



# **DETAILED SYLLABUS**

## **First Year**



### First Year First Semester

**Subject: MATERIALS & METHODS OF CONSTRUCTION I(Theory); 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

#### **Introduction to the subject & Evolution of Building Materials-**

Definitions - Art, architecture, structure, materials, construction. A brief introduction on evolution of building materials by chronological approach, Properties of Building Materials Physical properties, Mechanical properties, other characteristics and explanation of various technical terms used in building industry.

#### **Rocks & Stones**

Introduction, Rock-forming Minerals, Classification of Rocks, Quarrying of Stones, Natural Bed of Stone, Seasoning of Stone, Dressing of Stone, Uses of Stones, Characteristics of good Building Stone, Deterioration of Stones, Durability of Stones, Preservation of Stones, Selection of Stones, Common Building Stones, Artificial Stones, Applications of Stones, Principles of Stone Masonry, Types of Stone Masonry.

#### **Wood & Wood Products**

Introduction, Classification of Trees, Growth of Trees, Classification of Timber (IS: 399), Structure of Timber, Characteristics of good Timber, Seasoning of Timber, Defects in Timber, Diseases of Timber, Decay of Timber, Preservation of Timber, Fire Resistance of Timber, Suitability of Timber for Specific Uses, Properties of Wood, Applications of Wood and Wood-products

#### **Clay & Clay Products**

Introduction, Clay and its Classifications, Physical Properties of Clays, Bricks, Classification of Bricks, Characteristics of Good Brick, Ingredients of Good Brick Earth, Harmful Substances in Brick Earth, Manufacturing of Bricks, Different Forms of Bricks, Testing of Bricks, Defects of Bricks, Heavy Duty Burnt Clay Bricks, Burnt Clay Perforated Bricks, Burnt Clay Paving Bricks, Burnt Clay Soling Bricks, Burnt Clay Hollow Blocks, Burnt Clay Jallis, Clay Tiles, Fire-clay Bricks or Refractory Bricks, Terracotta

Structural Clay Products/ Ceramic materials- Clay bricks, Brickwork, Calcium silicate bricks, Concrete bricks, Tiles, Terracotta, Porcelain, Stoneware, Earthenware, Majolica, Glazing  
General Principles of Brick Masonry, Types of Bondings in Brick Work.

#### **Lime, Gypsum & Pozzolana**

Introduction to Lime, Impurities in Limestones, Classification, Manufacture, Slaking, Hardening, Lime Putty and Coarse Stuff, Lime Vs. Cement,

Introduction to Gypsum, Effect of Heat and Moisture, Setting and Hardening, Classification, Manufacture, Plaster of Paris or Stucco, Gypsum Wall Plasters, Hard Finish Plaster, Gypsum Plaster Boards, Non-load Bearing Gypsum Partition Blocks, Pyrocell, Glass-fibre reinforced gypsum (GRG)

Introduction to Pozzolana, Classification, The Activity of Pozzolana, Effects of Natural Pozzolanas, Applications of Fly Ash, Calcined Clay Pozzolana (Surkhi), Ground Blast Furnace Slag, Silica Fume, Rice Husk Ash

#### **Cement**

Introduction, Portland Cement, Chemical Composition of Raw Materials, Composition of Cement Clinker, Hydration of Cement, Rate of Hydration, Water Requirement for Hydration, Manufacture of Cement, Testing of Cement, Types of Cement, Storage of Cement, Glass-fibre reinforced cement

#### **Aggregates**

Introduction, Classification of Aggregates, Characteristics of Aggregate, Deleterious Materials and Organic Impurities, Soundness, Alkali-Aggregate Reaction, Thermal Properties of Aggregate,



Fine Aggregate, Coarse Aggregate, Cinder Aggregates, Broken Brick Coarse Aggregate, Testing of Aggregates

#### **Ceramic Materials**

Introduction, Classification of Ceramic, Refractories, Glass, Glass Wool, Polymorphism in Ceramic Materials, Mechanical Properties of Ceramic Phases, Thermal Properties of Ceramic Phases, Electrical Properties of Ceramic Phases, Glass- Characteristics and performance- solar control, wind loading & sound transmission, Properties, Uses, Types

#### **Polymeric Materials**

Introduction, Polymerisation Mechanism, Depolymerisation, Rubbers, Plastics, Constituents of Plastics, Applications of Plastics, Properties of Plastics, Effect of Temperature on Mechanical properties, Characteristics, Uses, Types, Thermoplastics and Thermosetting Plastics, Glass-fibre reinforced plastics, Degradation of plastics, Plastics forming processes, Plastics in construction, Re cycling of plastics, Reinforced Plastics like Glass-fibre reinforced plastics & Carbon-Fibre reinforced plastics, PVC Sheets, Laminated Plastics

#### **Suggested Books:**

1. Building Materials - S.K Duggal
2. Engineering Materials, Surendra Singh
3. Building Construction & Materials (Gurcharan Singh)
4. Building Materials & Components (CBRI, Roorkee)
5. Building Construction-Sushil Kumar
6. Building Materials & Construction, Punmia
7. Construction Technology, R. Chudley, Vol-1,2,3,4
8. The Construction of Building, Barry
9. Building Construction, J.K McKay, Vol-1-5
10. Building Materials in India: 50 yrs – BMTPC
11. Building Materials- P.C Varghese

**Subject: DESIGN FUNDAMENTAL (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

**Definition of Design:** Comparison between designed and non-designed objects. Appreciation of design criteria; Design as a process. **Visual Perception;** Light and Contrast- value, hue, intensity; **Visual properties of two-dimensional forms** of both geometric and non-geometric surfaces - Line, Shape, Form; Figure-ground relationship; **Principles of two-dimensional composition** - Spatial tension, Likeness basis, balance, movement, scale, proportion, rhythm, dominance and subordination, representation and association; Visual unity; Geometric ratios and dynamic symmetry; Visual textures and tonal variations; Colour theory and colour dynamics applied to the above exercises; **Principles of three-dimensional composition** applying the basic structure of 2-D composition - solids, voids, planes, lines, closed and open forms etc.; Inter-relationship between material, structure & form; **Elementary principles of Architectural Design** on the basis of 3-'ty's - stability, utility, beauty.

#### **Suggested Books:**

1. Design Fundamentals, Robert Scott.
2. Architecture: Form, Space and Order, F.D.K. Ching.
3. Introduction to Architecture, J. C. Snyder and A. J. Catanese.
4. Space, Time and Architecture, Gideon.

**Subject: STRUCTURAL MECHANICS I(Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Equilibrium of forces; concurrent forces; composition and resolution of forces; Polygon of forces; analytical and graphical methods, Bow's notations and vector diagram; Parallel forces; Moments; Couples; Maxwell's diagrams; Analysis of trusses of simple nature: method of joints; method of sections; Definition of statically determinate and indeterminate structures; Centroid and centre of gravity - applications; Moment of Inertia; Section Modulus.

Tutorial Problems with application shall be worked out.

**Suggested Books:**

1. Strength of Materials, 3e Vol. I : Elementary Theory and Problems, S. Timoshenko, CBS Publishers & Distributors; 3rd edition.
2. Fundamentals of Structural Mechanics and Analysis, M.L. Gambhir, Phi Learning Pvt. Ltd-New Delhi.
3. Strength of Materials, R. Subramanian, Oxford University Press.
4. Mechanics of Material, R.C.Hibbler, Pearson Education, 6th Ed.
5. Engineering Mechanics-Statics & Dynamics, R.C.Hibbler, Pearson Education, 11th Ed.
6. Strength of Materials 2/e, Debabrata Nag, Abhijit Chanda, Wiley India Pvt Ltd

**Subject: MATHEMATICS I(Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Successive differentiation, Rolles Theorem (Statement only), Mean Value Theorem

Taylor's & Maclaurin's expansions. Indeterminate forms, Maxima and minima of functions of a single variable; Partial differentiation.

Taylor's & Maclaurin's expansions. Indeterminate forms, Maxima and minima of functions of a single variable; Partial differentiation.

Integration by the solution into partial fractions; properties of definite integrals;

Definite integral defined as the limit of a sum. Fundamental theorem of integral Calculus.

Important Integrals, Beta and Gamma functions; Areas bounded by Improper plane curves and straight lines; Lengths of plane curves; Surface areas and volumes of solids of revolution; Multiple Integrals and their applications in calculation of areas, volumes etc. Numerical Integration by Simpson's Rule.

**Subject: MATERIALS & METHODS OF CONSTRUCTION I(Sessional); 3 Credits,**

**Full Marks – 100, Contact Periods/week: 3**

**Stone Masonry:** Detail drawings for stone masonry, Ashlar & Rubble Masonry

**Timber Joinery:** Detail drawings for Timber joinery-, Joinery in Wood Work.

**Brick Masonry:** Detail drawings for Brick Masonry- Types of Brick, Brick Masonry and Different Types on Brick Bonding- English Bond, Flemish Bond, Rat-Trap Bond, Special Bond. Project work and seminar on building materials.

**Suggested Books: Same as Materials & Methods of Construction I**



**Subject: ARCHITECTURAL GRAPHICS I (Sessional); 6 Credits,  
Full Marks: 100, Contact Periods/week: 6**

**Introduction to Architectural Graphic Fundamentals:** Lines, lettering and dimensioning, reduction and enlargement of drawings on different scales, Simple Geometrical Constructions, **Orthographic Projections:** Principles and projection methods of orthographic projection (First and third angle projection), introduction to architectural plans, elevations and sections. **Projection of Points, Lines, Planes and Solids; Introduction to Section of solids, Development of Surfaces of Solids and Interpenetrations of Solids, Principles of model making.**  
Use of Instruments, Pencils with different grade

Lines, lettering and dimensioning, reduction and enlargement of drawings on different scales,	
Simple Geometrical Constructions	2 Sheets
Orthographic Projections: Projection of Points and Lines	1 Sheet
Projection of Planes	1 Sheet
Projection of Solids	2 Sheets
Section of solids	1 Sheet
Development of Surfaces of Solids	1 Sheet
Interpenetrations of Solids	2 Sheets
Model making	

**Suggested Books:**

1. Engineering Drawing – Plane and Solid Geometry , N.D. Bhatt and V.M Panehal, Charotar Pub. House.
2. Perspective, Projections and Design: Technologies of Architectural Representation, M. Carpo, Routledge.
3. Architectural Graphics, F.D.K. Ching, John Wiley
4. Architectural Design Graphics, M. Ciriello, McGraw-Hill.

**Subject: BASIC DESIGN(Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 6**

**Basic Design, Visual Perception and Expression Skills, Human Dimension**

Understanding Design and its relationship to Architectural Design.

Visual perception and abstraction: Visual properties and principles of 2D compositions, line and plane, figure ground relationships. Perception and principles of 3D compositions, perception of form, space, and its relationship to light, ordering and organizing principles, compositions of walls and columns and resulting space, understanding scale, form and formal transformations.

Anthropometry: Anthropometry and human activities. Study of activity patterns and the relationship to time and season. Function, storage and circulation

**Subject: FREEHAND DRAWING(Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Techniques of drawing lines of various gradations and inclinations

Finding Visual proportions and principles of perspective

Free-hand drawing of simple objects in single and group formation

Free-hand drawing of simple furniture

Outdoor sketching of natural objects/ buildings/ any relevant structure, etc. Study on shades and shadows, on contrasts of light and on textures.

