

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
DEPARTMENT OF ARCHITECTURE, TOWN AND REGIONAL PLANNING
CURRICULAR STRUCTURE & SYLLABI FOR
FIVE-YEAR DEGREE COURSE IN BACHELOR OF ARCHITECTURE

With effect from intake of 2012-13

Part I (First and Second Semesters)

First Year (Part-I): First Semester						
Code	Subject	Contact Periods			Marks	Credit
		L	T	S		
Theoretical Subjects		L	T	S		
HU 101A	English	2	0	0	50	2
MA 101A	Mathematics – IA	3	0	0	100	3
AM 101A	Engineering Mechanics	3	0	0	100	3
AR 101	Design Fundamentals	3	0	0	100	3
AR 102	Materials & Methods of Construction – I	3	0	0	100	3
	Sub Total	14	0	0	450	14
Sessional Subjects						
WS 151A	Workshop Practice	0	0	3	50	2
AR 151	Basic Design	0	0	6	150	4
AR 152	Architectural Delineation	0	0	4	100	3
AR 153	Descriptive Geometry & Modelling Practice – I	0	0	6	150	4
	Sub Total	0	0	19	450	13
TOTAL		14	0	19	900	27
		33				
SA 191A	Additional Elective NCC / NSS / Physical Training – I	0	0	2	50	

First Year (Part-I): Second Semester						
Code	Subject	Contact Periods			Marks	Credit
		L	T	S		
Theoretical Subjects		L	T	S		
M 202A	Mathematics – IIA	3	0	0	100	3
CE 201A	Environment and Ecology	2	0	0	50	2
AM 201A	Strength of Materials	3	0	0	100	3
CS 1201	Introduction to Computing	2	1	0	50	2
AR 201	Evolution of Architecture – I	3	0	0	100	3
AR 202	Materials and Methods of Construction – II	3	0	0	100	3
	Sub Total	16	1	0	500	16
Sessional Subjects						
CS 1251A	Computer Lab	0	0	3	50	2
AR 251	Architectural Design Practice – I	0	0	6	150	4
AR 252	Descriptive Geometry & Modelling Practice – II	0	0	6	150	4
AR 253	Details of Construction Practice – I	0	0	4	100	3
	Sub Total	0	0	19	450	13
TOTAL		16	1	19	950	29
		36				
SA 291A	Additional Elective NCC / NSS / Physical Training – II	0	0	2	50	

FIRST SEMESTER

English (HU 101A)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Module A Note Making — Paragraph writing — Commercial Correspondence — Précis — Preparing Instruction Manual — Preparing Proposal — Report Writing — Writing of Dissertation/Thesis — Elements of Grammar and Vocabulary	14
2.	Module B Group Discussion — Extempore Speaking — Presentation Strategies — Interview Preparation	14
	Total	28

Mathematics – IA (MA 101A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and topics	No. of Classes
1.	Functions of a Single Real Variable: n-th order derivative, Liebnitz theorem for successive differentiation, Rolle's theorem (statement only), Mean value theorems of Lagrange and Cauchy, Taylor's theorem with Lagrange's and Cauchy's forms of remainders, Taylor's and Maclaurin's series, expansion of functions, curvature, asymptotes, curve tracing	18
2.	Functions of Several Real Variables: Partial derivatives, chain rule, differential and small error, Euler's theorem for homogeneous functions, Taylor's theorem (statement only), expansion of functions of two real variables, maxima and minima, Lagrange's method of undetermined multipliers.	12
3.	Infinite Series: Geometric series, Comparison test, p-series, D'Alembert's Ratio Test, Cauchy's Root Test, Rabbe's test, Power series, Radius of convergence.	6
4.	Multiple Integrals: Double integral, change of order of integration, change of variables, determination of area, volume, moment of inertia, centroid.	6
	Total	42

Recommended Reading: Advanced Engineering Mathematics by i) E. Krysizg, ii) Peter V. O'Neil. Engineering Mathematics by iii) B. S. Grewal, iv) S. Arumugam, A. Thangapandi Isaac & A.Somasundaram v) S.S.Sastry.

