CMR UNIVERSITY
Private University Established in Karnataka State by Act No. 45 of 2013

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Ph.D. Entrance Examination Syllabus

Index

Research Methodology Common for All Specializations

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.

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, and 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.

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.

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

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.

Chemistry

Organic Chemistry Carbonium ions, carbanions, carbenes, nitrenes, radicals and arynes, Reactive intermediates, Nucleophilic, Electrophilic, Radical substitution, Addition and Elimination reactions. Barton,Baeyer-villigier, Birch, Chichibabin, Clemmensen Diels-alder, Friedel crafts, Hoffmann, Hofmann- Loffler-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, Clasien, 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.

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, limtsup, 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 Pn(x) and Qn(x) and their properties. Bessel functions Jn(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.

English

Language

ELT: an introduction (History, Place, Position, Problems, Prospects and Future), Language acquisition and language learning, Listening, Speaking, Reading, Writing, Communicative Language Teaching, Computer-aided language learning, English for academic purposes, English for specific purposes, Business English Communication: Business letter, Report Writing, E-Communication, Basic concepts of Language Testing and assessment, eaching literature.

Literature

Indian Literature, Victorian Age, Literary Theories, Literary Devices

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.

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.

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.

Computer Applications

Data Structures: Stack: Definition, Representation, Stack as ADT, Operations and Applications: Polish and reverse polish expressions, Infix to postfix conversion, evaluation of postfix expression, infix to prefix, postfix to infix conversion; Recursion - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi. Queue: Definition, Representation, Queue as ADT, Operations, Queue Variants: Circular Queue, Priority Queue, Double Ended Queue; Applications of Queues. Linked lists: singly linked list, doubly linked and its applications. Tress, sorting and searching and its applications.

Discrete Mathematical Structures: Propositional logic, equivalences, Sets and set operations, Function definition and representation, types of function. Permutations, combinations, Graphs, terminology and special types of graphs, representation of graphs and its applications.

Operating Systems Management: Process Management and Mutual Execution: Process, Process States, Process Description, Process Control, Execution of the Operating System, Security Issues, Processes and Threads, Symmetric Multi-processing (SMP), Microkernels. CPU Scheduler and Scheduling. Principles of Concurrency, Mutual Exclusion: Hardware Support, Semaphores, Monitors, Message Passing, Readers/Writes Problem.

Dead Lock: Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, deadlock Detection, An Integrated Deadlock Strategy, Dining Philosophers Problem. Memory Management: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, demand paging Process Creation, Page Replacement, Allocation of Frames, Thrashing.

Database Management System: Relational Model: Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Concepts, Relational Model Constraints and Relational Database Schema Update Operations, Transactions and Dealing with Constraint violations, Unary Relational operations, Relational Algebra Operations from Set Theory, Binary Relational Operations, JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra Relational Database Design Using ER-to-Relational Mapping. Transaction Management: Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels. Concurrency Control: Lock Based Protocols, Deadlock Handling. Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm.

Analysis and Design of Algorithm: Introduction, Fundamentals of the Analysis of Algorithm Efficiency Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental data Structures. Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms.

Object Oriented Analysis and Design: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history. Modeling as Design Technique: Modeling; abstraction; The three models. Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Advanced object and class concepts; Association ends; N-array associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived, data; Packages;

Computer organization: Binary Systems and Combinational Logic Digital Computers and Digital Systems. Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, and Integrated Circuits. Digital Logic Gates, The map Method, Two–and Three–Variable Maps, Four–Variables Map. Arithmetic Circuits and Sequential Logic NAND and NOR Implementation, Other Two-Level Implementations, Don't Care Conditions. Introduction, Adders, subtractors, binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, BOOTH's algorithm for signed numbers with example.

OOPs with C++: The Origins of C++, What Is Object-Oriented Programming? Encapsulation, polymorphism, Inheritance. Some C++ Fundamentals, A Sample C++ Program, A Closer Look at the I/O Operators, Declaring Local Variables, No Default to int, The bool Data Type, Old-Style vs. Modern C++, The New C++ Headers, Namespaces, Working with an Old Compiler, Introducing C++ Classes, Function Overloading, Operator Overloading, Inheritance Constructors
and Destructors. Classes and Objects: Classes, Structures and Classes Are Related, Unions and Classes Are Related, Anonymous Unions, Friend Functions, Friend Classes, Inline Functions, Defining Inline Functions Within a Class Parameterized Constructors, Constructors with One Parameter: A Special Case Static Class Members, Static Data Members, Static Member Functions, When Constructors and Destructors Are Executed, The Scope Resolution Operator, Nested Classes, Local Classes, Passing Objects to Functions, Returning Objects.