**Suggested Books:** 1. Rendering with pen and ink by Robert Gill



**Subject: WORKSHOP PRACTICE (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

**Carpentry and Fitter Shop**

Introduction to types of Indian woods used for engineering purposes and carpenter's tools; use of wood working machines; making of selected joinery.  
Introduction to fitter's tools, gauges, measuring instruments etc.; marking of jobs; fitter's job involving chipping, filing, sawing, drilling; use of taps and dies; pipe fittings and plumbing.

**First Year Second Semester**

**Subject: MATERIALS & METHODS OF CONSTRUCTION II (Theory); 3 Credits  
Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,  
Internal Assessment: Class Test: 30**

**Ferrous Metals- Iron & Steel**

Introduction, Structures of Ferrous Metal, Iron, Pig Iron, Cast Iron, Wrought Iron, Steel, Rolled Steel Sections, Reinforcing Steel Bars, Rusting and Corrosion, Tensile Testing of Steel Sections (IS: 1608), Alloy Steel

**Non-Ferrous Metals**

Introduction, Aluminium, Copper, Zinc, Lead, Tin, Nickel, Titanium, Process of metallic Corrosion, Characteristics, Properties, Uses.

**Concrete**

Conventional Concrete, Classification, Production, Water-cement Ratio, Gel-space Ratio, Strength of Concrete, Workability, Durability, Defects, Physical Properties, Proportioning, OPC, PPC and PSC cements, Admixtures for Concrete

Non - Conventional Concrete, Precast, Ferrocement, Reinforced Cement Concrete, Prestressed Concrete, Polymer Concrete, Fibre Reinforced Concrete, Light Weight Concrete, High Strength Concrete, Shrinkage Compensating Concrete, Heavyweight Concrete, Roller Compacted Concrete, Ready Mixed Concrete (RMC), Self-compacting Concrete, Shotcrete, High-performance Concrete, Bacterial Concrete,

**Protective and Decorative coatings**

Introduction, Composition of Oil Paint, Characteristics of an Ideal Paint, Preparation of Paint, Covering Power of Paints, Pigment Volume Concentration (P.V.C.), Painting Plastered Surfaces, Painting Wood Surfaces, Painting Metal Surfaces, Defects, Enamel, Distemper, Water Wash and Colour Wash, Varnish, French Polish, Wax Polish, Miscellaneous Paints

**Tar, Bitumen and Asphalt**

Introduction, Bitumen, Tar, Pitch, Asphalt, Applications of Bituminous Materials, Characteristics, Properties, Uses, Types.

**Miscellaneous Materials**

Adhesives, Asbestos, Linoleum, Thermocol, Heat Insulating Materials, Sound Insulating Materials, Water Proofing Materials, Fiber, Geosynthetics, Sand Lime Brick (IS:4139, Smart Materials, Composite Materials.

Green Building Materials, Building Materials Industry and Pollution/ Standardization in construction industry.

**Suggested Books: Same as Materials & Methods of Construction I (Theory)**



**Subject: HUMANITIES (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 4,**

**Internal Assessment: Class Test: 30**

**English**

1. Basic writing skills
2. Report, Review, Covering Letter & Curriculum-Vitae writing
3. Reading and Comprehension
4. Selected Short Stories
5. Basic Communication Skills

**Sociology**

1. Sociology: Nature and scope of Sociology - Sociology and other Social Sciences - Sociological Perspectives and explanation of Social issues
2. Society and Technology: Impact of Technology on the Society - A case study
3. Social Stratification: Systems of Social Stratification - determinants of Social Stratification - Functionalist, Conflict and Elitist perspectives on Social Stratification
4. Work: Meaning and experience of work: Postindustrial society- Post-Fordism and the Flexible Firm
5. Development - Conceptions of and approaches to development - The Roles of State and the Market in the Development
6. Globalization: The concept of globalization – McDonaldization.
7. Interaction: Symbolic interaction, Garfinkel's Dramaturgy
8. Introduction to Urban Sociology

**Subject: STRUCTURAL MECHANICS II (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Stress, Strain and Elasticity; Stress-strain curves; Factor of Safety; Working stresses' problems of direct stress and strain; Thermal stress Poisson's ratio; Elastic constants, simple theory of bending of beams. B.M. and S.F. diagrams; Bending stresses, Shear stresses in beams; Moment of resistance. Tutorial Problems with application shall be worked out.

**Suggested Books:**

1. Strength of Materials, 3e Vol. I : Elementary Theory and Problems, S. Timoshenko, CBS Publishers & Distributors; 3rd edition
2. Fundamentals of Structural Mechanics and Analysis, M.L. Gambhir , Phi Learning Pvt. Ltd-New Delhi
3. Strength of Materials, R. Subramanian, Oxford University Press.
4. Mechanics of Material, R.C.Hibbler, Pearson Education, 6th Ed.
5. Structural Analysis, R.C.Hibbler, Pearson Education, 6th Ed.
6. Theory of Structures (Vol-I), Pandit,Gupta, Gupta, Tata McGraw-Hill Pvt Ltd.
7. Strength of Materials 2/e , Debabrata Nag, Abhijit Chanda , Wiley India Pvt Ltd

**Subject: MATHEMATICS II(Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Determinants; definition and properties, Cramer's Rule. Matrix and Multiplication of matrices; Inverse of a matrix; solution of linear equations by matrix method, Mathematical Optimization (Basic concept - with working examples from Linear Programming).Some properties of plane



curves; Tangent and Normal, Curvature, Asymptotes; Conic sections, Catenary, Geometry of three dimensions: Cartesian Coordinates. Curves represented by mathematical functions; Three dimensions in, direction cosines, planes and straight lines; standard equations of sphere, cylinder, cone, ellipsoid, hyperboloid of one and two sheets, hyperbolic paraboloid and their properties

**Subject: MATERIALS & METHODS OF CONSTRUCTION II (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Detail drawings for Ferrous Metals- Iron & Steel –Manufacturer's detail  
Detail drawings for Non Ferrous Metals- Aluminium & Copper – Manufacturer's detail  
Detail drawings for Concrete - Non-conventional Concrete Structures - Typical Strip Sections  
Conventional Concrete Structures -Typical Strip Sections

**Suggested Books: Same as Materials & Methods of Construction I (Theory)**

**Subject: ARCHITECTURAL GRAPHICS II (Sessional); 6 Credits,  
Full Marks – 100, Contact Periods/week: 6**

**Isometric and Axonometric Views:** Solids, compositions and buildings, **Perspective Drawing:** Definition of perspective technique (picture plane, stationary point etc.) and their role in drawing perspectives, **One point, two point and three point perspectives** of geometrical shapes leading to perspectives of built forms, **Sciography: Study of shades and shadows** cast by simple architectural forms on plain and curve surfaces.

Isometric and Axonometric Views: Solids, compositions and buildings 2 Sheets  
Perspective Drawing: Definition of perspective technique (picture plane, stationary point etc.) and their role in drawing perspectives, One point, two point and three point perspectives of geometrical shapes leading to perspectives of built forms 5 Sheets  
Sciography: Study of shades and shadows cast by simple architectural forms on different surfaces. 3 Sheets

Model making

**Suggested Books: Same as Architectural Graphics I**

**Subject: ARCHITECTURAL DESIGN I (Sessional); 6 Credits,  
Full Marks – 100, Contact Periods/week: 9**

**Activity Space Form Structure Correlation**

Design of spaces with respect to activity, form and structure. Relationship to site, location, form, movement and circulation, as well as landscape.  
Design of dwellings and small structures like kiosks, canteen, guard rooms. Small institutions with emphasis on circulation, like exhibition galleries.

**Subject: EDUCATIONAL TOUR I (Sessional); 3 Credits,  
Full Marks – 100, Contact Days/Semester: 10 days**

The students will submit/present a report on measured drawing/photo-documentation study of Indian architecture, traditional and contemporary, conducted during the educational tour spanning 10 days





# **DETAILED SYLLABUS**

## **Second Year**



### Second Year First Semester

**Subject: ARCHITECTURAL CONSTRUCTION I; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

**Foundations:** Purpose; Essential requirements; Settlement; Classification – Shallow (Wall footings, Inverted arch foundation, Isolated footings, Combined footing, Strip footing, Cantilever footing, Mat or raft foundation) Deep: (Pile foundation, Pier foundation)

**Floors:** Timber Floor; Jack arch floor; RCC Floor - Slab (one-way, two-way & cantilever), Beam & slab, Flat Slab, Ribbed floor; Pre-cast concrete floors; Steel Floor with joist and deck-plate.

**Partition Walls:**

Uses and construction details

**Wall Openings:** Corbels, Lintels and Arches; Typical detail of a masonry window opening showing sill, lintel & chajja projection; Lintel types by construction methods: Brick lintel, RCC lintel (precast and cast-in-situ); Typical details of an arch opening with nomenclature; Types of Arches - Semi-circular, Segmental, Flat, Relieving arch etc.

**Roofs:** Nomenclature, Types – Flat roof, Lean-to-roof, Coupled roof, Closed couple roof, King Post Roof Truss, Queen Post Roof Truss, Steel trusses; Roofing materials with fixing details; Roof drainage systems and details.

**Roofing Materials:** Burnt clay tiles, slates, AC sheets, GI and Aluminium sheets. Materials for Terracing: Mud- phaska and Brick Tiles and other new systems for terracing.

#### **Suggested Books:**

1. Building Materials - S.K Duggal
2. Engineering Materials, Surendra Singh
3. Building Construction & Materials (Gurcharan Singh)
4. Building Materials & Components (CBRI, Roorkee)
5. Building Construction-Sushil Kumar
6. Building Materials & Construction, Punmia
7. Construction Technology, R. Chudley, Vol-1,2,3,4
8. The Construction of Building, Barry
9. Building Construction, J.K McKay, Vol-1-5
10. Building Materials in India: 50 yrs – BMTPC

**Subject: EVOLUTION OF ARCHITECTURE I; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

#### **Introduction to the subject and its significance**

**Primitive Beginnings:** Introduction to history and architecture with special emphasis on stone age to Neolithic settlements in Europe and around with examples from Carnac and Stonehenge.

**Birth of Civilization:** In reference to the Asia-minor region with nascent cities like Jericho, Catalhoyuk, and Hattasus etc.

**Indus Valley civilization:** Particularly in reference to the town planning principles exemplified with examples from Mohenjo-Daro and Harappa.

**The Aryan civilization:** With its emphasis on the Vedic town plan, its motifs and patterns.

**Buddhist Architecture:** In specific reference to the lats, edicts, stupas, viharas, and chaityas, both in rock-cut or otherwise.



**Hindu Architecture-Indo Aryan:** With special attention to the evolution of the temple form, the shikhara in north India. Reference also to be made to the three schools of architecture - the Gujarat, the Khajuraho, and the Orissan styles.

**Hindu Architecture-Dravidian:** Particularly in reference to the evolution of the vimana and the contributions of the Chalukyas, the Pallavas, the Pandyas and Cholas as well as the contributions of the Nayaks to the temple cities.