Engineering Mechanics (AM 101A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module name and topics	No. of classes
1	Introduction: Concept of engineering mechanics – statics & dynamics – scalar quality – vector quality – addition & subtraction of vectors – basic units – derived units – SI units – relationship: m.l.t.	3
2	System of forces: Definition of a force with explanation – linear representation of force – system of co-planar forces – parallelogram law of forces – composition and resolution – transmissibility of forces – action and reaction – Triangle law & Polygon law of forces – determination of resultant by analytical and graphical method with equalitarian space diagram – vector diagram – Bow's notation	3
3	Moments & couples: Definition of moment of a force about a point – physical significance of moment – moment of a system of parallel and inclined forces – Varignon's theorem – definition of moment of a couple – physical significance of couples equivalent couples – resultant of any number of coplanar couples – replacement of a force about a point by an equal like parallel force together with a couple – resultant of a couple and a force	3
4	Condition of equilibrium: Lami's theorem – Triangle law & Polygon law of equilibrium – conditions of equilibrium of co-planer system of concurrent forces – conditions of equilibrium of co-planar system of non-concurrent parallel forces (like & unlike) – conditions of equilibrium of co-planar system of non-concurrent non-parallel forces (simple problems excluding statically indeterminate)	6
5	Friction: Definition – useful and harmful effects of friction – laws of static friction – co-efficient of friction – angle of friction – angle of repose – equilibrium of a body on a rough inclined surface with and without external force	3
6	Centre of gravity: Concept & definition – centre of mass – centroid — methods of finding out centroids of simple area — finding the centroid of the following areas by integration: (i) uniform triangular lamina, (ii) uniform rectangular lamina, (iii) uniform circular lamina, (iv) uniform semi-circular lamina, and, (v) uniform lamina of quadrant of a circle — finding the centroid of the following sections using the method of moment: (i) t-section, (ii) equal and unequal angle-sections, (iii) equal and unequal i-sections, (iv) channel-sections, (v) z-sections	6
7	Moment of inertia: Definition and unit — m_i of a lamina — theorems of finding out m_i by: (i) parallel axis theorem, and, (ii) perpendicular axis theorem — radius of gyration — finding out m_i of the different sections about axes lying in the plane of the sections by integration — m_i of irregular areas such as i-sections, t-sections, angle-sections, channel sections, z-section, composite sections (composite area method) – related simple problems — polar m_i	6
8	Rectilinear motion: Displacement-time and velocity-time diagrams – motion equations (with deduction) – Newton's Second Law of Linear Motion $p = mf$ and momentum of a body – conservation of momentum of a body – numerical problems	6
9	Curvilinear motion: Angular displacement – angular speed – angular velocity – relation between angular speed & angular velocity – angular acceleration – relation between linear & angular velocity – relation between linear & angular acceleration – motion and path of a projectile (numerical problems) – centripetal and centrifugal force (numerical problems)	6
Total		42

Recommended reading: Engineering Mechanics International Student Edition /Timoshenko & Young/ MGH