Software Engineering: Introduction: Professional Software Development Attributes of good software, software engineering diversity, IEEE/ ACM code of software engineering ethics, case studies. Software Process models: waterfall, incremental development, reuses oriented, Process activities; Coping with change, The rational Unified process. Agile methods, Plan-driven and agile Development, Extreme Programming, Agile project management, Scaling agile methods

Computer Networks: Networking Devices, Classification of Computer Networks, Network Protocol Stack (TCP/IP and ISO-OSI), Network Standardization and Examples of Networks. Data Transmission Concepts, Analog and Digital Data Transmission, Communication media, Digital modulation techniques (FDMA,TDMA,CDMA). DNS: Domain Name Space, Domain Resource Records, Domain Name Servers. Electronic

mail: SMTP, The World Wide Web: Static and dynamic web pages, web applications, HTTP, mobile web. Streaming audio and Video: Digital audio and video, streaming stored and live media, Content delivery: Content and internet traffic, content delivery networks, peer-to-peer networks.

Hindi Literature

Hindi Literature:

Ancient and Medieval Literature, Modern Hindi Literature, Regional Literature (e.g., Awadhi, Braj, Maithili, etc.), Literary Movements and Trends

Literary Criticism and Theory:

Major Literary Criticisms (e.g., Rasa, Dhvani, Alamkara, etc.), Literary Terms and Concepts, Schools of Literary Criticism

Hindi Language and Grammar:

Phonetics and Phonology, Morphology and Syntax, Vocabulary and Semantics, Stylistics and Composition

History of Hindi Language and Literature:

Evolution of Hindi as a Language, Development of Hindi Literature through the ages Influential Writers and their works, Literary Periods and Movements

Comparative Literature:

Comparative Analysis of Hindi Literature with other Indian Languages, Comparative Analysis of Hindi Literature with World Literature, Translation Studies

Literary History and Literary Criticism in Hindi:

Historical Overview of Hindi Literature, Notable Hindi Literary Critics and their works

Kannada Literature

Kannada Literature:

Ancient and Medieval Kannada Literature, Modern Kannada Literature, Regional Kannada Literature (e.g., Kodava, Tulu, etc.), Literary Movements and Trends in Kannada

Literary Criticism and Theory:

Major Literary Criticisms in Kannada, Literary Terms and Concepts in Kannada, Schools of Literary Criticism in Kannada

Kannada Language and Grammar:

Phonetics and Phonology of Kannada, Morphology and Syntax of Kannada, Vocabulary and Semantics in Kannada, Stylistics and Composition in Kannada

History of Kannada Language and Literature:

Evolution of Kannada as a Language, Development of Kannada Literature through the ages, Influential Writers and their works in Kannada, Literary Periods and Movements in Kannada

Comparative Literature:

Comparative Analysis of Kannada Literature with other Indian Languages, Comparative Analysis of Kannada Literature with World Literature, Translation Studies in Kannada

Kannada Poetry, Prose, and Drama:

Study of Kannada Poetry, Prose, and Drama across different periods, Analysis of Poetic Devices, Narrative Techniques, and Dramatic Elements in Kannada Literature

Literary History and Literary Criticism in Kannada:

Historical Overview of Kannada Literature, Notable Kannada Literary Critics and their works

Psychology

Biological Bases of Behavior:

Neuroanatomy and neurophysiology, Endocrine system and hormones, Genetics and behavior, Psychopharmacology.

Cognitive Processes:

Perception and attention, Learning and memory, Thinking and problem-solving, Language and communication.

Developmental Psychology:

Cognitive development, Social and emotional development, Lifespan development, Developmental theories.

Social Psychology:

Social perception and cognition, Attitudes and persuasion, Group dynamics and intergroup relations, Social influence and conformity.

Personality Theories and Assessment:

Major theories of personality, Personality assessment techniques, Psychodynamic, humanistic, and trait approaches, Self-concept and self-esteem.