**Jain Architecture:** With specific reference to the temple cities of Palitana and Girnar.

**Islamic Architecture:** Introduction and understanding of 'Islam's' philosophy and its interpretation in building type e.g. mosque, tomb, fort and their elements like domes, minarets, arch, squinch etc.

**The Sultanate Style:** With reference to the Slave, Khalji, Tughlaq, Sayyid, Lodhis and Shershah Suri regimes (who ruled from Delhi) and their architecture.

**Provincial Architecture:** Development of colloquial styles in various provinces of India like Punjab, Jaunpur, Gujrat, Bengal, Bijapur, Bidar and Deccan.

**Cities and Citadels:** Morphology of fortified cities of Jaisalmer, fort/ palaces like Mandu, Chittorgarh, Orchha, Datia, Jodhpur etc. with an overview on architectural types like havelis, stepwells, gates, baradaris etc.

**Mughal Architecture:** The architecture of the Timurids in India- Babur, Humayun, Akbar, Jahangir and Shahjahan.

**The Later Moghuls:** The Oudh architecture in Lucknow and its surroundings briefly outlining the Lucknow city.

**Colonial Architecture:** The British architecture of the colonial days in India- Calcutta and the capitol at Delhi emphasizing on their planning criteria and architectural features.

#### **Suggested Books:**

1. Indian Architecture Vol. 1 (Buddhist & Hindu), Percy Brown, D.B. Taraporevala Sons & Co. Pvt. Ltd
2. Indian Architecture Vol. 2 (Islamic Period), Percy Brown, D.B. Taraporevala Sons & Co. Pvt. Ltd.
3. Islamic Architecture in India, Satish Grover, Galgotia Publishing Company, New Delhi
4. Buddhist and Hindu Architecture in India, Satish Grover, CBS
5. The Great Ages of World Architecture, G. H. Hiraskar, Dhanpat Rai

**Subject: THEORY OF ARCHITECTURE I; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

A brief overview of Greek and Roman styles of architecture with emphasis on understanding of characteristic features of Parthenon in Athens and Pantheon in Rome; A brief overview of various styles of architecture during centuries; Definition of Theory of Architecture; Definition of Architecture and Architectural Design; Definition of Space; Study on Space as protagonist of Architecture; Internal and external spaces related to Architecture; Study on Scale and Proportion in Architecture with note on Golden Section and Fibonacci Series; The methods of Representation of Space; Study on Form in Architecture with respect to Envelop and Plan, Study on Geometry in Plan; Study on effect of climate on general Form; Study on Lines – Axis, Focal Point, Direction; Classification of buildings as per Functions; Study on Solid and Void in Architecture; Study on Colour Plane and effect of Colour on Architecture and People;

#### **Suggested Books:**

1. Arch form space & Order, Francis DK Ching, Wiley, 1996.
2. Experiencing Architecture, Steen Eiler Rasmussen, The MIT Press.
3. Architecture as Space, Bruno Zevi, Horizon Press, New York.



4. Elements of Architecture, M von Piere, Routledge, 1990.
5. Building construction illustrated, Francis D.K Ching, Van Nostrand Reinhold, 1991.
6. Notes of synthesis of form, C. Alexander, Harvard, 1974,
7. People & buildings, R. Gulman, Transaction Pub, 2009.

**Subject: CLIMATE & ARCHITECTURE; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Necessity of study of climatology in architecture. Global climatic factors, Elements of climate, Classification of tropical climates, site climate.

Concept of Thermal Comfort; different factors determining thermal comfort of human being in a built environment, Thermal comfort indices, bioclimatic chart –comfort range, effective temperature and its use; Thermal conductivity of building materials and its impact in thermal comfort, thermal quantities, heat exchange on buildings, Periodic heat flow.

Effect of Sun in architecture; orientation of Sun: azimuth and altitude; mathematical equations to determine azimuth and altitude of Sun from latitude of a location, date & time; study and method of drawing sun path diagram; study of shading devices in buildings; Solar radiation & heat gain.

Means of thermal control; Mechanical controls, heating, ventilation and cooling; Structural control, methods of solar control; Ventilation and air movement.

Effects of rain, wind and other climatic and environmental conditions on various building materials and built environment and the science of design for creating effective human comfort conditions; Study of airflow: global and regional, in and around city and buildings.

Light and lighting, lighting principles, illumination, visual efficiency daylighting, the design sky concept, daylighting in the tropics, artificial lighting.

Climatic zones of India, Impact of various climatic elements in different regions of our country in building design, Solar passive architecture, Introduction to Sustainability in architecture.

Tutorials on Drawing sun path diagram and utilizing it for design of buildings and shading devices; design for natural ventilation in buildings, Study/documentation of buildings giving due consideration to the impact of various climatic elements such as sun, airflow, precipitation etc. in different climatic regions of the country, with special emphasis on the climate of Bengal, Study and Documentation on the latest developments in the field of climate and architecture; materials and methods, technology, research, fieldwork. Understanding of Climate and its impact on architectural design, fundamentals of climatology and environmental studies.

**Suggested Books:**

1. Manual of Tropical Housing and Buildings, O.H. Koenigsberger
2. Housing, Climate and Comfort, Martin Evans
3. Building in the Tropics, Maxwell Fry
4. Climate Responsive Architecture, Arvind Kishan, Baker & Szokolay
5. An introduction to Building Physics, Narashimhan

**Subject: THEORY OF STRUCTURES I; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Principal stress, shear stress, normal stress, conjugate stress, Mohr diagram, Deflection of determinate beams: Area moment Theorem, Principle of superposition;



Analysis of indeterminate beams: Propped cantilever, Fixed and continuous beams, Columns and struts: Short columns with eccentric loading (small eccentricity), Euler's theory of long columns, Empirical formulas for design of columns.

**Suggested Books:**

1. Theory of Structures, S. P. Timoshenko - D. H. Young
2. Fundamentals of Structural Mechanics and Analysis, M.L. Gambhir, Phi Learning Pvt. Ltd-New Delhi
3. Structural Analysis, T. S. Thandavamoorthy, Oxford University Press.
4. Strength of Materials, R. Subramanian, Oxford University Press.
5. Mechanics of Material, R.C.Hibbler, Pearson Education, 6th Ed.
6. Structural Analysis, R.C.Hibbler, Pearson Education, 6th Ed.
7. Theory of Structures (Vol-I), Pandit,Gupta, Gupta, Tata McGraw-Hill Pvt Ltd.
8. Theory of Structures (SI Units) (English) 12th Edition (Paperback), Dr. B. C. Punmia Ashok Kr. Jain, Arun Kr. Jain, Laxmi Pub.

**Subject: SURVEYING; 3 Credits,**

**Semester Examination: Time: 3 hrs. Full Marks – 100, Contact Periods/week: 3**

**Internal Assessment: Class Test: 30**

Introduction to surveying: Fundamental Definitions, Errors and Accuracy; Linear & angular measurement and corrections; Traversing: Principles and Adjustments of Traverse; Plane table surveying; Leveling: Ordinary, Reciprocal, Contouring; Area and volume measurements, Mass diagram; Introduction to Theodolite surveying.

**Suggested Books:**

1. Surveying & Levelling, 2nd Edition, Basak, McGraw Hill Education
2. Surveying and Levelling (English) 2nd Edition, R. Subramanian, Oxford Univ Pr
3. A Text Book of Surveying and Levelling (English) 11th Edition, R. Agor, Khanna Publishers-Delhi
4. Surveying and Leveling, S. V. Kulkarni, T. P. Kanetkar, Vidyanthi Griha Prakashan
5. Surveying: Vol- I, Dr. B.C. Punamia, A.K.Jain, A.K.Jain, Laxmi Publications
6. Textbook Of Surveying, Rao, P. Venugopala, Akella, Vijayalakshmi, Prentice Hall India

**Subject: ARCHITECTURAL CONSTRUCTION I (Sessional); 3 Credits,**

**Full Marks – 100, Contact Periods/week: 3**

Detailed drawings for different types of Foundations, Floors, Partition Walls, Wall Openings, Roofs, Roof Coverings.

**Suggested Books: Same as Architectural Construction I**

**Subject: ARCHITECTURAL DESIGN IIA (Sessional); 6 Credits,**

**Full Marks – 100, Contact Periods/week: 9**

**Space Structure Correlation**

Role of structure and construction to create space, structural systems as choices based on activity or function, space and form character. Study of different structural systems, correlation between site, function, form, space and structure. Understanding role of light and view. Study and documentation of cluster rural houses to understand relationship of space, form, structure, and construction.

Design of small buildings or small group of buildings of not more than 2 floors preferably in rural neighborhoods such as junior schools, community centers, neighborhood hospitals.



**Subject: COMPUTER AIDED DELINEATION (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Elements of Graphics and Visualization

Basics of two- and three-dimensional computer graphics systems: Computer aided drawing and 3-D modeling and rendering, and selected graphics software APIs.

Introduction to graphics softwares; Short tutorials and exercises in scene depiction; Suitably rendered sectional perspective/s or other orthographies of an architectural design problem set by instructor.

Other topics may include interactive graphics, animation, graphical user interfaces, and the graphical presentation of information.

### Second Year Second Semester

**Subject: ARCHITECTURAL CONSTRUCTION II; 3 Credits,  
Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,  
Internal Assessment: Class Test: 30**

**Water Proofing Treatments** - Flat Roofs & Terraces, Parapet Wall (Details of Coping and Drip course), Window Sill & Chajja (Detail of Drip course)

**Conventional Doors:** Types of doors based on operation - Swing door, Revolving door, Sliding door, Sliding-folding door, Collapsible door, Rolling shutter door; Timber doors – Battened, Panelled & glazed door – Flush door; Steel doors – Collapsible door, Rolling shutter; Aluminium doors: Swing door – Sliding door; PVC/UPVC door; Fire door.

**Conventional Windows:** Types of windows based operation and Location – Fixed window, Casement window, Sliding window, Pivoted window, Louvered (or Venetian) window, Bay window, Clerestory window, Corner window – Gable and Dormer window. Timber windows – Panelled & glazed timber casement window; Steel windows – Glazed fixed & casement steel window; Aluminium windows – Casement and Sliding aluminium window; PVC window

**Hardware:** Fixing and fastening for doors and windows – Nails, Screws, Hinges, Bolts, Rivets, and Handles etc.

**Stairs:** Components and requirements; Classification based on form, structural systems, materials; Typical construction details such as balustrade fixing, nosing, etc.

#### **Suggested Books:**

1. Building Materials - S.K Duggal
2. Engineering Materials, Surendra Singh
3. Building Construction & Materials (Gurcharan Singh)
4. Building Materials & Components (CBRI, Roorkee)
5. Building Construction-Sushil Kumar
6. Building Materials & Construction, Punmia
7. Construction Technology, R. Chudley, Vol-1,2,3,4
8. The Construction of Building, Barry
9. Building Construction, J.K McKay, Vol-1-5
10. Building Materials in India: 50 yrs – BMTPC
11. Building Material, R.C. Smith



**Subject: EVOLUTION OF ARCHITECTURE II; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

**Egyptian:** Particularly in reference to early tomb architecture & later temple architecture with examples - Great pyramids of Cheops, Mastabas, Funery temples & later temples like Khons etc.