Design Fundamentals (AR 101)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Defining design — Design as a process — Thought process as a design process: Vertical & Lateral	2
2	Contrast: Perception of Light: Chrome – Brightness – Hue – Saturation — Perception of Reflecting Surfaces: Tonal quality: value, hue & intensity – Visual texture — Composition – Figure-Ground Relationship: Space, Shape, Format, Figure, Ground, Closure	4
3	Figure Organisation: Spatial basis for Grouping of figure elements: Shapes that Touch: Corner to corner – Corner to side – Side to side — Shapes that Overlap: Partially – Completely — Shapes that Interconnect: Interpenetrating – Interlocking – Interlacing — Likeness basis for Grouping of figure elements: Formal factors: Shape – Size – Position (direction, interval, attitude) — Tonal Factors: Achromatic-chromatic – Warm-cool – Value – Hue – Intensity — Visual Texture — Meanings from experience: Representation – Association – Symbolism — Variety in Unity: Hogarth's "line of beauty"	6
4	The Idea of Unity: Qualities of Unity: Pattern of Movement – Balance – Proportional Relationships – Rhythm — Background of Visual Unity: Structure of Visual Field – Eye movements in perception — Movement & Balance: Movement in Design – Dynamic Values in the Field — Balance: Axial Balance – Radial Balance – Occult Balance — Proportion & Rhythm: Analyzing proportion & rhythm: Simple numerical ratios – Values of the summation series – Geometric Ratios – Dynamic symmetry (golden-mean rectangle, root-five rectangle, root-two rectangle) & Intrinsic geometric ratios — Rhythm: Sequence of Progression & Alteration – Occult Rhythm — Dominance & Sub-ordination	6
5	Colour Pigment & Tone Control: Colour Theory: Subtractive mixing — Colour Wheel: Primaries – Secondaries – Tertiaries — Tone Control: $T = H + B + W$ – Tints [$T = H + W$] – Shades [$T = H + B$] – Greyed tones [$T = H + (B + W)$] – Complimentary ($T = H + cH$)	3
6	Colour Relationships: Colour Schemes: Related (Monochromatic & Analogous) – Contrasting (Complementary, Split Complimentary & Triad) — Physiological-Psychological basis for Colour Relations: Likeness – Sequence in hue, value and intensity perception – Psychological complements — Simultaneous Contrast: Value Contrast – Hue Contrast – Intensity Contrast	6
7	2-D Organisation: Basis of Space Illusion — Indication of Depth on a Two-Dimensional Plane: Contrast & gradation in size – Converging parallels & diagonal action – Position in the picture plane – Overlapping – Transparency – Diminishing detail – Atmospheric perspective – Advancing & receding colour — Plastic Effect on Two-Dimensional Plane: Structural Enhancement, line – Differences of tone – Chiaroscuro Modelling – Effect of light	9
8	3-D Organisation: Closed and Open Form — Inter-relationship between Material, Structure & Form: Homogeneous materials – Assembled materials	3
9	Design Methodology: General principles of architectural design on the basis of functions and forms — Brief – Analysis – Synthesis – Implementation – Communication & Feedback — Journey from known to unknown	3
Total		42

Recommended Reading: Design Fundamentals/ Robert Scott — Form, Space and Order/ F. D. K. Ching — Introduction to Architecture/ J. C. Snyder & A. J. Catanese — Space, Time and Architecture/Siegfried Giedion

Materials and Methods of Construction – I (AR 102)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Stone: Building stones- types and properties; Stone masonry.	3
2	Clay: Mud, adobe, mud block, burnt brick, ceramic products; Tiles – Flat tiles, Pan tiles, Half-round country tiles, Mangalore tiles	6
3	Brick Masonry: Composition of good brick earth; Brick manufacturing process; Brick sizes, classification and properties, Principles in brick masonry construction; Brick bonding - English, Flemish, Rat trap, etc.	9
4	Wood & Wood Products: Structure and classification of timber; Processing of Timber –Seasoning, Preservation etc.; Defects in timber; Timber products – Veneer, Plywood, Laminated board, Block board, Batten board, Composite board, Fibreboard, Particleboard.	6
5	Ferrous Metals (Iron & Steel): General characteristics of metals – Ductility, Elasticity, Malleability, Toughness, Weldability; Properties & uses of Iron and steel – Pig Iron, Cast Iron, Wrought Iron, Mild Steel, Alloy steel (hard steel)	3
6	Non-ferrous Metals (Aluminium & Copper): Properties, finishes, uses in buildings.	3
7	Plastics: Polymerisation; Polymer types - Thermoplastics, Thermosetting plastics, Elastomers; Properties of plastics.	3
8	Glass: Principal constituents of glass; Types of glass— properties & uses.	6
9	Adhesives: Types of adhesives, Use for bonding of surfaces of wood, metal, glass and plastic	3
	Total	42

Recommended Reading:

1. Materials for Architects and Builders: An Introduction / Arthur R Lyons / Arnold
2. A Text Book of Materials and Construction / TTTI
3. Building Construction Volume I, II, III & IV (Metric Ed.) / J. K. McKay & W. B. McKay / Orient Longman
4. The Construction of Buildings Volume 1, 2, 3, 4 & 5 / R. Barry / English Language Book Society — A Text Book of Building Construction: Planning Techniques & Methods of Construction / S. P. Arora & S. P. Bindra
5. Building Construction / Sushil Kumar / Standards Publishers Distributors, Delhi

Workshop Practice (WS 151A)

