

Research Methodology Syllabus for PhD. Entrance Examination

Name of Subject: Research Methodology

Common for all Specialization: (Paper-1)

Research and Types of research: Meaning of Research- Objectives of Research- Motivation in Research. Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Research Process. Criteria of good Research. Research Formulation – Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis. Data Collection and analysis: Execution of the research - Observation and Collection of data - Methods of data collection – Modeling, Mathematical Models for research, Sampling Methods- Data processing and Analysis strategies. Data Analysis with Statistical Packages – Hypothesis-testing, Generalization-and Interpretation.

Reference Books:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes. 4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.
6. Leedy, P.D. and Ormrod, J.E., 2004 Practical Research: Planning and Design, Prentice Hall.
7. Satarkar, S.V., 2000. Intellectual property rights and Copy right. Ess Ess Publications

Ph.D. Entrance Exam Syllabus (Paper-II)

Civil Engineering

Structural Analysis: Shear force and bending moment, Simple stresses and strains, Shear stresses in beams, Principal stresses and strains, Direct and bending stresses, Columns and struts, Analysis of determinate and indeterminate structures, Moving load, influence lines, Strain energy, Three hinged arches.

Design of Reinforced Concrete and Steel Structures: Cement, Aggregates, Water, Admixtures, Fresh concrete, Properties of hardened concrete, Strength porosity relationship, Durability of concrete and its significance, Concrete mix design, Limit state of collapse, Limit state of serviceability, Design of flexural and compression members, Connections-simple and eccentric, Plastic analysis of beams and frames

Fluid Mechanics and Hydrology: Fluid statics, Pascal law, Hydrostatic law, Pressure measurements, Buoyancy & floatation, Fluid kinematics, Fluid dynamics, Flow measurement: Orifices, Mouth pieces, Notches, Weirs, Flow through pipes, Dimensional analysis and Models, Laminar flow, Turbulent flow in pipes, Boundary layer theory, Open channel flow, Varied flow, Bernoulli's equation. Hydrology, Hydrologic cycle, Scope and applications of hydrological cycle, Precipitations types and measurement, Evapo-transpiration, Consumptive use, infiltration and percolation, Measurement and analysis of runoff data, Hydrographs, Mass curve and flow duration curve, Concept of unit hydrograph, Methods of estimation of unit hydrograph, Ground water hydrology, Types of aquifers and wells, Darcy's law and its limitations.

Geotechnical Engineering: Soil structure and mineralogy, Phase diagrams, Index properties and classification of soils, Stresses within soil, Permeability of soils, Compaction, Consolidation, Shear strength, Seepage pressure, Earth pressure theories, Shallow and deep foundations.

Environmental Engineering: Quality standards, basic unit processes and operations for water treatment. Drinking water standards, basic unit operations and unit processes for surface water treatment, Sewage and sewerage treatment, quantity and characteristics of wastewater, Primary, secondary and tertiary treatment of wastewater, effluent discharge standards, sludge disposal, Solid and hazardous waste management.

Transportation Engineering: Highway planning and geometric design, Highway material, Properties of sub-grade and pavement component material, Highway construction – WBM, bituminous and cement concrete pavement, Design of pavement and its factors for flexible and rigid pavements.

Ph.D. Entrance Exam Syllabus (Paper-II)

Computer Science

Set Theory & Algebra: Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra. Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation. Computer Organization and Architecture: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage, 8085 microprocessor. Programming and Data Structures: Programming in C/C++; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps. Algorithms: Divide & conquer, Branch & bound, Dynamic programming, Greedy techniques, NP-Hard & NP Complete. Theory of Computation: Regular languages and finite automata, Context free languages and Pushdown automata Compiler Design: Lexical analysis, Parsing, Syntax directed translation Operating Systems: Processes, Threads, Interprocess communication, Concurrency, Semaphores, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security. Databases: ER-model, Database design (integrity constraints, normal forms), Query languages (SQL). Information Systems and Software Engineering: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance. Computer Networks: ISO/OSI stack, LAN technologies (Ethernet), Flow and error control techniques, TCP/UDP and sockets, IP(v4), Application layer protocols, Basic concepts of hubs, switches, gateways, and routers. Network security – basic concepts of public key and private key cryptography, digital signature, firewalls

Ph.D. Entrance Exam Syllabus (Paper-II)

Electronics & Communication Engineering (ECE)