**Mesopotamian:** With special attention to cities of Mesopotomian like Ninveh, Khorsahbad, Marie, Babylon, and architectural constructs like Ziggurat.

**Aegean:** With reference to cities in Aegean like Troy, Sparta, Mycenae, which formed the basis of Greek civilization.

**Greek Architecture:** Classical orders as constituent element of Architecture. Column Orders and the articulation of temples. Classification of temples. Geometry and symmetry of individual buildings and their relationship with others based on different organizing principles and conditions of site. Study of important acropolis, agora, temples, theatres, tombs and house forms.

**Roman Architecture:** Multiple building types to correspond the complex social functions and structure. Complex axial organizations of Forums. Concrete and construction of walls, vaults and domes. Use of Classical Orders in surface articulation. Study of important forums, temples, basilicas, thermaes, theatres, amphitheatres, circuses, tombs, triumphal arches, palaces, houses and villas

**Suggested Books:**

1. The Great Ages of World Architecture , G. H. Hiraskar, Dhanpat Rai
2. A World History of Architecture, Marian Moffett, Michael Fazio & Lawrence Wodehouse, McGraw-Hill
3. A History of Architecture, Sir Banister Fletcher, Butterworth Heinemann, CBS Publishers & Distributors
4. The Story of Architecture From Antiquity to the present, Jan GympelKonemann
5. Puzzle of Architecture, Robin Boyd, Melbourne Architectural Press

**Subject: THEORY OF ARCHITECTURE II; 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Study on Aesthetics in Architecture including a sense of Rhyme and Pattern, Rhythm, Balance and Harmony; Perception of Architecture emphasizing qualities that characterize Architecture; Art and Science issues related to Architecture; Architect's Creative Faculties; Architectural Design – Approach and Procedure; Relationship of Space, Geometry, Function, Form, Texture, Colour and Climate factors in totality in Architectural Design; Structure in Architecture – various types and systems, forces, limitations and possibilities; A brief overview on Earthquake Resistant Structure; A study on Basic Building Services; Analysis of Human factors – Anthropometry and Ergonomics; Study on Barrier-Free Design; Design Guidelines for Natural Ventilation;

**Suggested Books:–**

1. Notes of synthesis of form, C. Alexander, Harvard, 1974.
2. The pattern language, C.Alexander, Oxford Univ. Press, 1977.
3. Building construction illustrated, Francis, D.K. Ching, Van-Nostrand-Reinhold, 1991.
4. People & buildings, R. Guiman, Transaction Pub, 2009.
5. Architecture for People, Byron Mikellides (Edited by),Harber, G.M., Thomas O. Blank & Group (Ed). 1992.
6. Building Design for Handicapped and Aged Persons. McGraw-Hill, Inc. New York, USA.
7. Low-Energy Cooling, Donald W. Abrahams.



**Subject: STRUCTURE FOR ARCHITECTS; 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

Study of new structural systems with emphasis on limitation and scope of these systems - multistoried R.C.C and steel buildings, pre-stressing, shells, folded plate, space frame, suspension structures. Emphasis will be given to the structural philosophy and not on the rigorous calculation. Models of structural form.

**Suggested Books:**

1. Structure for Architects, Salvadori & Heller
2. Shell Structures, Felix Candela
3. Tensile Structures, Frei Otto

**Subject: THEORY OF STRUCTURES II; 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

Strain Energy: Castigliano's theorems, Analysis of indeterminate structures by use of energy principle and moment distribution method; Effect of wind and earthquake on framed structures; Portal and Cantilever method for analysis of frames under wind and earthquake forces.

**Suggested Books:**

1. Theory of Structures, S. P. Timoshenko - D. H. Young Structural Analysis, T. S. Thandavamoorthy , Oxford University Press.
2. Structural Analysis, R.C.Hibbler, Pearson Education, 6th Ed.
3. Theory of Structures (Vol-I & II), Pandit, Gupta, Gupta, Tata McGraw-Hill Pvt Ltd.
4. Intermediate Structural Analysis, Chu-Kia Wang , TBS
5. Theory Of Structures (SI Units) (English) 12th Edition (Paperback), Dr. B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, Laxmi Pub.

**Subject: ARCHITECTURAL CONSTRUCTION II (Sessional); 3 Credits,**  
**Full Marks – 100, Contact Periods/week: 3**

Detailed drawings for different types of Doors,  
Detailed drawings for different types of Windows,  
Detailed drawings for different types of Hardware,  
Detailed drawings for different types of Staircases

**Suggested Books: Same as Architectural Construction II**

**Subject: ARCHITECTURAL DESIGN IIB (Sessional); 6 Credits,**  
**Full Marks – 100, Contact Periods/week: 9**

**Climate, Culture and Place dimensions of Space**

Relationship of culture, place, environment, on built form. Understanding the effect of sun, wind, temperature, rain, and its relationship to space and form. Correlation of structure and basic services in buildings. Understanding social and cultural behavior of people in a place. Design of a cluster of dwellings and small institutions such as market place, clubs, small neighborhood centers and theaters.





**Subject: SURVEY PRACTICAL (Sessional); 3 Credits,  
Full Marks – 100, Contact Days/Semester: 10 days**  
Field Work on theory taught in Surveying.

**Subject: FIELD WORK & STUDY II (Sessional); 3 Credits,  
Full Marks – 100, Contact Days/Semester: 10 days**

A study of Indian architecture both traditional and contemporary to be done during the educational tour and a precise report to be submitted. Thorough measured drawing of architecture/ architectural elements/ pieces to be done belonging to a particular style, period, influence, spatial appraisal, social or cultural importance etc. at least within seven days at a particular location of interest and should be submitted by each student.



# **DETAILED SYLLABUS**

## **Third Year**



### Third Year First Semester

**Subject: ARCHITECTURAL CONSTRUCTION III (Theory); 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

**Special Doors:** Definition, Characteristics, Uses, Types.  
**Special Windows:** Definition, Characteristics, Uses, Types.  
**Wall Panelling:** Definition, Characteristics, Uses, Types.  
**Curtain Walls:** Definition, Characteristics, Uses, Types.  
**Suspended Ceilings:** Definition, Characteristics, Uses, Types.  
**Special Structural System:** Definition, Characteristics, Uses, Types.

#### **Suggested Books:**

1. Building Materials - S.K Duggal
2. Engineering Materials, Surendra singh
3. Building Construction & Materials (Gurcharan Singh)
4. Building Materials & Components (CBRI, Roorkee)
5. Building Construction-Sushil Kumar
6. Building Materials & Construction, Punmia
7. Construction Technology, R. Chudley, Vol-1,2,3,4
8. The Construction of Building, Barry
9. Building Construction, J.K McKay, Vol-1-5
10. Building Materials in India: 50 yrs - BMTPC
11. Building Material, R.C. Smith

**Subject: SERVICES & EQUIPMENT I (Theory);3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

#### **Water Supply & Drainage**

Water supply, sources (surface and underground), Methods of lifting and storage and supply, Standard of potable water and methods of removal of impurities, Standard of requirement of water for daily uses. Simple principles of design for water supply, system for low as well as high buildings.

Equipment for water supply- pipes, pumps, tube well, reservoirs and cisterns for storage, different types of pipes and accessories, controlling fixtures like valves, taps, etc. receptacles like wash basins, sink bath- tubs, shower-trays, etc.

Drainage- Different types of drainage for rain water waste and soil, systems of collection carriage and disposal; simple graphical methods of determining sizes, jointing system of pipelines and fixtures. Equipment like- trap, yard outlines, man-holes, water closets, urinals, slop sinks, septic tanks, etc. Garbage disposal, incinerators, protective devices against insects, rodents, etc.

Minimizing pollution, Recycling processes. Fire fighting in buildings - regulations and requirements, different types- dry and wet risers, sprinkler system, chemicals.

Means of vertical transportation (mechanised) in a building- details of elevators and escalators- regulations and requirements.

#### **Suggested Books:**



1. Environmental Technologies in Architecture, Bertram York, Kinzey Jr. & Howard M. Sharp.
2. Textbook of Water Supply and Sanitary Engineering, S.K. Husian.
3. Plumbing, H. E. Babbitt.
4. Plumbing Technology, F. Hall.

**Subject: LANDSCAPE ARCHITECTURE I (Theory); 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

Introduction to the theory of landscape architecture; Landscape design principles; Landscape elements including natural- vegetation, water & landform and man-made – landscape shelters & outdoor furniture; landscape techniques, materials and methods. Site planning, grading, drainage, ecological and environmental concerns; Study of different historical landscape styles across the globe through different ages; Contemporary landscape design; Understanding ecological and sustainability issues in landscape including management of plant, water and soil resources, soil and water conservation, rain water harvesting; application in architectural design.

**Suggested Books:**

1. An Introduction to Landscape Architecture, Michael Laurie.
2. Landscape Architecture: A manual of site planning and design, John O. Simonds.
3. Landscape of man: Shaping the environment from pre-history to the present day, G. Jellicoe, and S. Jellicoe, 1979.
4. The Gardens of Mughal India: A history and a guide, Sylvia Crowe *et al.*
5. Landscape design with plants, ed. by Brian Clouston, 1977
6. Common Trees, H. Santapau, 1966.
7. Flowering Trees, M.S. Randhawa.

**Subject: EVOLUTION OF ARCHITECTURE III (Theory); 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

**Early Christian Architecture:** Development of early church from Roman basilica. The concept of center and path of Christianity manifested through centralized and longitudinal church. Interiority of churches and the articulation of interiors to create spiritualized space. Study of different basilica churches in Italy.

**Byzantine Architecture:** Centralization in Byzantine churches. Centrality and interiority of both cross-domed and cross in square planned church. Indistinct exterior of churches and the domed 'heavenly' interior. Construction of dome over polygonal compartments through the use of pendentives. Study of important churches in Constantinople.

**Romanesque Architecture:** Massiveness and verticality of medieval churches. Combination of the five towered structures and longitudinal basilica. Gradual integration of tower from early to later examples. Integration of centralized and longitudinal plans. Articulation of external wall like arcaded interiors resulting in dematerialization of exterior. Study of important cathedrals and churches from Italy and France.

**Gothic Architecture:** Continued integration of centralized and longitudinal plans. Spatial and formal integration of Romanesque churches. Integration of wall and vault. Ribbed vault and the dissolution external wall to allow light. Sensitivity to light and use of stained glass for mysterious interiors. Need and development of different external buttressing. Study of important cathedrals and churches in France.



**Renaissance Architecture:** Break with medieval churches for sources from Roman antiquity. Spatial centralization through simple addition of independent spatial elements. Use of elementary geometrical forms unified through symmetry and simple mathematical ratios. Reintroduction of anthropomorphic Classical Orders. Study of palazzos and development of centralized church form through specific examples from Italy.

**Mannerism:** Conflict and tension in Mannerism in place of harmony and order of Renaissance. Dynamic interplay of contrasting elements as against static addition of independent units of Renaissance church. Interplay between manmade and nature in villas. Dynamism of urban spaces. Centralized longitudinal and the elongated central church plans. Study of important villas, churches and urban spaces in Italy.