Sessional: 0 – 0 – 3 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Carpentry: Specifications of wood and wood-products; Introduction to tools and equipment; Practice jobs and different wood-joineries like half-lap joint; tenon and mortise, tenon and dove-tailed bridle joint, right angled single mitred tenon and mortis joint and haunched tenon and mortise for windows frames etc.	15
2	Fitting: Introduction to tools; Sawing and Filing and Drilling; Preparation of simple fitting jobs including use of measuring devices	12
3	Masonry: Practice of construction of brick masonry wall of English and Flemish Bond	15
	Total	42

Basic Design (AR 151)

Sessional: 0 – 0 – 6 (L – T – S) Full Marks: 150 Credit: 4 Prerequisite: None

The objective of this course is to facilitate appreciation of visual form, grammar of visual form, vocabulary of design, principles of composition, appreciation of form and function interrelationships, and study of anthropometrics.

Module No.	Module Name and Topics	No. of Classes
1	Colour Schemes: Study of the hue spectrum and representation of the primary, secondary and tertiary colours through colour-wheels —Study of related and contrasting colour schemes through simple applications	15
2	Two Dimensional Composition: Study of monochromatic and chromatic shapes through two-dimensional composition of simple geometrical shapes	15
3	Three Dimensional Composition: Study of monochromatic and chromatic forms through three-dimensional composition of simple solids	15
4	Modular Composition: Study of modules through compositions based on the principles of ratio and proportion	15
5	Model making: Study of the design process from whole to part and part to whole applying different elements and principles of design using homogeneous and assembled materials	24
	Total	84

Architectural Delineation (AR 152)

Sessional: 0 – 0 – 4 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Freehand Drawing: Freehand drawing of objects / group of objects with shades & shadows and using colours in various media such as pencil, crayons, watercolour, poster colours etc.	12
2	Delineation of landscape elements: Presentation and rendering of Trees, herbs, shrubs, ground covers, contours & water bodies as a single entity and in clusters / groups in association with built forms, in plans, elevations and 3-dimensional views rendered in various mediums	9
3	Working with Scale: Presentation and rendering of various designed objects, human figures, cars etc. in different scales	9
4	Delineation of buildings: Monochromatic / Coloured Presentation drawings of sites / buildings / building parts / furniture in plan/s, elevation/s and view/s using various mediums	12
	Total	42

Recommended Readings:

1. Rendering with Pen and Ink / Robert W. Gill / Thames and Hudson Ltd., London
2. Architectural Rendering / Albert O Halse / McGraw-Hill Book Company
3. "How To Draw" Art Books / Artist's Library Series:
 - (a) Series 8/ How to Draw and Paint Landscapes/ Walter Foster
 - (b) Series 29/Perspective Drawing/ Ernest Norling
 - (c) Series 34/ABC of Lettering/Carl Holmes
 - (d) Series 51/Drawing in Charcoal/Charles LaSalle
 - (e) Series 55/More Trees/ Fredrick J. Garner
 - (f) Series 115/Quick Sketching/ Paul Coze
 - (g) Series 154/ Understanding Colour/ William F. Powell

Descriptive Geometry and Modelling Practice – I (AR 153)

Sessional: 0 – 0 – 6 (L – T – S) Full Marks: 150 Credit: 4 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction to Engineering Drawing and Descriptive Geometry; Introduction to the drawing instruments and their use	3
2	Types of lines used in Engineering Drawing – Lettering techniques and types	6
3	Scale: Concept of Representative Fraction – Scales generally used for Architectural and Engineering Drawing – Concept of Diagonal Scale	6
4	Orthographic Projections: Planes of Projection – Concept of 1st angle and 3rd angle projection – ISI code of practice – projection of straight line, lamina and solid	24
5	Section of Solids: True shape of a section	12
6	Surface Development: Principal Developments – Parallel and Radial Developments	9
7	Intersection of surfaces	12
8	Model Making	12
	Total	84

Recommended Reading:

N. D. Bhatt, Engineering Drawing [Plane and Solid Geometry], Charotar Publishing House

SECOND SEMESTER

Mathematics – IIA (M 201A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Co-ordinate Geometry – Two dimensions: Transformation of coordinates – Translation Rotation only, Reduction of general equation of second degree	6
2.	Co-ordinate Geometry – Three dimensions: Coordinates, Direction Cosines, Planes, Straight lines, Spheres, Standard equations of simple surface e.g. cylinders, cones, ellipsoids, Hyperboloids etc.	6
3.	Vector Algebra: Sum and products of vectors, Application of Geometry and Mechanics	6
4.	Linear Programming: Geometrical ideas of convex sets, feasible solutions and domains etc. Fundamental theorem of LPP (statement only), Graphical methods, Applications of Simplex Algorithm	6
5.	Statics: Analysis data (direct and grouped), Frequency Diagrams, Ogive, Histogram, Measures of central tendency: Mean, Median, Mode, Measures of dispersion, Skewness, Curtosis Fitting of curves (Least square method).	9
6.	Differential Equations: Second order differential equations with constants co-efficient and with variable co-efficient reducible to case constant co-efficient, applications	9
	Total	42

Environment and Ecology (CE 201A)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Components of environment; renewable and non-renewable resources	2
2	Ecology: Structure and function of an ecosystem: material cycle; energy flow; food chain; food web; ecological pyramid; bio-magnification; ecological successions; major ecosystems of the earth; ecological balance and consequences of change; biodiversity and its conservation	4
3	Water Pollution: Surface water and ground water; water pollutants – sources and effects; agricultural pollution; eutrophication; case studies; water quality standards; control of pollution	4
4	Air Pollution: Atmospheric composition; energy balance; air pollutants – sources and effects; weather and dispersion; vehicular pollution; case studies; air quality standards; control measures; global atmospheric issues – global warming, ozone layer depletion, acid rain, indoor air pollution	4
5	Land Pollution: Municipal, industrial, commercial, agricultural, hazardous solid waste; collection and disposal; recovery and conversion; case studies	4
6	Noise Pollution: Classification of noise; the decibel; frequency characterization; noise criteria (Leq, LN); standards; control measures	4
7	Other Environmental Issues: From unsustainable to sustainable development; environmental impact assessment, environmental impacts of urbanization; environmental impacts of selected industrial activities; clean technologies; waste minimization; water conservation; rain water harvesting; watershed management; Environment Protection Act; Water (Prevention and Control of Pollution) Act; Air (Prevention and Control of Pollution) Act, relevant international protocols and conventions; ISO 14000	6
	Total	28

Strength of Materials (AM 201A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Simple Stresses & Strains: Mechanical Properties of Materials – Definitions with explanations only — Different types of loads and their effects on materials – Tensile, Compressive, Shear and Impact — Simple stresses and types of stresses — Simple strains and type of strains — Stress-strain diagram for M.S. in tensile test showing salient points such as Proportional Limit, Yield point, Elastic Limit, Ultimate points and Breaking Point — Study of stresses – Strain diagram for Cast Iron and Dead Steel — Modulus of Elasticity — Ultimate stress, working stress and Factor of safety and their effect on simple designs — Stresses in members with stepped cross section and stress in composite members — Stress in nuts and bolts — Temperature stress and strain — Simple problems	12
2	Shear Force & Bending Moment: Types of beams, types of supports and types of loads on beams — Definitions of B.M. and S.F. and their sign conventions — Bending Moment and Shear Force diagrams of simple cases such as: Cantilever beams with point loads and UDL, Simply supported beams with point loads and UDL, Simply supported overhanging beam – one side and both sides – Simple Problems	12
3	Bending Stresses in Beams: Definitions of bending stress deduction of simple bending formula i.e. $M/I = f/y = E/R$ with their usual notations (assumption made in theory of simple bending) – Neutral axis — Moment of Resistance, Section modulus and Radius of Gyration — Related problems in bending stress for symmetrical section about axis parallel to the plane of bending	6
4	Deflection of Beams: Differential equation of elastic curve – Relation among deflection, slope, shear force, bending moment and rate of loading – Sign convention of slope and deflection — Standard formula (no proof) for maximum slope of deflection in: (a) cantilever beam subjected to point load at free end alone & when subjected to uniformly distributed load on entire span; (b) simply supported beam carrying a point load at mid span alone & when carrying a uniformly distributed load on entire span — Problems related to above two cases of cantilever and simply supported beams	6
5	Columns: Definitions of Columns & Struts – Long, Medium & Short columns – Effective Length – Slenderness Ratio – Critical load – Safe load — Different kinds of end conditions — Euler's formula for critical load (no proof) — Assumptions made and its limitations — Strength of columns	6
	Total	42

