEDs, Digital techniques and applications (Registers Counters, Comparators and similar circuits); ICs; modulation & demodulation, AM,PM,FM;A/D and D/A convertors; Sensors.

TEXT & REFERENCE BOOKS:

1. Mathematical Physics: Mary L B
2. Statistical Physics: TMH-1988; F.Reif
3. Introduction to Modern Physics:H.S.Mani & G.K.Mehta
4. Introduction to Solid State Physics: C.Kittel
5. Solid State Electronic Devices:B.G.Streetmann
6. Electronics Fundamental & Applications:J.D.Ryder

SUBJECT: MATHEMATICS (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

Linear Algebra : Finite dimensional vector spaces; Linear transformations and their matrix representations, rank; systems of linear equations, eigen values and eigen vectors, minimal polynomial, Cayley-Hamilton Theroem, diagonalisation, Hermitian, Skew-Hermitian and unitary matrices; Finite dimensional inner product spaces, Gram-Schmidt orthonormalization process, self-adjoint operators.

Complex Analysis : Analytic functions, conformal mappings, bilinear transformations; complex integration; Cauchy's integral theorem and formula; Liouville's theorem, maximum modulus principle; Taylor and Laurent's series; residue theorem and applications for evaluating real integrals.

Real Analysis : Sequences and series of functions, uniform convergence, power series, Fourier series, functions of several variables, maxima, minima; Riemann integration, multiple integrals, line, surface and volume integrals, theorems of Green, Stokes and Gauss; matric spaces, completeness, Weierstrass approximation theorem, compactness; Lebesgue integral, Fatou's lemma, dominated convergence theorem.

Ordinary Differential Equations : First order ordinary differential equations, existence and uniqueness theorems, systems of linear first order ordinary differential equations, linear ordinary differential equations of higher order with constant coefficients; linear second order ordinary differential equations with variable coefficients; method of Laplace transforms for solving ordinary differential equations, series solutions; Legendra and Bessel functions and their orthogonality.

Algebra : Normal subgroups and homomorphism theorems, automorphisms; Group actions, Sylow's theorems and their applications; Euclidean domains, Principle ideal domains and unique factorization domains. Prime ideals and maximal ideals in commutative rings; Fields, finite fields.

Functional Analysis : Banach spaces, Hahn-Banach extension theorem, open mapping and closed graph theorems, principle of uniform boundedness; Hilbert spaces, orthonormal bases, Riesz representation theorem, bounded linear operators.

Probability and Statistics : Probability space, conditional probability, Bayes theorem, independence, Random variables, joint and conditional distributions, standard probability distributions and their properties, expectation, conditional expectation, moments; weak and strong law of large numbers, central limit theorem; Sampling distributions; Testing of hypothesis, standard parametric tests based on normal, Chi-Square, t, F - distributions; Linear regression; Interval estimation.

REFERENCE BOOKS:

1. Mathematical Analysis by Rudin,M
2. Discrete Mathematics by Truss, Pearson Education
3. Linear Algebra by Ramachandra, McGraw Hill Pub.
4. Mathematical Statistics by M.Ray, S-Chand Pub.

5. Abstract Algebra by S.David, Wiley Pub.
6. Ordinary Differential Equation by Garrett, Wiley Pub.

SUBJECT: ZOOLOGY (Ph.D. ENTRANCE TEST)
SECTION I (40 MARKS 40 QUESTIONS)

This section will contain 40 questions with multiple choices to test general awareness, research aptitude, reasoning, basics of computation, logic, data interrelation, presentation, analysis synthesis etc.

SECTION II (60 MARKS 30 QUESTIONS)

This section will contain of 30 questions (multiple choices) to assess the candidates capability of explaining concepts & knowledge from the relevant discipline in which he/she seeks registration as indicated in application form.