**Baroque Architecture:** Dynamism and systemization of Baroque architecture. Vitality and spatial richness with underlying systematic organization. Space as constituent element of architecture, as a complex totality and indivisible figure, comprising of interacting spatial elements based on inner and outer forces. Sensitivity to effects of texture, color, light and water. Study of important urban spaces and churches in Italy and Germany.

**Suggested Books:**

1. A History of Architecture, Sir Banister Fletcher, Butterworth Heinemann, CBS Publishers & Distributors
2. The Great Ages of World Architecture, G. H. Hiraskar, Dhanpat Rai
3. A History of Architecture, Kostof, Spiro.
4. A World History of Architecture, Marian Moffett, Michael Fazio & Lawrence Wodehouse, McGraw-Hill
5. Crash course in Architecture, Eva Howarth, Caxton Editions.
6. Puzzle of Architecture, Robin Boyd, Melbourne Architectural Press
7. Architecture Highlights!, Adams Hubertus and Paul Jochen, Dumont monte
8. Architecture of Today, Andreas Papadakis & James Steele, Terrail
9. At the end of the century: One hundred years of Architecture, Edited by Russel Ferguson, The Museum of Contemporary Art, Los Angeles, Harry N. Abrams Inc., Publishers
10. The Story of Architecture From Antiquity to the present, Jan Gypfel, Konemann

**Subject: DESIGN OF STRUCTURES I(Theory);3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Theory of reinforced concrete, properties and assumptions; Tests for measuring workability and strength of concrete; Design of singly reinforced rectangular and T-beams; Slabs spanning in one direction. Design of R.C. columns subjected to axial loads only.

Design of members and joints of M.S. truss with riveted joints and welded joints.

Design of laterally restrained steel beams with R.S.J.; Design of columns subjected to axial load only using R.S.J.; Design of slab-base.

**Suggested Books:**

1. Fundamentals of Reinforced Concrete Design, M.L. Gambhir, Phi Learning Pvt. Ltd-New Delhi
2. Reinforced Concrete Design 3/E (English) 3rd Edition S. Pillai, Devdas Menon, McGraw Hill Education
3. Limit State Design of Reinforced Concrete, 2/E (English) 2nd Edition, P. C. Varghese, Phi Learning
4. Limit State Design of Reinforced Concrete (English) 1st Edition, Punmia B C, Laxmi Publications-New Delhi
5. Limit State Design of Steel Structures (English) 2nd Edition, S. K. Duggal, McGraw Hill Education
6. Design of Steel Structures [With CDROM] (English) 1st Edition, N. Subramanian, Oxford University Press, USA



**Subject: ARCHITECTURAL CONSTRUCTION III (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Detailed drawings for different types of Special Doors, Special Windows, Wall Paneling, Curtain Wall, Suspended Ceiling and Special Structural Systems.

**Suggested Books: Same as Architectural Construction III**

**Subject: ARCHITECTURAL SERVICES I (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Large scale plan, section, elevation of attached and detached type of lavatories and Kitchens, Sculleries etc. showing fixtures and connections of water supply drainage and sewage disposal. Layout drawing for sewage and storm water drainage etc. rain water disposal system for roof terraces etc.

Drawing of Lift, Lift well and Lift machine room; Escalator with necessary details.

Drawings related to building automation, preparation of flow charts, detailing and systems involved.

**Suggested Books: Same as Services & Equipment I**

**Subject: ARCHITECTURAL DESIGN IIIA (Sessional); 6 Credits,  
Full Marks – 100, Contact Periods/week: 9**

**Structure Construction and Services. Emphasis on Landscape**

Attention to program, land-building relationships, environmental concerns. Integration of space, structure, materials, construction and services. Proportions and proportional systems. Emphasis on landscape.

Design of schools, hostels, clubhouses, guesthouses, and small hotels.

**Subject: INTERIOR DESIGN (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Elements of Interior Design, Colour and Colour Theory, Evolution of furniture, Furnishings, Fittings and Fixtures, Construction Materials, Plant materials, Illumination, Co-ordination and implementation drawings

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### **Third Year Second Semester**

**Subject: SERVICES & EQUIPMENT II (Theory); 3 Credits  
Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,  
Internal Assessment: Class Test: 30**



Ventilation- Natural and Forced or mechanical, standard of requirement quantity, and velocity for different conditions of living and works, principles of natural ventilation and simple methods of induced or forced ventilation.

Airconditioning - Control of quality, quantity, temperature and humidity, conditions for comfort, principles refrigeration and its commercial application in air-conditioning.

Psychrometry: the properties of air and measurement, psychrometric terms, numerical problems on psychrometry, advanced psychrometric process

Simple calculations for finding cooling load, major equipment used, their characteristics and suitable place for location; consideration and reduction of heat gain and for economic layout for supply and return air ducts.

Mechanical equipment for vertical transport, recommended use for escalators and elevators; simple calculation to determine number if type of escalators and elevation sketch drawings showing the air-conditioning system of an auditorium, multi-storeyed hotel and office Buildings. Plan and section of elevators, machine room and escalators.

Various methods of building automation, general overview.

**Suggested Books:**

1. Principles of Air conditioning, V. Paul Lang.
2. Modern Air Conditioning Practice, Norman C. Harris & David F. Conde.
3. Refrigeration and Airconditioning, P.L. Ballaney.

**Subject: QUANTITY SURVEYING & SPECIFICATIONS (Theory);3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Standard method of measurement and unit, procedure of taking out quantities and estimating for all trades involved in construction of medium complexity, abstracting and preparation of bills of quantities. Different types of estimates, Estimate of buildings, Schedule of rates, Analysis of rates, Quantity survey of materials, Types of specification, Specifications of different materials and various items of work, Method of measurement of works, writing of measurement books.

**Suggested Books:**

1. Estimating, Costing, Specification & Valuation, M. Chakraborty.
2. Estimating & Costing, B. N. Dutta.
3. A textbook of Estimating and Costing, D.D Kohli and R.C Kohli.

**Subject: DESIGN OF STRUCTURES II (Theory);3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Design of doubly reinforced concrete beams, two way R.C. slabs, column sections subject to combined bending and thrust. Design of isolated and combined footing.

Design of laterally unrestrained beams, M.S. plated beams and compound columns. Design of eccentric connection in steel structures.

**Suggested Books: Same as Design of Structures I**

**Subject: EVOLUTION OF ARCHITECTURE IV (Theory);3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**



**Picturesque and Neo- classical architecture:** Purity and structural honesty of antiquity preferred over ornamentation and exaggeration of Baroque. Representation of ancient Roman monuments in imaginary compositions. Archeological purism and importance of pictorial values in historical settings. Recreation of antique Roman simplicity and splendor for modern living. Study of important palaces and public buildings in Britain and France.

**Enlightenment and beginnings of Modern:** Belief in creation of 'new' and 'ideal' world through return to fundamentals, 'true' and 'original' values. Romanticizing elementary geometrical forms with undecorated surfaces. Iron and glass construction for openness and lightness: Art Nouveau. Repetitive, Orthogonal, skeletal systems for horizontal and vertical expansion. Latter attempts to dissociate references to past styles.

**Modern Architecture:** Social intentions and search for ideal world. Pluralism in place of past unity of styles. Search for paradigms in historical sources: It return to fundamentals and origins in geometry, nature and paradigms of technology.

Expressions of construction and technology. Equating technology and progress with present. Functionalism and functional appropriateness. Thoughts and works of Frank Lloyd Wright, Walter Gropius, Le Corbusier, Mies van der Rohe, Alvar Aalto, Louis Kahn, Dutch De Stijl Italian futurists and Russian Constructivists.

International style: Oversimplification of the modern Movement into functional, steel and glass, cubes. Monotonous functionalist abstractions and Modernism as a style.

Disenchantment of modern cities and fall of modern Movement.

**Post Modern Architecture:** Post Modern Architecture as a revision of Modern architecture and resistance to functional containers of 60's. Objective, representational and emphasis on content. Pluralistic and differing trends.

**Post Modern – Historicism:** Rooted to place and history. Regards of expression: ornaments, symbolism and context with irony and humour, exemplified through the works of James Stirling, Michael Graves, Charles Moore, Arata Isozaki.

**Neo- Modern:** Disregard historical imaginary to recapture ideas for modern architecture of 20's. Hi-tech metal abstractions of Richard Rogers, Norman Foster, showing structure and equipment as implied ornament. References of Russian Constructivists. The early works of New York Five including later works of Richard Mier as complicated, exaggerated and sophisticated revival of the modern grid and Corbusier's geometry. Synthesis of Hi-Tech and Historicism in the works Aldo Rossi, Mario Botta, Cesar Pelli.

**Deconstructivist Architecture:** Narrative and representational. Sources in Russian Constructivism. Non perfection in the works of Frank Gehry, Peter Eisenman, Bernard Tschumi, Daniel Libeskind, questioning traditional purity of form, geometry and structure.

#### **Suggested Books:**

1. A History of Architecture, Sir Banister Fletcher, Butterworth Heinemann, CBS Publishers & Distributors
2. The Great Ages of World Architecture, G. H. Hiraskar, Dhanpat Rai
3. A History of Architecture, Kostof, Spiro.
4. A World History of Architecture, Marian Moffett, Michael Fazio & Lawrence Wodehouse, McGraw-Hill
5. Crash course in Architecture, Eva Howarth, Caxton Editions.
6. Puzzle of Architecture, Robin Boyd, Melbourne Architectural Press
7. The Language of Post-Modern Architecture, Charles Jenks, Academy Editions, London
8. Architecture Highlights!, Adams Hubertus and Paul Jochen, Dumont monte
9. Architecture of Today, Andreas Papadakis & James Steele, Terrail
10. At the end of the century: one hundred years of architecture, Edited by Russel Ferguson, The Museum of Contemporary Art, Los Angeles, Harry N. Abrams Inc., Publishers
11. The Story of Architecture From Antiquity to the present, Jan Gypmel, Konemann





**Subject: ARCHITECTURAL SERVICES II (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Location of air conditioning plant room, air handling unit rooms, systems of horizontal and vertical ducts layouts for conveying conditioned air, return air fresh air, chilled water and return water pipes.

**Subject: WORKING DRAWING (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 6**

Familiarizing with Building Bye-Laws of Local Development Authorities and National Building Codes. Interpretation of Bye-Laws applicable to small, Residences and Housings, as well as, small Commercial, Educational and Institutional Buildings.

Making Local Development/ Regulatory Authority drawings for a small residence or an institution designed in any of the previous semesters with desired modifications needed as per Local Authority or NBC guidelines.

Making complete set of Working Drawings and Details for the residence or institution presented earlier or any other small project designed in any of the previous semesters. The drawings to incorporate all services needed for construction along with schedules and specifications.

**Subject: ARCHITECTURAL DESIGN IIIB (Sessional); 6 Credits,  
Full Marks – 100, Contact Periods/week: 9**

**Design Development and Details. Emphasis on Interior Design**

Design development and detail, working drawing. Exposure to materials, products, construction principles. Integration of structure and services.

Design of small institutional projects to develop construction drawings and details.

**Subject: CIVIL ENGINEERING LAB (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Using civil engineering lab for various materials, their structural properties and tests involved. General discussion and guidelines to enrich the concept of structure and different materials involved.