Introduction to Computing (CS 1201)

Half Paper: 2 – 1 – 0 (L – T – S) Full Marks: 50 Credits: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: A brief history of the efforts in Automated computing: ABACUS, PASCAL to Babbage’s Difference Engine. Electronic era and early developments. Number system, codes: Positional number system, Binary, Hex etc., Conversion, Representation of negative numbers, Floating point representation. Addition, Subtraction, Character representation: ASCII, UNICODE	5
2	Logic operation and basic gates: AND, OR, NOT, XOR, NAND and NOR; operations, gates, Truth tables and use with respect to arithmetic circuits. (Half Adders and Full Adders etc.)	6
3	Computer Organisation: Functional units: CPU, MEMORY, I/O Devices – commonly used peripherals, cache, Bus etc. Organisation of a typical PC	6
4	Problem Solving Steps: Systematic decomposition, Flowchart & Algorithm. Simple constructs (assignment, loop and decisions) — Operating System and the programmer/user: What is OS, How it helps developing programs, Basic file manipulation, Editing, Compilation and linking loading steps, Debugging, I/O redirection, Source file, object file, compiler etc.	3
5	Introduction to Programming (in C): High level, assembly and machine level language. Writing simple programs, Basic data types and their use, Declaration and definition. Loop and Decision statements, Structured type: Array of basic types, Use of array in simple problems. Special control structures: Switch, break, continue. Philosophy of modular development, User defined and library functions, Parameters, return type, call by value and call by reference. Storage class. Bit manipulation. Definition and use. Array and pointers, Special use like memory allocation. Combined data types, use in real life problems. Running debugger, creating library, finding execution time, linking/loading concepts, Stack and heaps.	22
	Total	42

Recommended Reading: Digital Principles and applications (5th Edition): Leach & Malvino — Digital Computer Electronics: Malvino — The Elements of Computing Systems: Building a Modern Computer: Noam Nisan and Shimon Schocken — C Programming Language: Kernighan & Ritchie

Evolution of Architecture – I (AR 201)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credits: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction and Prehistoric Developments: Introduction to early interventions in the natural environment — Megalithic – Funerary architecture— Religious/Symbolic developments as at Stonehenge, Salisbury Plains, England – Neolithic settlements e.g., Catal Huyuk, Anatolia.	3
2	Systems of Enclosure: Principles and examples of Trabeated, Arcuated and Corbelling systems, introduction to different developments of the arcuated form at conceptual level.	3
3	Surface Treatment and Ornamentation Techniques: Principles and techniques for treating surfaces definitions and examples.	1
4	Architectural developments in Ancient Egypt: The contextual factors influencing the architecture – use of temporary materials of vegetable origin in the vernacular architecture and their translation into stone— evolution of tomb architecture from mastabas (in different stages), to The Step Pyramid to Bent Pyramid to the True Pyramids – Construction materials and systems in the pyramids of Egypt – Temple architecture – typology of temples — detail study of conceptual space organization and architectural elements in Egyptian temple architecture with examples.	6
5	Architectural developments in West Asia: The contextual factors influencing the architecture – building techniques and processes – three dimensional articulation of spaces – architectural elements – external finishing techniques – building services – introduction of the arch – temples and palaces as the chief building typologies – principles of architectural organization – symbolism and meaning – social underpinnings – Early Mesopotamian Architecture, Assyrian Architecture, Babylonian Architecture and City Planning, Persian Architecture (Palace of Persepolis).	9
6	Architecture and Town Planning Principles in the Indus Valley: The contextual factors – town planning principles, residential architecture, public buildings such as The Great Bath in Mohenjo Daro and The Granary in Harappa.	3
7	Early Vedic Architecture: The contextual factors influencing the architecture – residential architecture, introduction to the elements used in the essentially rural settlements – fences, roof and walls of huts, gateways, etc.	2
8	Buddhist Architectural Developments: Ashokan edicts - Buddhist stupa architecture –Detailed study of the Sanchi Stupa	3
9	Rock Cut Architecture of India: Buddhist, Jain and Brahmanical Pillars - Early Examples - Barabar Hills, Bihar - Orissan (Jain) monastic retreats at Udaygiri - Hinayana Phase – chaityas and viharas - Mahayana Phase – Rationale for developments – chaityas and viharas — Brahmanical Phase – Detailed study of the culmination of Rock cut architecture in India, the Kailasha Temple at Ellora.	12
Total		42