Network graphs: matrices associated with graphs; incidence, fundamental cut set and fundamental circuit matrices. Energy bands in silicon, intrinsic and extrinsic silicon. Carrier transport in silicon: diffusion current, drift current, mobility, and resistivity. Generation and recombination of carriers, PN junction diode, Simple diode circuits, clipping, clamping, rectifier, Zener diode, tunnel diode, BJT, JFET, MOS capacitor, MOSFET, LED, PIN and avalanche photo diode, Basics of LASERs. Small Signal Equivalent circuits of diodes, BJTs, MOSFETs and analog CMOS. CMOS Inverter & its characteristics, Biasing and bias stability of transistor; FET amplifiers. Boolean algebra, minimization of Boolean functions; logic gates; CMOS logic & other logic families, Fundamental considerations of CMOS fabrication process. Definitions and properties of Laplace transform continuous-time and discrete-time Fourier series, continuous-time and discrete-time Fourier Transform. Digital modulation schemes: amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), TDMA, FDMA and CDMA and GSM. Elements of vector calculus: divergence and curl; Gauss' and Stokes' theorems, Maxwell's equations: differential and integral forms, wave equation, Poynting vector. Plane waves: propagation through various media; reflection and refraction; phase and group velocity; skin depth. Transmission lines: characteristic impedance; impedance transformation; Smith chart; impedance matching; S parameters, pulse excitation. Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies; dispersion relations. Basics of propagation in dielectric waveguide and optical fibers. Basics of Antennas: parameters, array antennas, Measurements. Frequency band, microwave components, TWT, Gun diode, different types of radar, radar antennas, radar range equation.

Ph.D. Entrance Exam Syllabus (Paper-II)

Electrical Engineering (EE)

1. **Electric Circuits and Networks:** Network graph, Node and Mesh analysis, Transient response of DC and AC networks, Time Domain & Frequency Domain Analysis using Laplace and Fourier Transformations. Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer Theorems, Star-Delta Transformations, Source Transformation. Analysis of Two-port networks: H, Y, Z and ABCD parameters representations. Magnetic Circuits. Single phase and Three phase circuits.
2. **Power Systems:** Basic concepts of Generation, Transmission and Distribution of Electrical Power, Models and Representation of Power System components: Synchronous Machines, Transformers, Transmission Lines etc. Per Unit Representations, Symmetrical Components, Fault Analysis (LG, LLG, LL, LLLG faults), Bus impedance and Admittance Matrices, Load Flow Analysis and Solution Techniques, Voltage Control, Reactive Power Compensation and Power Factor Correction, Economic Operation, Power System Stability – Angle and Voltage Stability, HVDC Transmission and FACTS Devices, Protection Systems - Relays and Circuit Breakers.
3. **Electrical Machines:** Single and Three Phase Transformer – Equivalent circuit, Phasor diagram, tests, regulation and efficiency, parallel operation; Auto-transformer; Energy conversion principles; DC machines – types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; Single & Three Phase Induction Motors – principles, types, performance characteristics, starting and speed control; Synchronous Machines – construction, performance, regulation and parallel operation of generators, motor starting, characteristics and applications.
4. **Power Electronics and Drives:** Semiconductor Power Diodes, Transistors, Thyristors, Triacs, GTOs, MOSFETs and IGBTs – static characteristics and principles of operation; Triggering circuits; Phase control rectifiers; bridge converters – fully controlled and half controlled; principles of choppers and inverters; Basis concepts of adjustable speed dc and ac drives.
5. **Control Systems:** Principles of Open Loop and Feedback; Transfer Function; Block Diagrams; Steady-State Errors; Routh and Nyquist Techniques; Bode Plots; Root loci; Lag, Lead and Leadlag compensation; State Space Model; State Transition Matrix, Controllability and Observability.
6. **State variable analysis and design:** State space model for continuous time linear system and discrete time linear system. State space representation using phase variables and canonical variables, transfer function from state model, state model from transfer function, diagonalization Eigen values and eigen vector, solution of state equation.

Ph.D. Entrance Exam Syllabus (Paper-II)