Structural models and their analysis. Study and analysis of any specific problem related to architecture and structure.

**Subject: FIELD WORK & STUDY III (Sessional); 3 Credits,  
Full Marks – 100, Contact Days/Semester: 10 days**

a) A study of Indian architecture both traditional and contemporary to be done during the educational tour and a precise report to be submitted.

b) Thorough measured drawing of architecture/ architectural elements/ pieces to be done belonging to a particular style, period, influence, spatial appraisal, social or cultural importance etc. at least within seven days at a particular location of interest and should be submitted by each student.

# DETAILED SYLLABUS

## Fourth Year



### Fourth Year First Semester

**Subject: PRACTICAL TRAINING (Sessional); 18 Credits,  
Full Marks – 600**

The practical training of 24 weeks duration shall be carried out in the office of an experienced architect registered with the Council of Architecture or trained professional of the relevant field. The practical training shall be supervised and evaluated by the institution after completion of the training.

**Subject: TRAINING REPORT (Sessional); 6 Credits,  
Full Marks – 200**

At the end of the semester, each student would be required to submit a portfolio on the work done by him/her during the practical training and explain the lessons learnt.

**Subject: GENERAL SEMINAR (Sessional); 6 Credits,  
Full Marks – 200**

At the end of the semester, each student would be required to make a formal presentation on any approved topic of his/her research interest related to subjects taught in previous semesters including Practical Training.

### Fourth Year Second Semester

**Subject: SERVICES & EQUIPMENT III (Theory); 3 Credits  
Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,  
Internal Assessment: Class Test: 30**

#### **Illumination and domestic wiring**

Concepts of Light Source, Luminaire; Photometry, Colorimetry/Color science.

Introduction to Lighting Design, Design directives for illumination in interiors of commercial buildings, educational institutions, housing, gallery, marketplace, heritage building; Design directives for illumination in exterior spaces like roads, pathways, building facade; Miscellaneous standards and codes

Green building certification concept, building area method, space function method.

Introduction of Domestic Wiring/Electrical.

Power Distribution System for a particular project -Components of the substations, High tension voltage and low tension voltage gradation, concept of 3-phase and 1-phase, transformers, HT & LT distribution boards, its area coverage locations preferable locations with respect to the project. Domestic wiring systems (exposed and concealed) for small residence and high-rise buildings. development of SLD, protection against lightning, earthing.

#### **Suggested Books :**

1. Lighting in Architectural Design, D. Phillips.
2. Lighting: Interior & Exterior, Robert Bean.
3. Building Services, Peter R. Smith & Warren G. Julian.
4. Lighting in Architecture, W. Kohler.
5. Light, Colour, Environment, F. Birren.

**Subject: BUILDING MAINTENANCE & MANAGEMENT (Theory); 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

Causes of Damage and Decay in Buildings; Inspection of a Building – Methodology, Equipment and Format of Report; Various Methods of Assessment of damages; Building Foundation and its Problems; Damages in Walls and Method of Repair of Walls; Rising Dampness – Causes and Effects, Remedial Measures; Study on Roofs of Old and New Buildings; Causes of Deterioration of Plain and Reinforced Concrete; Problems in Timber; Remedial Measures for damage of Roof; Remedial Measures for damages of RCC Columns and Beams; Study on Maintenance, Conservation and Restoration of Architecture;

**Suggested Books:**

1. Building Maintenance Management, B. Chanter & P. Swallow, Wiley, 2008.
2. Maintenance and repair of buildings- 2nd Ed., P.K. Guha, New Central Book Agency, Kolkata, India, 2006.
3. Diagnosis and Assessment of Concrete Structures - State-of-Art Report, CEB (1989).
4. Concrete Repair and Maintenance Illustrated: Problem Analysis; Repair Strategy; Techniques, P.H. Erimons Kingston, MA: RS Mears, 2002.
5. Testing of Concrete in Structures – 4th edition, J.H Bungey, S.G. Millard, & M.G. Grantham, 2006. London: Taylor & Francis.

**Subject: INTRODUCTION TO HOUSING (Theory); 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

**Concepts and Definitions**

Shelter as a basic requirement, determinants of housing form, Census of India definitions, Introduction to policies, housing need, demand and supply, dilapidation, structural conditions, materials of constructions, housing age, occupancy rate, crowding, housing shortage, income and affordability, poverty and slums, houseless population. Various housing typologies viz. traditional houses, plotted development, group housing, multi-storied housing, villas, chawls, etc.

**Social and Economic Dimensions**

Housing as social security, role of housing in development of family and community well-being, status and prestige related to housing, safety, crime and insecurity, deprivation and social vulnerability, ghettoism, gender issues, housing for the elderly, Contribution of housing to micro and macro economy, contribution to national wealth and GDP, housing taxation, national budgets, fiscal concessions, forward and backward linkages.

**Housing and the City**

Understanding housing as an important land use component of city plan / master plan, considerations for carrying out city level housing studies, projections, land use provisions; Suitability of land for housing, housing stress identification, projecting housing requirements, calculating housing shortages, housing allocation.

**Housing Environments**

Slums and squatters, night shelters, public health issues related to housing, various theories of housing, concept of green housing, green rating of housing projects; basic services for housing neighborhoods. Approaches to neighborhood living in traditional and contemporary societies, elements of neighborhood structure, Planning and design criteria for modern neighborhoods, norms and criteria for area

distribution, housing and area planning standards, net residential density and gross residential density, development controls and building byelaws, UDPFI & URDPFI guidelines, NBC 2005 provisions and Case studies of neighborhood planning.



**Suggested Books:**

1. People and Housing in Third World Cities; D.J. Dwyer, Orient Longman, 1981.
2. Housing : a factual analysis , Glen H Beyer, The Macmillan Co, NY, 1958.
3. Man's Struggle for Shelter in an Urbanizing World, Charles Abrams, MIT, Harvard, 1964.
4. Urban Housing in the Third World, Geoffrey Payne, Routledge and Keegan Paul, USA, 1977.
5. Inside the Civano Project (Green Source Books): A Case Study of Large-Scale Sustainable Neighborhood Development, Al Nichols, Jason Laros, (McGraw-Hill's Green source Series) 2009 McGraw-Hill Professional.
6. Sustainable Urbanism: Urban Design with Nature, Douglas Farr, John Wiley & Sons, 2007.
7. Shelter in India – Sustainable Development Series, Aromar Revi, Stosius Inc / Advent Books Division, 1990
8. Eco housing Assessment criteria Version II, International Institute for Energy Conservation.

**Subject: INTRODUCTION TO URBAN DESIGN (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

History, Definitions, Objectives, Requirements.  
Comparison of Architecture, Urban Design & Urban Planning.  
Theories & Concepts – Historic & Modern.  
Present Scenario.  
Process, Parameters – Image & Characteristics.  
Scale, Types, Examples.

**Suggested Books:**

1. Urban Design. The Architecture of towns & cities- Paul D. Spreiregen, McGraw Hill
2. The Consise Town Scape, Gordon Cullen.
3. Town Design, Sir Frederick Gibberd
4. Design of cities, Edmond Bacon.
5. Image of the city, Kevin Lynch.
6. The City in history, Lewis Mumford.
7. Town Planning, S. C. Rangwala.
8. Urban Pattern, Arthur Gallion.

**Subject: INTRODUCTION TO URBAN & REGIONAL PLANNING (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

**Evolution of City Building**

Relevance of the study of evolution of settlements; Hunter, gatherer, farmer and formation of organized society; Cosmological and other influences, origins and growth of cities, effects of cultural influence on physical form; Human settlements as an expression of civilizations; Basic elements of the city; Concepts of space, time, scale of cities.

**Planning History**

Town planning in ancient India; Medieval, renaissance, industrial and post industrial cities; City as a living spatial entity; Concepts of landmark, axis, orientation; City form as a living space; City as a political statement: New Delhi, Chandigarh, Washington D.C. Brasilia etc; Contribution of individuals to city planning: Lewis Mumford, Patrick Geddes, Peter Hall, etc; Dynamics of the growing city, impact of industrialization and urbanization, metropolis and megalopolis.

**Definitions and Objectives of Planning**

Definitions of town and country planning; Orthodoxies of planning; Goal formulation, objective, scope, limitations; Sustainability and rationality in planning; Components of sustainable urban



and regional development.

### **Theories of City Development and Planning Theories**

Theories of city development including Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory and other latest theories; Land use and land value theory of William Alonso; Ebenezer Howard's Garden City Concept; and Green Belt Concept; City as an organism: a physical, social, economic and political entity; Emerging Concepts: global city, inclusive city, safe city, etc.; City of the future and future of the city; Shadow cities, divided cities; Models of planning: Advocacy and Pluralism in Planning; Systems approach to planning: rationalistic and incremental approaches, mixed scanning and middle range planning; Equity planning; Political Economy Model; Types of development plans, plan making process.

### **Suggested Books:**

1. Text Book of Town Planning, A. Bandyopadhyay, Arunabha Sen, Kolkata, India, 2010.
2. Ekistics: An Introduction to the Science of Human Settlements, C.A. Doxiadis, Hutchinson, London, 1968.
3. Housing and Urban Renewal, Andro D. Thomas, George Allen and Unwin, Sydney, 1986.
4. Urban Development Plans: Formulation & Implementation-Guidelines-1996, Ministry of Urban Affairs and Employment, Government of India, New Delhi.
5. Report of the National Commission on Urbanisation, Government of India, 1988.
6. Ministry of Urban Development, Government of India, New Delhi., 'URDPFI 2015
7. Urban pattern, Arthur Gallion.

**Subject: ARCHITECTURAL SERVICES III (Sessional); 3 Credits,**

**Full Marks – 100, Contact Periods/week: 3**

Design and layout Drawing of wiring and lighting system in a residence, working drawing (with symbols). A complete site drawing comprising of Electrical Portions such as transformer, switch, gear unit, distribution boards of panels, wiring system and switch boards.

Introduction to Renewable sources.

B.O.Q development comprising of server room detail (Communication cable/ cable management source), M.C.C., P.C.C., High tension and low tension panels, Cable tracing, Converter/ electrical board, brief introductions to the working of a generator.

**Subject: ARCHITECTURAL DESIGN IV (Sessional); 6 Credits,**

**Full Marks – 100, Contact Periods/week: 9**

### **Complex Structural Systems and Services. Emphasis on Interior Design**

Emphasis on complex structural systems and services, multistoried buildings with extensive vertical and horizontal circulation, plumbing and electrical services. Addressing local authority norms. Emphasis on design of interiors.

Design of multistoried office or commercial buildings, auditorium buildings and multiplexes, design of multistoried hotels and hospitals.

**Subject: LANDSCAPE ARCHITECTURE (Sessional); 3 Credits,**

**Full Marks – 100, Contact Periods/week: 3**

Study, analysis and critical appraisal of existing landscapes/ case-studies; landscape documentation, site planning exercises; landscape design of residential/institutional/commercial/recreational/public landscapes; study & identification of plant species; learning to inventorize landscape assets and plants through short assignments/projects/seminars and visit to botanical gardens/ agri-horticultural gardens/ nurseries.