Abnormal Psychology and Psychopathology:

Classification and diagnosis of mental disorders, Etiology and risk factors for psychological disorders, Treatment approaches and interventions, Assessment and evaluation of psychopathology

Applied Psychology:

Organizational psychology and industrial/organizational behavior, Educational psychology and learning theories, Health psychology and behavioral medicine, Counseling and psychotherapy approaches.

Cognitive Neuroscience:

Brain imaging techniques, Cognitive neuroscience of perception, attention, and memory, Neural correlates of consciousness, Cognitive processes and brain connectivity.

Cross-cultural and Multicultural Psychology:

Cultural influences on behavior and cognition, Cross-cultural research methods, Diversity and multicultural issues in psychology, Cultural competency and sensitivity in psychological practice.

Social Work

Social Work Theories and Perspectives:

Major theories in social work (e.g., systems theory, ecological perspective, strengths-based perspective, etc.), Historical development of social work, Contemporary perspectives in social work practice, Ethical principles and professional values in social work.

Social Work Practice:

Direct practice with individuals, families, and groups, Community practice and social action, Policy analysis and advocacy, Crisis intervention and trauma-informed practice.

Social Policy and Social Welfare:

Historical and current social welfare policies, Policy analysis and evaluation, Social justice and social welfare, Welfare state models and their implications.

Human Behavior and Development:

Human development theories across the lifespan, Social and cultural factors influencing human behavior, Socialization processes and identity formation, Psychological and social aspects of human behavior.

Social Work Administration and Management:

Organizational theory and behavior, Leadership and supervision in social work, Program planning, implementation, and evaluation, Resource mobilization and grant writing.

Community Development and Social Change:

Community development models and approaches, Participatory methodologies in community work, Social change theories and strategies, Community organizing and empowerment.

Gender, Race, and Social Justice:

Gender and social work practice, Race, ethnicity, and social work practice, Intersectionality and multiple identities, Anti-oppressive and anti-discriminatory practice

Mental Health and Psychosocial Interventions:

Mental health theories and disorders, Assessment and intervention in mental health settings, Trauma-informed care and psychosocial support, Substance abuse and addiction treatment

International Social Work and Global Perspectives:

International social work practice and principles, Global social issues and challenges, Cross-cultural competence and cultural diversity, Human rights and social work practice

Mass Communication and Journalism

Mass Communication Theories:

Theories of mass communication and media effects, Agenda-setting theory, Uses and gratifications theory, Media ecology and technological determinism.

Media Research Methods:

Quantitative research methods in media studies, Qualitative research methods in media studies, Content analysis, Surveys, interviews, and focus groups

Media and Society:

Media and democracy, Media ethics and responsibility, Media literacy and media education, Media and cultural studies

Journalism Studies:

News writing and reporting, Investigative journalism, Media law and ethics, Journalism history and development

Media and Communication Technologies:

New media technologies and their impact on society, Digital journalism and online media, Social media and its role in communication, Media convergence and multimedia storytelling

Strategic Communication and Public Relations:

Public relations theories and practices, Strategic communication planning and campaigns, Corporate communication and reputation management, Crisis communication and risk management

Media Management and Economics:

Media industry structures and ownership patterns, Media economics and business models, Media policy and regulation, Media entrepreneurship and innovation

Media and Cultural Studies:

Cultural studies theories and concepts, Media representations and stereotypes, Popular culture and media consumption, Global media and cultural flows

International Communication:

Global media systems and communication flows, Media imperialism and cultural globalization, Comparative media systems, International news and journalism

Advertising and Marketing Communication:

Advertising theories and practices, Integrated marketing communication, Consumer behavior and persuasion, Branding and advertising campaigns.