Mechanical Engineering

Metal Casting: Design of patterns, moulds and cores; solidification and cooling; riser and gating design, design considerations. Forming: Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk and sheet metal forming processes; principles of powder metallurgy. Joining: Physics of welding, brazing and soldering; adhesive bonding; design considerations in welding. Machining and Machine Tool Operations: Mechanics of machining, single and multi-point cutting tools, tool geometry and materials, Fluid Mechanics: Fluid properties; fluid statics, manometry, buoyancy; fluid kinematics: Lagrangian and Eulerian description, Reynolds transport theorem, Conservation Laws: control-volume analysis of mass, momentum and energy; Bernoulli's equation, viscous flow of incompressible fluids), Dimensional analysis and similarity, Ideal flow, laminar flow, boundary layer; elementary turbulent flow; flow through pipes, Compressible flow. Heat-Transfer: Heat Conduction: Steady state heat conduction, Transient heat conduction, Numerical solution to heat conduction, Convection Heat transfer: Forced convection, Free convection and Mixed convection, Boiling and Condensation, Thermal radiation, radiation from black body, radiation properties of real bodies, Radiative exchange between surfaces, Heat exchanger design and analysis, LMTD and NTU methods, Melting and solidification. Thermodynamics: thermodynamic system and processes; phase diagrams, Laws of Thermodynamics, Temperature scales, Irreversibility and availability; behavior of ideal and real gases, properties of pure substances, Cycle analysis, Carnot cycle, Rankine cycle, Air standard cycles, refrigeration and heat pump cycles, analysis of thermodynamic cycles related to energy conversion. Engineering Mechanics: Free body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion, 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; Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains; flywheels. Production Planning and Control: Forecasting models, aggregate production planning, scheduling, materials requirement planning. Inventory Control deterministic & probabilistic models; safety stock inventory control systems. Operations Research: Linear programming, simplex and graphical method, transportation model, assignment model, network flow models, simple queuing models, PERT and CPM. Supply Chain Management. Numerical Methods for Engineers: Solution of a system of linear algebraic equations, direct and iterative methods for matrix inversion, numerical solution of ODE, Taylor series expansion, Errors

Ph.D. Entrance Exam Syllabus (Paper-II)

PHYSICS

Mathematical Methods of Physics: Eigenvalues and eigenvectors, linear ordinary differential equations, Special functions. Fourier series, Transforms, Elements of complex analysis, Elementary probability theory, random variables, Distributions, Green's function, Partial differential equations, Elements of computational techniques, Tensors. Classical Mechanics: Newton's laws, Central force motions, two body Collisions - scattering in lab and C.m. frames , Rigid body dynamics, Non-inertial frames and pseudo forces, Lagrangian and Hamiltonian formalism, small oscillations, normal modes, Special theory of relativity, Lorentz transformations, relativistic kinematics. Electromagnetic Theory: Laplace and Poisson equations, boundary value problems, Maxwell's equations in free space and linear isotropic media, Scalar/ vector potentials, gauge invariance, Dispersion relations in plasma, Lorentz invariance of Maxwell's equations, Transmission lines and wave guides, Radiation- from moving charges and dipoles, Retarded potentials. Quantum Mechanics: Schrödinger's equation and its Applications for simple problems, Heisenberg uncertainty principle, Dirac notation , Motion in a central potential, angular momentum algebra, Hydrogen atom, Approximation methods, Fermi's golden rule, Pauli exclusion principle, Elementary theory of scattering, Klein-Gordon and Dirac equations. Thermodynamic and Statistical Physics: Laws of thermodynamics, Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria, micro- and macro-states, Micro-canonical, canonical and grand-canonical ensembles and partition functions, Free energy and its connection with thermodynamic quantities, Classical / quantum statistics, Bose and Fermi gases, Diamagnetism, Para magnetism, and ferromagnetism, Bose-Einstein condensation, Diffusion equation, , Nonequilibrium processes. Electronics and Experimental Methods: Semiconductor devices, frequency dependence and application, Opto-electronic devices, Operational amplifiers and their applications, Digital techniques and applications, Microprocessor and microcontroller basics. Atomic & Molecular Physics: Spectrum of He and alkali atoms, LS & JJ couplings, Zeeman, Paschen-Bach & Stark effects, E.S.R. and N.M.R., chemical shift, Frank-Condon principle, Born-Oppenheimer approximation, Diatomic molecules, spectra, Lasers. Condensed Matter Physics: Bravais lattices, Reciprocal lattice, Diffraction and the structure factor, bonding of solids, Elastic properties, phonons, lattice specific heat, Free electron theory and electronic specific heat, Response and relaxation phenomena, Hall effect , Periodic potential, Type-I and type-II superconductors, Josephson junctions, Super fluidity, Defects and dislocations. Nuclear and Particle Physics: Binding energy, semi empirical mass formula, liquid drop model, Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge-symmetry of nuclear forces, Deuteron problem, Shell structure, single-particle shell model, Rotational spectra, Fission and fusion, Classification of fundamental forces, Quark model, C, P, and T invariance, Weak interactions.