Recommended Reading:

1. A History of Architecture (Century Edition) / Sir Banister Fletcher / Butterworth Heinemann (Hb), CBS (Pb)
2. Indian Architecture Vol. 1 (Buddhist & Hindu) / Percy Brown / D. B. Taraporevala
3. Buddhist and Hindu Architecture in India / Satish Grover / CBS
4. Architecture: From Prehistory to Postmodernity / Marvin Trachtenberg and Isabelle Hyman/ Prentice Hall
5. A World History of Architecture / Marian Moffett, Michael Fazio & Lawrence Wodehouse / McGraw-Hill
6. Encyclopaedia of Architectural Technology / Ed: Pedro Guedes / McGraw-Hill
7. The Story of Architecture from antiquity to the present / Jan Gympel / KÖNEMANN (Pb)
8. The Great Ages of World Architecture / G. H. Hiraskar / Dhanpat Rai.

Materials and Methods of Construction – II (AR 202)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credits: 3 Prerequisite: MMC-I (AR 102)

Module No.	Module Name and Topics	No. of Classes
1	Cement: Portland Cement; Types of Portland Cement - Pozzolona Cement, White Cement, Blast furnace slag cement; Storage of cement	6
2	Aggregates: Grading of aggregates – Fine & Coarse aggregate- types and properties.	3
3	Building Mortars: Classification, constituents and applications - Cement mortar , Lime mortar, Mud mortar , Composite mortars (Lime-Cement mortar, <i>Surki</i> -Lime mortar) , Gypsum mortar	3
4	Cement Concrete: Constituents – Cement, Aggregate, Water -quality and permissible limits of deleterious materials; Water-Cement Ratio; Properties of concrete: Strength, Durability, Workability; Concreting Processes – Batching, Mixing, Transporting, Placing, Compaction, Curing, Finishing; Concrete additives and admixtures; Principal types of concrete construction - Plain Cement Concrete (PCC), Reinforced Cement Concrete (RCC), Pre-cast Concrete, Pre-stressed concrete; Defects of concrete and their curing measures	9
5	Special Concrete: Light-weight concrete; FRC; Fly ash concrete; High strength - High performance Concrete; Silica Fume Concrete; Polymer Concrete; Ferrocement; Ready Mixed Concrete; Pre-packed concrete.	6
6	Door: 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.	6
7	Window: 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; uPVC window	6
8	Hardware: Fixing and fastening for doors and windows – Nails, Screws, Hinges, Bolts, Rivets, Handles etc.	3
	Total	42

Recommended Reading:

1. McKay W. B., 2000 Building Construction, Orient Longman
2. Varghese P. C., 2005 Building Materials, Prentice' Hall of India Private Limited
3. Sharma S. K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited
4. Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors
5. Arora S. P., Bindra S. P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications
6. Duggal S. K., 2003, Building Materials, New Age International Publishers

Computer Laboratory (CS 1251A)

Sessional: 0 – 0 – 3 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of classes
1.	Familiarization with Laboratory Environment: LAN, Server-Client, Microsoft Windows and Linux Platforms, Common OS Commands, Editor, Compiler.	3
2.	Developing simple C programs involving computation of arithmetic expressions having integer variables with user input.	3
3.	Developing C programs involving conditional statements.	3
4.	Developing C programs involving iterative statements.	3
5.	Developing C programs involving arrays and pointers.	3
6.	Developing C programs with user-defined functions.	3
7.	Developing C programs with user-defined functions having arrays (multidimensional) as parameters.	3
8.	Developing C programs with recursive user-defined functions.	3
9.	Developing C programs involving structure and dynamic memory allocation.	3
10.	Developing C programs involving file operations.	3
11.	Developing C programs involving command line arguments and pre-processor directives.	3
12.	Laboratory Test	9
	Total:	42

Architectural Design Practice – I (AR 251)

Sessional: 0 – 0 – 6 (L – T – S) Full Marks: 150 Credit: 4 Prerequisite: None

The objective of this course is to understand the process of designing and appreciating built forms; understanding the concept of built form as shelter, circulation; space analysis and activity studies.