Library and Information Science

Foundations of Library and Information Science:

History and development of library and information science,Theoretical foundations and concepts, Information ethics and professional values, Intellectual freedom and censorship

Information Organization and Management:

Cataloging and classification systems (e.g., AACR2, RDA, Dewey Decimal Classification, Library of Congress Classification, etc.), Metadata standards and schemes, Information retrieval systems and techniques, Knowledge organization systems

Information Sources and Services:

Reference services and information literacy, Digital libraries and electronic resources, Collection development and management, User needs assessment and information-seeking behavior

Information Technology and Systems:

Information systems and databases, Digital preservation and archiving, Web technologies and content management, Information security and privacy

Research Methods in Library and Information Science:

Research design and methodology, Quantitative and qualitative research methods Data collection and analysis, Literature review and citation management

Library Management and Administration:

Library planning and strategic management, Financial management and budgeting, Human resource management, Marketing and outreach strategies

Information Policy and Intellectual Property:

Copyright laws and intellectual property rights, Information policy and legislation, Open access and open educational resources, Digital rights management

Digital Libraries and Information Retrieval:

Digital library design and development, Information retrieval algorithms and models, User interface design and user experience (UX), Information visualization and data mining

Knowledge Management:

Knowledge creation and organization, Knowledge sharing and transfer, Knowledge management systems and tools, Organizational learning and innovation

Specialized Areas in Library and Information Science:

Academic libraries,Public libraries,School libraries, Archives and special collections

Education

Educational Philosophy and Foundations:

Philosophical foundations of education, Theories of learning and teaching, Historical development of education, Sociological and psychological perspectives in education.

Research Methods in Education:

Research design and methodology, Quantitative research methods, Qualitative research methods, Mixed methods research

Educational Psychology:

Cognitive development and learning theories, Motivation and self-regulated learning
Assessment and evaluation in education, Individual differences and inclusive education

Curriculum and Instruction:

Curriculum theory and design, Instructional strategies and methods, Assessment and evaluation of student learning, Technology integration in the curriculum

Educational Leadership and Administration:

Educational leadership theories and practices, School organization and management
Educational policy and governance, Educational law and ethics

Teacher Education and Professional Development:

Teacher preparation programs and practices, Pedagogical content knowledge, Reflective teaching and professional growth, Mentoring and teacher induction programs

Educational Measurement and Evaluation:

Principles of educational measurement, Test construction and validation, Assessment and evaluation techniques, Data analysis and interpretation

Comparative and International Education:

Comparative education systems and policies, Cross-cultural perspectives in education
Global educational reforms and challenges, Education and development

Educational Technology:

Integration of technology in education, E-learning and online education, Digital tools and resources for teaching and learning, Educational technology research and evaluation

Specialized Areas in Education:

Early childhood education, Higher education, Special education, Adult and lifelong learning

Sociology

Sociological Theory:

Classical sociological theories (e.g., Marx, Durkheim, Weber), Contemporary sociological theories (e.g., functionalism, conflict theory, symbolic interactionism), Feminist theories, Postmodern and post-structuralist theories

Research Methods in Sociology:

Qualitative research methods (e.g., interviews, ethnography, content analysis), Quantitative research methods (e.g., surveys, statistical analysis), Mixed methods research, Research design and ethics in sociology

Social Institutions:

Family and marriage, Education, Economy and work, Religion

Social Stratification and Inequality:

Social class, Race and ethnicity, Gender, Intersectionality

Social Change and Social Movements:

Globalization and its impact on society, Social movements and activism, Social change theories, Technology and society

Sociology of Culture:

Culture and society, Cultural identity and representation, Popular culture and media Cultural globalization

Sociology of Gender:

Gender roles and socialization, Feminist theories and perspectives, Gender inequality and discrimination, Intersectionality and gender

Sociology of Deviance and Crime:

Theories of deviance and crime, Social control and punishment, Juvenile delinquency White-collar crime

Sociology of Health and Illness:

Social determinants of health, Medicalization and pharmaceuticalization, Health disparities and inequalities, Sociology of mental health

Urban Sociology:

Urbanization and urban development, Urban poverty and inequality, Urban planning and governance, Urban social movements

Architecture Engineering

THEORY OF ARCHITECTURE & DESIGN

1. Theory in Antiquity: Marcus Vitruvius
2. Theory in Renaissance: architects of French Academic Tradition
3. 18th Century and 19th Century theories: ideas & concepts
4. Modern movement theory post industrial revolution
5. Postmodern movement theories
6. Geoffrey Broadbent: design generation theories.
7. Architectural Criticism: Wayne Attoe
8. Contemporary Significant Theory: Archigram, Paolo Soleri, Kenzo Tange, Moshe Safdie etc.