Ph.D. Entrance Exam Syllabus (Paper-II)

CHEMISTRY

Organic Chemistry Carbonium ions, carbanions, carbenes, nitrenes, radicals and arynes, Reactive intermediates, Nucleophilic, Electrophilic, Radical substitution, Addition and Elimination reactions. Barton, Baeyer-villiger, Birch, Chichibabin, Clemmensen Diels-alder, Friedel crafts, Hoffmann, Hofmann-Löffler-Freytag, Hydroboration, Lossen, Mannich, Michael addition, Meerwein Ponndorf-Verley, Perkin, Grignard, Reimer-Tiemann, Reformatsky, Storkenamine, Wittig, Wolff Kishner. Oppenaur oxidations, Robinson annulations, Routine functional group transformations and inter-conversions of simple functionalities, Aldol, Claisen, Stobbe and Dieckmann, Schmidt, Condensations, Beckmann and Fries, Favorski, Curtius Rearrangements. Stereochemistry and Conformational Analysis: Pericyclic Reactions, Photochemistry, Dyes.

Physical Chemistry: Basic principles and applications of quantum mechanics, Variational and perturbational methods. Basics of atomic structure, electronic configuration, shape of orbitals, hydrogen atom spectra. Theoretical treatment of atomic structures and chemical bonding. Chemical applications of group theory. Basic principles and application of spectroscopy – rotational, vibrational, electronic, Raman, ESR, NMR.

Chemical thermodynamics. Phase equilibria. Statistical thermodynamics. Chemical equilibria. Electrochemistry, Chemical kinetics, Polymer chemistry, Solid State Chemistry, Collids and surface phenomena, Non-ideal systems, Inorganic Chemistry Chemical periodicity. Structure and bonding, Concepts of acids and bases, Chemistry of the main group elements and their compounds. Allotropy, synthesis, bonding and structure, Chemistry of transition elements and coordination compounds, Inner transition elements, organometallic compounds, Cages and metal clusters, Analytical chemistry separation techniques. Spectroscopic electro- and thermo analytical methods, Bioinorganic chemistry, Physical characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-, NQR, MS, electron spectroscopy and microscopic techniques. Nuclear chemistry.

Ph.D. Entrance Exam Syllabus (Paper-II)

MATHEMATICS

Analysis: Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum. Sequences and series, convergence, limsup, liminf. Bolzano Weierstrass theorem, Heine Borel theorem. Continuity, uniform continuity, differentiability, mean value theorem.

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

Complex Analysis: Algebra of complex numbers, the complex plane, polynomials, Power series, transcendental functions such as exponential, trigonometric and hyperbolic functions. Analytic functions, Cauchy-Riemann equations. Contour integral, Cauchy's theorem, Cauchy's integral formula,

Ordinary Differential Equations (ODEs): Existence and Uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs. General theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem, Green's function.

Partial Differential Equations (PDEs): Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs. Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.

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

Special Functions & Integral Transform: Gauss hypergeometric function and its properties, Integral representation, Linear and quadratic transformation formulas, Contiguous function relations, Integral representation, Legendre functions $P_n(x)$ and $Q_n(x)$ and their properties. Bessel functions $J_n(x)$. Laplace transform, Fourier Transforms,

Fluid Dynamics: Governing equations of fluid motion; stream line; velocity potential, path line, equation of continuity, Motion in two dimensions; stream function; complex potential; source; sink and doublet; image circle theorem, Viscous fluid, Stokes-Navier equations

Discrete Mathematics: Set Theory, Types of relations on sets and their properties, Relational matrix and the graph of a relation, Partitions, Equivalence relations, Poset, Hasse diagram. Definitions & Classification of functions, Characteristic function of a set, Hashing functions, Recursive functions, Permutation functions.

Discrete numeric function, Basic counting principles, Generating functions, Recurrence relations, Inclusion and exclusion principle

Linear Programming Problem: Mathematical Formulation of linear programming problem, Types of solutions, Linear programming in matrix notation. Some Exceptional Cases, General Linear Programming Problem Slack and Surplus Variables, Duality, Transportation & Assignment Problems.

Ph.D. Entrance Exam Syllabus (Paper-II)

English

Part A: Language

1. ELT: an introduction (History, Place, Position, Problems, Prospects and Future)
2. Language acquisition and language learning
3. Listening
4. Speaking
5. Reading
6. Writing
7. Communicative Language Teaching
8. Computer-aided language learning
9. English for academic purposes
10. English for specific purposes
11. Business English Communication: Business letter, Report Writing, E-Communication
12. Basic concepts of Language Testing and assessment
13. Teaching literature

Part B: Literature

1. Indian Literature
2. Victorian Age
3. Literary Theories
4. Literary Devices

Ph.D. Entrance Exam Syllabus (Paper-II)

Management

General Management: Concept of Management, Evolution of Management, Functions & Principles of Management.