**ELECTIVE I (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

**Subjects under Elective-I:**

**1. ADVANCED COMPUTER APPLICATION [non-graphic] (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Developing skills in non-graphic applications of computer as required for architectural profession and office management, such as word processing, spreadsheets, power point presentations, databases, etc.

General structure of electronic computers; concept of bit, byte and word.

Binary, octal, decimal, hexadecimal, BCD & floating point numbers;

Idea about machine language, assembly language, high level language, interpreter & compiler.

Digital electronics and Boolean Logic, Digital circuits, Analog digital interface.

Mention of programming language paradigms, Common examples like block (eg. C), object oriented, modular etc.

General introduction to C; structure of a C program; Data types, variables, operators, statements and functions in C; Standard input and output; Conditional statements and control structures;

Arrays; Functions, parameter passing; Pointers;

Introduction to advanced topics, Time complexity function  $O()$  of algorithms; Common data Structures; Graphs, AutoLisp.

**2. APPLICATION OF QUANTITATIVE METHODS IN ARCHITECTURE (Sessional): 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Architecture Design is a holistic and creative process, which must be supported by the analysis of corresponding data with the help of appropriate qualitative and quantitative methods. Definitions of qualitative and quantitative methods, Details of different qualitative methods (like, Delphi method, consumer market survey etc.) and quantitative methods (like, Regression analysis, Cluster analysis, Queuing theory, Analytical hierarchy process, etc.); Application of qualitative and quantitative methods in the process of architectural design

**3. ARCHITECTURAL CONSERVATION AND RESTORATION (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

To study the definition, history and theory of conservation, Philosophy of conservation, Values and Ethics, Cultural heritage, Conservation methods, Classifications, To study the conservation-principles defined in the Venice Charter and Burra Charter. Students have to study a historic building appropriate for conservation in context of the various conservation-values, study the architectural style and survey to prepare a floor plan layout, inspect its structural and physical condition and suggest the possible method of restoration, management of historic sites. Role of various organizations.

**4. DISASTER RESISTANT BUILDINGS (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Understanding risks, hazards and vulnerability; types of disaster; disaster zones of India, disaster preparedness and mitigation; Study of Factors causing disaster for buildings in all climate zones,



Study of building designs to resist earthquake, natural disasters like flood, cyclones, tornados and avalanche. Fire protection provisions in buildings, infrastructure provisions for flood mitigation. Post disaster problem resolutions.

**5. ENVIRONMENTAL SCIENCE (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

**Multidisciplinary nature of environmental studies** -Definition, scope and importance.

**Natural Resources** -Natural resources and associated problems.

**Renewable and non-renewable resources**- Forest resources, Water resources, Mineral resource, Food resource, Energy resources, Land resources, Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.

**Ecosystems** - Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the different ecosystems - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**Biodiversity and its conservation** Definition: genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity.

**Environmental Pollution** - Definition, Cause, effects and control measures of - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management, Role of an individual in prevention of pollution, Disaster management.

**Social Issues and the Environment** -Sustainable development, Urban problems related to energy, Water conservation, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation, Consumerism and waste products. Environment Protection Act, Issues involved in enforcement of environmental legislation, Public awareness.

**Human Population and the Environment** -Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health.

**✓ 6. GLASS ARCHITECTURE & DESIGN (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

**Glass – The building Material**

Evolution & importance of Glass in Modern Architecture, Applications of Glass in Buildings (façade/ interior applications), Understanding the Production & properties of Glass, Value additions - Coating Technology: Importance & necessity, Processing, Concepts on Tempering, Heat Strengthening, DGU, Laminated, Ceramic Fritting, Different Types of Glass: Mirror, Lacquered, Fire Resistant & Modern Glass with different applications; Glass for segments- Hospitals, Green Homes, Airports, Offices, Other buildings; Understanding Glass & Human safety Compliances; Role of Glass in Fire Safety Considerations: Class E, EI & EW, Role of Glass in Acoustics; International Standards & Codal Provisions Green Building Visit Green Building Visit report

**Glass and Green Architecture**





Building Physics: Theory of electromagnetic radiation, Understanding of internal & external reflections; Day-lighting in Buildings: Introduction & basic concepts (VLT), Solar Control and thermal Insulation(SF, UV, SHGC), Need for Green Buildings: Energy efficient buildings, Benefits of going green, Achieving energy efficiency using glass, Factors of energy efficient material selection: Performance parameters, Energy codes and Green ratings: ECBC, IGBC, GRIHA, Approaches of energy efficiency; Prescriptive method; Trade off method – Accommodating Passive architecture; Whole Building Simulation; Case study of Green Building Designed predominantly with energy efficient materials; Calculations involving basic factors in Glass Design; Optimization of Glass: For wastage reduction & standardization of Design Industry Visit Report on Industry Visit

#### **Software Analysis And Case Studies**

CREATE your building: Interactive Modelling; Sun Path Analysis, Solar exposure Analysis, Building Orientation Analysis, Simulating the NEIGHBORHOOD; Site Shadow Analysis; Accommodate COMFORT: Daylight Analysis and Acoustic analysis; SAFETY check: Thickness analysis; LOOK: Colour and aesthetics; Costing: WASTAGE optimization; AC load calculations and PAYBACK analysis – A comparative case study; Creative use and solutions of Glass

### **7. STUDIES IN INDIAN ARCHITECTURE (Sessional); 3 Credits, Full Marks – 100, Contact Periods/week: 3**

Study of ideas, elements, and examples that help articulate Indian architecture in relation to land, climate, light, movement, construction techniques, sustainability, and so on, through primary and/or secondary sources.



# **DETAILED SYLLABUS**

## **Fifth & Final Year**



### ***Fifth Year First Semester***

**Subject: ARCHITECTURAL ACOUSTICS (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

The Physics of Sound – Wave motion, Sound frequency, sound velocity, particle velocity and wavelength, the Decibel Scale, Combining Sound Levels, Sound Attenuation by Distance, Sound Fields

Sound Measurement and Hearing – Sound Level Meter, The Ear's Sensitivity, The Haas Effect, Sound Masking, Binaural Hearing

Sound Reflection, Diffraction and Diffusion – The Boundary Phenomena, Absorption Coefficient of Sound, Sound Diffraction, Relevance of Acoustical Shadows, Acoustical Transparency of a Screen, Diffuse and Specular Reflections, Sound Diffusion, Flutter Echo

Sound Absorbing Materials –Types of Sound Absorbing Materials, Porous Absorbers, Panel Absorbers, Volume Absorbers

Noise Control in Buildings – Interior Noise Criteria, Interior Noise Control through Architectural Design, Sound Absorptive Treatment and Barriers, Exterior Noise Criteria, Exterior Noise Control through Site Planning and Barriers

Control of HVAC Noise – HVAC Systems, Noise Attenuation in Ducts, Noise Generated by Air Flow, Sound Radiation by Duct Walls, Estimating HVAC Noise Levels, Active Noise Control in HVAC Systems

The Behavior of Sound in Rooms –Impulse Response of a Room, Impulse Diagram and Sound Diffusion, Reverberation Time, Sabine's Law, Coupled Rooms

Design of Rooms for Speech – Speaker-Listener Distance, Balcony and Hall Depth, Room Shape and Volume, Reflecting and Absorbing parts of a Room, Floor Rake, Ceiling Reflections

Design of Rooms for Music – Musical Attributes and Acoustical Phenomena, Early Decay Time and Clarity, Intimacy, Spaciousness, Warmth and Brilliance, Loudness, Concert Hall Design Procedure

Acoustical Instruments – Some examples and descriptions

#### **Suggested Books:**

1. Architectural Acoustics – Principles and Design, Madan Mehta, James Johnson and Jorge Rocafort, Prentice Hall Inc., Upper Saddle River, New Jersey.
2. Acoustical Designing in Architecture, V. O. Knudsen and C. M. Harris.

**Subject: PROFESSIONAL PRACTICE (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

Study of Building Control Standards, Codes of practices and Bye laws prevalent in different development authorities, municipalities/ corporations and urban arts commissions in India.

Environmental acts & laws, special rules governing hill area development & coastal area management, heritage act of India, Real Estate Laws.

Study of office practices, Office administration, Accounting.

Expression of Interest.

Tendering- Tender and its different constituents- Conditions of engagement, Specifications of Workmanship & Materials, Specifications of different items of works, Schedule of quantities.

Supervision of projects. Checking and certifying contractor's bills.

Contracts and Arbitration, Valuation, Professional conduct and ethics.



Architects Act 1972, Role of COA and IIA.

**Suggested Books:**

1. Professional practice, Roshan Namavati.
2. Architects Act 1972.
3. Publications of Handbook on Professional practice by IIA.
4. Publications of Council of Architecture-Architects (Professional conduct) Regulations.
5. Architectural Practice and Procedure, Ar. V.S. Apte, Mrs. Padmaja Bhide, 2008
6. Consumer Protection Act, 2011
7. Arbitration Act, 2005
8. Persons with Disabilities Act, 1995
9. The West Bengal Municipal (Building) Rules, 2007.
10. Kolkata Municipal Corporation Building Rules, 2013.

**Subject: BUILDING ECONOMICS & VALUATION (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

**Building Economics**

Detail study on PERT, CPM, Bar Chart.

**Building Economics**

Economic Principles-Definition of Economics and Economic System, Factors of production with special emphasis on land, Types of Business organization, Business units, Cost of production.

Market : Perfect, Imperfect and Monopoly, Law of Demand, Supply and Pricing.

Accounting- Definition of Accounting -Types of Accounting, Definition of cost classification and interpretation of cost, Preparation of cost sheet, Marginal costing and Management Decision, Contract costing, Accounting Ratios, Value analysis and project evaluation.

All the above factors should be considered with respect to Building Operation as economic activity.

**Valuation**

General Principles of Valuation.

Concepts : Value, Price and Cost.

Definitions : Value in Use and Value in Exchange, Market Value.

Reproduction Value, Replacement Value, Re-installment Value, Book Value.

Salvage Value / Scrap Value, Capital Value / Sinking Fund, Depreciation and Obsolescence,

Rent- Ground Rent, Gross Rent, Rack Rent, Net Rent, Leases and Reversion - examples by sums on rent and valuation of Lease-holds.

Net Income : Tear's Purchase, examples by sums on Income Computation.

Property : Freehold, Lease-hold, Condominiums and Co-operatives, Timeshared Property, Developmental Rights.

Principal Methods of Valuation : Cost Approach, Income Approach, Market Approach

**Suggested Books:**

**Building Economics:**

1. Economics, Paul Samuelson & William Nordhaus
2. Principles of Economics, N. Gregory Mankiw.
3. Business Economics.
4. Land Economics, Edited by Daniel W. Bromley
5. Urban Land Economics, Hard Press Publishing.



6. Principles of Accountancy, Hrishikesh Mukherjee.
7. Costing, P.V. Ratnam.
8. Principles of Costing, B.K. Bhar.
9. Project planning & Control with PERT & CPM, B.C Punmia & K.K. Khandelwal.
10. PERT & CPM- Principles and Applications, 3<sup>rd</sup> Edition, L.S. Srinath.