HISTORY OF ARCHITECTURE

1. Architecture of prehistoric times and river Valley civilizations.
2. Indian Temple architecture - Dravidian and Indo-Aryan styles.
3. Classical architecture of Europe (Greek, Roman, Early Christian, Byzantine) Renaissance
Architecture.
4. Islamic architecture (central Asia, west Asia and India)
5. Colonial Architecture in India.
6. Modern and Postmodern Architecture of Europe and America.

HUMANITIES & SOCIAL SCIENCES

1. Definition of Sociology; Nature, Scope and Utility of Sociology; Branches of Sociology; Relation of Sociology and its branches to architecture and the built environment.

2. Biosocial and Sociocultural associations; Definitions of sociological terms: society, community, family, culture; Difference between society and community; Relation between culture and built form.

3. Urban and Rural Communities: Definitions of the terms “urban” and “rural”. Relation and interdependencies between urban and rural settlements.

4. Effects of urbanization on rural areas. Impact of growing urbanization on urban life, viz. health, housing, transportation. Different types of migration. The impact of migration on urban form.

5. Social Research: The need for research; the research process; ethics of social research; scope of social research. Difference between methodology and methods. Types of research methods: qualitative, quantitative, mixed research methods. Sources of research data: primary and secondary sources.

6. Definitions of terms: Goods; Utility, Value, Price and Wealth. The relationship of economics with the built environment and land use. 8. Economic organization of society. Economic systems - capitalism; socialism, communism, mixed-economies.

Primary, secondary and tertiary sectors of economy: agriculture, mining, manufacturing, banking, marketing, transport and service sectors. Factors of production: land, labour, capital and entrepreneurship.

7. Building Costs: Cost and cost indices. Life cycle costs. Total cost of construction. Time value of money. Different sources of financing buildings.

CLIMATOLOGY AND SUSTAINABILITY

1. Introduction to Climate & comfort: Elements and Characteristics of tropical climates, Climatic zones of India. Site Climate. Thermal comfort-Thermal balance of the human body, Thermal Comfort Indices, corrected effective temperature, bioclimatic chart, T.S.I. Overheated and under heated period. Sun-path diagram: Solar geometry & design for orientation and use of solar charts in climatic design. Thermal performance of building elements. Convection, Radiation, concept of Sol- air temperature and Solar Gain factor.

2. Thermal Heat gain or loss: Steady state and periodic heat flow concepts, thermal capacity, time lag and 'U' value, Time lag. Construction techniques for improving thermal performance of
walls and roofs.

3. Shading devices: Optimizing Design of Shading devices. Natural ventilation, Indoor air movement: Functions of natural ventilation, Air movements around buildings

4. Day Lighting: Nature of natural light, its transmission, reflection, diffusion, glare. North light,
Daylight factor & components

5. Sustainability concepts- natural and renewable resources, conservation of energy, Sustainable site development, site layout, Storm water design, Alternative transportation, Urban heat islands.

6. Eco-friendly development: Water efficiency, Materials relevance in buildings, re- use and reduction of water usage, eco-friendly alternative to traditional construction, functions and materials.

7. Site & building energy utilization: Onsite renewable energy, Buildings performance Indoor environmental quality, Efficiency, Green buildings, Application of solar passive design in architecture suitable to regional climates

8. Air quality daylight & Rating systems: Indoor air quality management, optimization of Daylight, Rating systems, GRIHA and LEED systems.

METHODS OF CONSTRUCTION

1. Brick and stone as a building material, types of brick and stone masonry walls and bonds

2. Types of Wooden Doors, Wooden glazed windows, Timber Roof

3. RCC Foundations, types of Staircases and construction methods, RCC Slabs: one-way, two-
way slabs, cantilever slabs, sloping RCC roof, Vaults & Domes

4. Floor finishes including Toilet flooring, Advanced RCC roofs: Flat slab, Flat plate, Filler slabs,
Waffle slab. RCC filler Slabs
5. Construction of steel trusses for various spans, Pre-engineered building, shell roof, geodesic domes, space frame, pneumatic structures, Frameless glass doors and windows,
6. Structural Glazing and cladding, Metal cladding of facades and building envelopes
7. UPVC, PVC & FRP: Doors and windows, Steel sliding and folding doors and partitions.