Managerial Communication: Introduction, Types, Medium, Barriers and Techniques.

Organisational Behaviour: Concepts and Significance of OB, Understanding and Managing Behaviour - Personality, Perception, Values, Attitudes, Learning and Motivation, Leadership, Managing Conflicts, Organisational Development.

Human Resources Management: Concepts and perspective in Human Resource Management, process and techniques, Recruitment and Selection, Performance Appraisal system and evaluation, Methods of Training and Development, Dispute Resolution and Grievance Management, Labour Welfare and Social Security Measures.

Financial Management: Concept, Nature and Scope, Functions, Financial Instruments, Capital Structure & its Theories, Cost of Capital, Capital Budgeting, Working Capital Management, International Financial Management

Marketing Management: Concepts , Nature and Scope, Marketing Mix – Product, Price, Place and Promotion, Role and Relevance of segmentation, Targeting and Positioning, Product Life Cycle, Branding and Packaging, Retailing, Consumer Behaviour, Marketing of Services

Statistics: Techniques and its uses, Descriptive Statistics.

Ph.D. Entrance Exam Syllabus (Paper-II)

COMMERCE

Accounting: - Basic accounting principles & concepts, IndAS, IFRS, Capital and Revenue. Journal & Ledger entries, Final A/c (Trading, P.&L. & Balance Sheet), Partnership Accounts, Ratio Analysis, Cash Flow Analysis

Cost & Management Accounting: Concept of different costs, Elements of Costs, Break-Even – Point analysis, Marginal Costing, Standard Costing, Budgetary control

Financial Management:- Concept and objectives, Capital Structure, Basic theories of capital structure, Capital Budgeting, Cost of Capital, Working Capital Management.

Statistics: - Meaning, Collection and classification of data. Central tendency, Correlation and regression, Probability, Sampling

Business Economics:- Introduction, Consumer Behavior, demand and supply, Indifference Curve Analysis, Cost & Revenue, Price determination in different markets, Law of Variable Proportions

Principles of Management:- Concept, Planning, Decision making, Organization, Motivation, Leadership, Organization structure, Organizational Culture

Business Communication: Meaning, role, principles, factors, Modern Techniques, Types of communication, Non Verbal Communication.

Banking & Financial Institutions:- Types of banks & their functions, RBI Act 1934, Role of RBI and Financial Institution's, NABARD & Rural Banking, E- Banking, Financial Institutions, Financial Regulators, Banking sector reforms

Income Tax:- Basic Concepts, Residential Status, Incidence of tax for different tax payers, Exempted incomes, Heads of Income, Deductions and Rebates

Marketing Management: Concept of Marketing & Marketing Management, Scope of Marketing, Marketing Mix, Product decisions, Pricing decisions, Promotion decisions, Distribution decisions, Market Segmentation, Targeting & Positioning, Product Life Cycle, Consumer Behavior.

Human Resource Management (HRM): Concept of HRM, HR Planning, Recruitment, Selection, Job Description, Job Analysis, Job Specification, Training & Development, Performance Appraisal.

Business and Corporate Laws: Indian Contract Act, 1872, Sale of Goods Act, 1930, RTI Act, Negotiable Instruments Act, 1881, Goods and Services Tax (GST), The Companies Act, 2013.

Ph.D. Entrance Exam Syllabus (Paper-II)

Design

Elements of Design- Dot, Line, Shape, Form, Texture, Light, Depth, Pattern etc.

Principles of design - Contrast, Harmony, Rhythm, Balance, Unity, Proportion, Scale etc.

Color theory -Colour System (RGB, CMYK, and PANTONE), Colour Wheel (primary, secondary and tertiary colours), etc. Colour Schemes and color theory.

Drawing and Sketching- Introduction to drawing/ sketching tools (pencil grades, scales, etc.).Drawing techniques and its Implementation. Introduction to design -types of Design like visual design, usability, and strategic etc. use of Design. Design Research, Inspiration, idea Generation, Visualization, Design representation. Design idea representation. Apply design concepts in developing products. Creating design options. Prototyping & Design Evaluation.

Design Thinking- design thinking methods. Role of design thinking in building brands. Four power of design: a value model in design management. Measuring the value of design in services. Types of printing methods.

Traditional Art and Craft - stages of development over civilizations.

Tools and Techniques – Adobe photoshop, corel draw, Adobe illustrator.