**Valuation:**

1. J. A. Parks- Principles & Practice of Valuation, 6<sup>th</sup> Edition, edited by D. N. Bannerjee & assisted by Basudev Dey.
2. Valuation of Real Property – Principles & Practice, Syamales Datta .
3. Professional Valuation Practice, Ashok Nain.

**Subject: PROJECT MANAGEMENT (Theory); 3 Credits**

**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**

**Internal Assessment: Class Test: 30**

**Entrepreneurship Development**

Introduction-Perspective: Entrepreneur and Entrepreneurship Concept and it's Types, Characteristics, Decision Process, Functions and role, Growth of Entrepreneurship in India.

Woman Entrepreneurship

Rural Entrepreneurship: Meaning, concept and Need, Rural Entrepreneurship/Industrialization in Retrospect, Problems, How to Development, NGOs and Rural Entrepreneurship

Social Entrepreneurship and Family Business: Introduction and Meaning, Perspective of Social Entrepreneurship and in Practice, Family Business in India: A Historical Perspective, Advantages and Disadvantages, Planning and it's Effectiveness

Growth, Motivation and development Programs: Factors affecting Entrepreneurship, Motivating Factors and it's Cycle or Process, Changes in Entrepreneurship Motivation, Entrepreneurship Development Programs(EDPs)in India: A Historical Perspective

**Project Management**

Project Appraisal: Meaning and Concept of Business Plan, Project Appraisals and it's Methods, Environmental Clearance for small and medium enterprises(SMEs), Planning Commission Guideline for Formulating Project Reports, Network Analysis

Financing of Enterprise: Meaning and need for Financial Planning and for Industrial Finance, Sources of Finance, Capital Structure of the Business, Industrial Finance and Term loans

Forms of Business Ownership: Introduction, Meaning and Types: Sole Proprietorship, Partnership, Company, Co-operative, Public Sector Enterprise

Fundamentals of management: Meaning and Characteristics of Management, Importance, Scope and Functions of Management, Principles and Process of Management, Difference between Management and Administration

Development: IPR-Intellectual Property Rights and MSMEs-Micro small and Medium Enterprises, Need and Objectives of Accounting, Growth Strategies, Promotion of Enterprise, Sickness.

**Suggested Books:**

1. Professional construction Management & Project administration, W.B. foxhall, 1972.
2. Project Management for the Design Professional, D. Burstein & F. Stasiowski.
3. Project Management in Construction, A. Walker.
4. Project Management: A systems approach to planning, scheduling & controlling- 11<sup>th</sup> Edition, Harold R. Kerzner.
5. Project planning & Control with PERT & CPM, B.C Punmia & K.K. Khandelwal.
6. PERT & CPM- Principles and Applications, 3<sup>rd</sup> Edition, L.S. Srinath.



**Subject: BUILDING SCIENCE & SUSTAINABILITY (Theory): 3 Credits**  
**Semester Examination: Time: 3 hrs. Full Marks: 100, Contact Periods/week: 3,**  
**Internal Assessment: Class Test: 30**

Building physics, Building Envelope – state and operations, insulation and building envelope materials and systems including polymeric, mineral, cellulose-based, and composites, building interactions with the environment, occupants, and allied building materials, components, and sub-systems, green roofing, double skinned envelopes and interaction of building enclosure with mechanical systems. Hygro-thermal, acoustical and light related properties of building components (roofs, façade, windows, partition walls etc.), rooms, buildings & building assemblies; Building heat transfer, Thermal performance of buildings & comfort parameters, passive & active cooling options; Heating, ventilating & Air conditioning load, lighting load, electrical power; Global energy scenario, principles of energy systems, energy and global environment, Use of energy in buildings, energy conservation and efficiency in buildings, ECBC compliance in buildings, life cycle energy & water analysis, concepts of embodied energy & embodied water, operation water, energy, water & ecological/carbon footprint of buildings; Design, construction & operation of high performance buildings.

Need, definition and concept of sustainability; Brundtland Commission, sustainable development, sustainable consumption and production, Visions of sustainability, Source and ethics of sustainability; Ecology and sustainability, Concept of ecological balance & conservation of natural resources, Sustainability and Climate Change, Sustainable sites, Green Building in the context of sustainability, Green Building Ratings – GRIHA, LEEDS, BREEAM, Sustainable construction practices, sustainable cities/eco-City.

**Suggested Books:**

1. Energy and environment in architecture: A technical design guide, N. Baker and K. Steemers, 2000
2. Energy and environment in developing countries, Chattergy, M, 1981
3. Energy and habitat; town planning and building design for energy conservation, 1984.
4. Energy conservation and energy management in buildings, edited by A.F.C. Sherratt, 1976.
5. Energy conservation in hot climates, D. Holm, 1983.
6. Energy design for architects, A. Shaw, 1989.
7. Green building handbook ; a guide to building products and their impact on the environment , T. Woolley and others, 1999.
8. Sustainability through building, edited by N.K. Bansal and J. Cook, 2001
9. Sustainable place: A place of sustainable development, C. Phillips, 2003. SSSS

**Subject: DISSERTATION LEADING TO ARCHITECTURAL THESIS (Sessional); 3 Credits,**  
**Full Marks – 100, Contact Periods/week: 3**

The students should take help from the Thesis Coordinator and the panel of teachers from time to time pertaining to formulation of action plan including methodology of selection of the topics, case studies, site selection, functional requirements, design methodologies, drafting procedure and defense techniques.

Students are to select architectural topics of individual interest reflecting social and technological considerations. The topics so chosen should be subjected to discussions and criticisms by a panel of teachers from time to time.

At the end of the semester, each student would be required to make a formal presentation on the chosen and approved subject of Thesis.



**Subject: ARCHITECTURAL DESIGN V (Sessional); 6 Credits,  
Full Marks – 100, Contact Periods/week: 9**

**Urban Insertion: Context and Character  
Urban Institutions**

Inter-relationship to urban context and neighborhood, institutional character. Design development and detail. Nature of urban institutions and their relationship to urban structure, typology, correlation to urban laws and regulations, urban services and building services.  
Design of buildings or group of buildings in an urban context and as insertion in an urban fabric.

**Subject: GENERAL VIVA VOCE (Sessional); 3 Credits,  
Full Marks – 100.**

A Viva-voce test would be conducted by a panel of teachers of the Department. The test would cover the topics related to the various subjects taught to the students throughout their all previous academic sessions and would also contain topics of general nature related to Architecture.

**ELECTIVE II (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

**Subjects under Elective-II:**

**1. ADVANCED LANDSCAPE ARCHITECTURE (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Broad perspective on landscape planning, microclimate, planting design, landscape engineering. Landscape typologies: Heritage landscape, cultural landscapes, Urban landscape; Landscape illumination, Emerging/New concepts in landscape architecture; Sustainability issues, Landscape and Green Buildings, Green rating for landscapes, special landscapes like roof/ terrace gardens and interior landscapes, Green/cool roof; understanding aspects of landscape practice, preparation of landscape working drawings, construction details, BOQ & cost estimation.

**2. ADVANCED MATERIALS (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Introduction of pre-stressing, prefabrication and systems building. Jointing, tolerances and modular coordination.

Mass production, transportation, storage and handling of materials. Characteristics, performances and application of mechanized construction equipments, Advanced construction techniques. Natural and artificial materials.

Cost effective and environmentally friendly materials.

Vernacular materials. PVC & FRP, frameless glass doors and windows and partitions. Wooden/Steel/Aluminum sliding and folding doors and partitions. Steel doors for garages and workshops. Collapsible gate and rolling shutters, remote control systems of doors and gates. Structural glazing, aluminum composite panel cladding.

Insulation materials – Thermal and sound insulation materials. Glass – its manufacture in its various types like plate, tinted, decorative, reinforced, laminated glass block, fibre glass, glass murals, partially coloured glass, etching of glass and its applications in building industry for both exteriors and interiors. Glass fabrication techniques, fibre reinforced composite materials and products.

**3. ARCHITECTURAL DESIGN THEORIES (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Principles, ideas and theories, such as, social, cultural, philosophical, scientific, semantic, technological, formal, and so on, that have influenced Western thought and architecture.

**4. INFRASTRUCTURE PLANNING (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Definitions of infrastructure; Necessity and Importance for infrastructure; Various physical infrastructural facilities like transportation network, Water Supply System, Drainage and Sewerage Systems, Waste Disposal System, treatment, recycle & reuse, Urban rain water harvesting, Street furniture, Electrification, Gas Supply System, etc. and social infrastructural facilities like education, health, recreational, religious, postal, etc.; Government organizations, Public agencies associated for planning of such infrastructure. Planning strategies of various infrastructural facilities in a new and existing town. Planning for infrastructure of rural areas of the country. Current National and International trends in infrastructural planning. Technology for execution of such infrastructure

**5. INTERIOR AND FURNITURE DESIGN (Sessional); 3 Credits,  
Full Marks – 100, Contact Periods/week: 3**

Historicity, Principles, Theory of interior design, traditional & contemporary crafts, design of built-in and movable furniture, Interior fittings and furnishings, Color, form, texture and lighting in interiors, Materials used in interiors and landscaping elements., Building services related to interiors. A student will take any one or more of the above topics and write a paper or a project design in consultation with the teacher-in-charge.

**6. STUDIES ON URBAN ENVIRONMENT, DEVELOPMENT AND SUSTAINABILITY  
(Sessional); 3 Credits, Full Marks – 100, Contact Periods/week: 3**

Studies on urban ecology and environment; role of water bodies, open spaces and parks; quality of air and water in a city; various pollutants in air and water; sources of air pollution; sources of water pollution; understanding of groundwater and the reason of its depletion; study on urbanization and development in the city; the mechanism of water supply, drainage and sewerage, and solid waste management in a city; effect of development on environment and population; meaning of sustainable development; a comprehensive planning for environmental sustainability in a city.





### **Fifth Year Second Semester**

**Subject: ARCHITECTURAL THESIS (Sessional); 24 Credits,  
Full Marks – 800, Contact Periods/week: 15**

Students should select their individual subjects for theses by the middle of the first semester of the final year of the course. Along with a programme of action, the subjects so selected should be approved by the Thesis Coordinator, the Head of the Department and BOS. The Subjects should be restricted to areas of Architecture meaning without going into Urban Design or Town Planning. The project is to be done under faculty guidance and presented in a graphic form, model, computer generated graphics and report. The knowledge earned during the five years of study should be reflected in the Theses works. The student should have the ability to conduct investigative research through library and other resources, co-ordinate all pertinent architectural issues with the design concept and objectives to reach a viable solution for the resolution of the selected problem.

The candidate shall submit a synopsis of the Thesis Project and the institution will approve this before the candidate is allowed to proceed with the Thesis project.

The institution shall conduct the internal evaluation stages (at least 3 reviews) for the Architectural Thesis/Project with the guide as a co-assessor.

A jury comprising of internal and external examiner and the guide shall conduct the final examination of the Architectural Thesis/Project in the institution at the end of the semester.

**Subject: ARCHITECTURAL THESIS VIVA VOCE; 6 Credits,  
Full Marks –200.**

The individual student has to present his final outcome on Architectural Thesis and defend the same. The presentation should portray the performance through drawings, models, etc. The verbal communication should reflect the command over the work.