MATERIALS OF CONSTRUCTION

1. Wood as a building Material: defects, seasoning and preservation of timber
2. Cement and Steel as a Building material, Concrete: grades of concrete, production of concrete, mix, proportioning, Vaults & domes
3. Marble, granite, mosaic, terrazzo, ceramic tiles
4. Paints, varnishes and distempers, emulsions, cement based paints
5. Structural steel: Types, properties, uses
6. Aluminum as a building Material
7. Plastic, types, properties and uses of plastics, construction chemicals and additives, Alternative wall technologies, Sandwich panel walls, PUF panels.

BUILDING SERVICES

(A) PUBLIC HEALTH & ENGINEERING

● Introduction to environment and health aspects, the history of sanitation and health and hygiene.
● Water supply systems- the various sources, the quantity and quality of water required for various uses, water treatment systems, storage and pumping and distribution of water, schematic diagrams for various applications.
● Sewerage systems – Assessment of sewage generated, the collection and conveyance of sewage, types of sewage treatment, the space and ventilation required for STP, the MOC (materials of construction) of sewerage network.
● Storm water management – Rainwater harvesting system, assessment and quantification, drainage system, collection and reuse of water within a project.
● Plumbing – Water supply systems for hot, cold & flushing systems, drainage - floor traps, MOC, various control valves, pipe supports, hangers, fixing and plumbing of small houses.
● Sanitary Fixtures, Fittings & Wellness – Various products available and their application.
● Solid waste management – Waste segregation, treatment and disposal
● Special requirements – solar hot water generation, Central LPG system, Medical gases supply,
storage of High-Speed Diesel, Central Vacuum & Waste collection

(B) ELECTRICAL SERVICES & ILLUMINATION

● Electrical services generation, supply, transmission & Distribution – commonly used terminology, standards & codes, various sources and transmission & distribution system

● Internal electrical distribution system – load calculation and systems and distribution for various building typology

● renewable energy systems – onsite and off-site generation, concept of net zero building, energy conservation techniques in electrical systems

● Electrical services protection systems - switchgear and various protection devices, earthing and lightning protection systems.

● Illumination – Quality and quantity of lighting, lux levels and various types of lighting fixtures,

integration with natural lighting and laws of illumination. Lighting methods, systems of luminaries and preparation of lighting layout

● Extra low voltage system – Telephone, data & Cable TV networking and service provider requirement.

● Electrical layout design and load estimation - electrical layout design using symbols as per IS

codes and electrical load calculations.

(**C) HEATING VENTILATION & AIRCONDITIONING, MECHANICAL TRANSPORTATION & FIRE PROTECTION**

● Introduction to Mechanical ventilation – Need, types of systems & application.

● Introduction to air conditioning – Definition, psychrometric processes, refrigeration cycles, basics

of load calculation, zoning and air distribution, heating systems

● Air-conditioning systems – various systems, the components of various systems, basics of duct sizing and routing, preferred location of equipment and architectural requirements.

● Specialized systems – clean rooms, server, hub & UPS rooms. OT

● Mechanical transportation systems in buildings – Elevators, Types, design considerations, Quality & Quantity of elevators, architectural requirements, safety devices, finishes, location and arrangement of elevators.

● Escalators & Travellators – Application, calculation of traffic capacity, inclination factor, location and arrangement

● Fire Safety in buildings Passive protection – Classification of Fire, causes and hazards, classification of buildings as per NBC, combustible & noncombustible materials, Concepts of passive protection through escape routes, stairs, fire refuge areas, pressurization, travel distance, fire tower, compartmentation, fire signages etc

● Active Fire Control – Firefighting installations, fire sprinklers, fire hydrants, automatic fire detection and alarm systems

● Rules of fire safety for high rise buildings

(D) ACOUSTICS & NOISE CONTROL

● Introduction to sound & room acoustics - origin and nature of sound, its characteristics & measurements, inverse square law, human hearing and auditory range for humans, pitch, tone & loudness, reflection from various surfaces, reverberation time calculation using Sabine's & Eyring's formulae, effect of RT on speech & music.

● Acoustical tools & measurements – Use of SLM, AI, STI, sound attenuation, absorption coefficients of acoustical materials, NRC value, NC Curves for various spaces.

● Acoustical materials, Acoustical design & detailing of Auditoriums, and other spaces

● Introduction to environmental noise control – noise source and classification, noise transmission, maximum acceptable noise levels, reduction at source, reduction near source etc.