1. **Non-Chordata and Chordata :** A generall survey, classification and relationship of the various phyla.Protozoa : Study of the structure, bionomics and life history of 'JerboaIla, Paramecium, Monocystic, rralarial parasite, Typanosoma. Protozoa & disease.Perifera : Sycon. Coelentorate : Structure and life history of Obelia and Aurelia. Sea anemones, Corals, Aleyonium. Helminths, Structure and life history of planaria.Fasciota. Tacenia. Ascaris, Medical importance of Nematedes. Annelida, Neries , earthworm and leech Arthropoda, Palaemon , Scorpion, Cockroach, Mollusea. Unio and Pita, Pearl Formation Modifications of nervous system. Echinodermata , Asterias and its larva. Generall organisation and characters, outline classification and inter- relationsaip of proto -chordata. Pisces, Amphibia , Reptilia, Ayes and Mammalia. Neoteny and retrogressive metamorphosis. A generall study of comparative account of the various systems of vertebrates. Locomotion arid respiration in fishes, structure and affinities of Dipnoi. Structural peculiarities of Amphibia. Poisonous and non- poisonous snakes of India, Aerial adaptations of bitls. Structural peculiarities and affiniting distributon relation of prototheria and Metatheria

2. **Ecology and Economic Zoology:** Environment: Abiotic factors and their role; Biotic factors -Inter and Intra¬specific relations. Ecosystem, Niogeo-Chemical cycles. Adaptation in fresh water, marine and terrestrial habitats. Pollution in air, water and land. Wild life in India and its conservation.

3. **Economic Zoology:** Parasitism, Commensalism and Host parasite relationship. Parasitic protozoan's and helminthes of man. Beneficial and harmful insects.

4. **Cell Biology -**Structure and function of cell and cytoplasmic constituents : structure of nucleus , plasma membrane, mitochondria, Golgi-bodies, endoplasmic reticulum and ribosome's , cell division, mitosis and meiosis. Gene structure and function: Watson-Crick models of DNA, sex-chromosomes and sex -determination.

5. **Genetics -** Mendelian laws of inheritance, linkage and crossing over, mutation aid evolution, cytoplasmic inheritance genes and diseases.

6. **Evolution and Systematics -** Orgin of life, History of evolutionary thought. Lamarck and his works, Darwin and his works, Sources and nature of organic variation. Natural selection, Isolation. Concept of species and sub-species, principles of classification, zoological nomenclature and international code. Fossils, geological eras, distribution of animal's zoogeographical realms of the world.

7. **Biochemistry -**Structure of carbohydrates, lipids, amino-acids, proteins and nucleic acids, glycolysis and Krebs cycle, oxidation and reduction. Oxidative phosphorytagion, energy conservation and release, ATP, cholesterol. Enzymes and coenzymes, Hormones and their functions.

8. **Physiology with special reference to mammals:** Composition of blood, blood groups in man , coagulation, oxygen and carbon dioxide transport, nephron and urine formation, mechanism of conduction along axon and across synapse ,neurotransmitters, Vision, Hearing and other receptors, mechanism of contraction of skeletal muscle, role, of salivary

gland, liver, pancreases and intestinal glands indigestion. Absorption of digested food, roles of pituitary, thyroid, parathyroid, pancreas, adrenal testis, ovary and pineal body.

9. **Embryology:** Gametogenesis, fertilization, types of eggs, cleavage, development up to gastrulation in Branchiostorna, frog and thick, Metamorphosis in frog; Formation and fate of extra embryonic membranes in chick; formation of amnion, allanteis and classification of placenta in mammals, function, of placenta in mammals.

SUGGESTED READING MATERIAL:

1. M. Kato. The Biology of Biodiversity, Springer.
2. J.C. Avice. Molecular Markers. Natural History and Evolution,Chapman & Hall, New York.
3. E.O. Wilson. Biodiversity, Academic Press, Washington.
4. G.G. Simpson. Principle of Animal Taxonomy. Oxford IBH Pub.Co.
5. E. Mayer. Elements of Taxonomy.
6. E.O. Wilson. The Diversity of Life (The College Edition), W.W.Northern & Co.
7. B.K. Tikadar. Threatened Animals of India, ZSI Publication, Calcutta.
8. Jorgensen, SE., Fundamentals of Ecological Modelling, Elsevier New York.