● Constructional measures of noise control and sound insulation – enclosures, sound insulation,
sound isolation, vibration isolation etc

● Industrial noise – impact, friction, methods of reduction by enclosures & barriers

● Introduction to Urban soundscape – Noise reduction and control by site planning, town and
regional planning consideration, sustainable building strategies in building acoustics, role of
architects in shaping the urban soundscape.

STRUCTURES

1. Mechanics: Concept of Force, Concept of particle and rigid body. Concurrent, Non-Concurrent and parallel forces in a plane, moment of force, free body diagram, conditions of equilibrium, Principle of virtual work, equivalent force system.

2. Strength of Materials: Simple Stress and Strain, Elastic constants, axially loaded compression members, Shear force and bending moment, theory of simple bending, Shear Stress distribution across cross sections, Beams of uniform strength, Deflection of beams, Torsion of Shafts, Elastic stability of columns, Euler's and Rankine's formulae, Arches.

3. Design of Structures as per I.S. Codes:

a) Structural Steel: Factors of safety and load factors. Riveted, bolted and welded joints and connections. Design of tension and compression member, beams of built up section, stanchions with battens and lacings.

b) Reinforced Concrete: Concept of mix design. Working Stress and Limit State method of design– Recommendations of I.S. codes , Types of Slabs & Beams, Design of one way and two way slabs, stair-case slabs, simple and continuous beams of

rectangular, T and L sections. Compression members under direct load with or without eccentricity, Types of Footings shallow, deep and distribution of load to soil

c) Prestressed concrete: Methods and systems of prestressing, anchorages, Analysis and design of sections for flexure based on working stress, loss of prestress.

d) Brick masonry, Long Span Structures & High Rise Structures: Design requirements and analysis due to lateral loads.

4. Cost Effective Housing Techniques:

a) Development and adoption of low cost housing technology,

b) Alternative building materials for low cost housing & Low cost Infrastructure services: Ferrocement, Gypsum boards, Timber substitutions, Industrial wastes, Agricultural wastes.

5. Maintenance And Rehabilitation Of Structures: Influence on serviceability and Durability,

Maintenance and Repair Strategies, Materials for Repair, Techniques for Repair.

6. Earthquake Resistant Structures: Understanding earthquakes and Seismology, Building forms and Seismic effects related to building configuration. Materials, Plan & vertical irregularities, redundancy. Horizontal & vertical eccentricities in mass and stiffness distribution, soft storey etc., Seismic Resistance System, Seismic Isolation System, Seismic Damping System, Seismic Design to Satisfy Indian Codes.

7. Site Surveying & Analysis: Chain Survey, Plane table survey, Levelling, Characteristics of contours, Analysis of a Site - On site factors, Analysis of natural factors, topography, hydrology, soils, landforms, vegetation, climate, microclimate.; influence of water bodies, type of land survey drawing.

DESIGN IN URBAN CONTEXT

1. Methods of Observation
    a. Drawing (sketching, diagramming, documenting / measured drawing, etc)
    b. Collating digital information (through mobile and data usage)
    c. 3D Scanners and other digital means
    d. Surveys
2. Layers of Information
    a. Civic structure (public and private space, hierarchy, etc.)
    b. Physical Infrastructure (buildings, roads, etc.)
    c. Social aspects (gender, caste, age, etc.)
    d. Cultural aspects (memory, symbolism, value, equity, etc.)
    e. Time (in terms of the physical age and in terms of passage through areas within)
    f. Local and city governance (introduction to the agencies concerned and their ambit)
    g. Climate and its impact
    h. Services (incl. waste management) and their integration within the context

i. Transportation (Private and public) systems

3. Assimilation of Information

a. Integration of all observations to develop an approach to speculation.

b. Meaning of the terms ‘appropriate’, ‘response’, ‘heritage’, ‘in-fill’, ‘style’, etc. in the
context of the locality being studied.

c. The place of abstract notions of artifice, kinetics, abstraction, simultaneity in the way
one responds.

LANDSCAPE ARCHITECTURE & SITE PLANNING

1. Mughal Gardens
2. Japanese Gardens
3. English Gardens – Concept & Philosophy
4. Terminologies used in Landscape like alley, ha ha fence, topiary, etc
5. Hardscapes and softscapes – components like trees, shrubs, grasses, ground covers and their role
6. Site planning based on natural factors like topography, soils, geology, flora and fauna, hydrology and physiography