Sessional works shall include explorations with architectural elements in natural and built environments, design of shelters for simple uses / usages at their lowest hierarchy such as gate house, kiosks for different uses, play areas, bus passenger shelters, simple landscape elements, street furniture, etc. Emphasis shall be on exploration of different methods of presentation including three dimensional scaled models and on visual expression.

Module No.	Module Name and Topics	No. of Classes
1	Study and Presentation: Study / Studies may cover various topics like anthropometrics, forms and shapes, circulations and functions, standards, analysis of buildings / built forms etc.	18
2	Design Problem 1	30
3	Design Problem 2	30
4	Time Sketch	6
	Total	84

Descriptive Geometry and Modelling Practice – II (AR 252)

Sessional: 0 – 0 – 6 (L – T – S) Full Marks: 150 Credit: 4 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Axonometric Projection System Isometric Projection System of points, lines, polygons and solids on Isometric plane using Isometric Scale. Dimetric and Trimetric Projections systems Isometric View/s of built forms / buildings / complex structures	6 6 6
2.	Perspective Projection System Development of concepts on Perspective Projection Systems – types of Perspectives - learning of various relevant nomenclatures like Station Point, Picture Plane, Eye Level, Vanishing Points, Horizon Line – Orientation Sheet One-Point Perspective Projection Two-Point Perspective Projection Three-Point Perspective Projection	9 6 12 6
3.	Sciography Study of basic principles of Sciography – light sources - casting shades and shadows of points, lines, polygons and solids – Orientation Sheet Sciography - single and group of objects, built forms, furniture etc.	9 12
4.	Model Making	12
	Total	84

Recommended Reading: Engineering Drawing / N. D. Bhat — Basic Perspective Drawing / J. Montage — Architectural Graphics / F. D. K. Ching

Details of Construction Practice – I (AR 253)

Sessional: 0 – 0 – 4 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Study of Bricks: F.P.S. or Ordinary bricks, Metric Bricks — Terms Associated With A Brick: Arris, Bed, Header, Stretcher, Face, Frog or Kick, Bed Joints, Course, Quoin, Stopped or Closed End, Vertical Joints, Perpend — Portions of A Brick: Bat (Half bat, Three-quarter bat, Bevelled bat large, Bevelled bat small) – Closer (Queen closer, Queen closer half, Queen closer quarter, King closer, Bevelled closer, Mitred closer) – Bullnose – Splay (Splay stretcher, splay header) — Drawing the above in suitable combination and scale.	3
2	Brick Bonding – English Bond: Preparing drawings of (a) English Bond of One and One & Half Brick Right Quoins and Square Stopped Ends, (b) English Bonded Tee Junction between a single brick external wall and a half brick internal wall, (c) English Bonded Cross Junction between a single brick wall and a one & half brick wall.	6
3	Brick Bonding – Flemish Bond: Preparing drawings of (a) Double Flemish Bond of One And One & Half Brick Right Quoins and Square Stopped Ends, (b) CBR Bond of One Brick Square Stopped End.	6
4	Timber Panel Door: Study and Preparing Drawings of the following: Sectional Plan showing width of masonry & clear opening, frame, framing members, panels and glass panes; Front Elevation showing height of masonry & clear opening, door clearance, width of top, bottom & lock rails, position of lock, hinges, handles etc.; Sectional Elevation; Typical detail showing fixing of frame to wall, stile, panel and overlapping of shutters.	6
5	Timber Flush Door: Study and Preparing drawings of the construction details of solid core, cellular core and hollow core flush door.	3
6	Timber Casement Window: Study and Preparing Drawings of the following: Sectional Plan showing width of masonry & clear opening, frame, framing members, panels & glass panes; Elevation – Showing height of masonry & clear opening, shutter and framing arrange, handle fastener, bolt, hinge etc.; Sectional Elevation; Typical detail showing fixing of frame with wall and framing members with glass panes;	3
7	Metal (Aluminium) Glazed Door: Study and Preparing Drawings of the following: Sectional plan, front elevation, sectional elevation and typical details showing fixing of aluminium framing members, glass panes, floor springs and related other hardware.	6
8	Metal (Aluminium) Window: Study and Preparing Drawings of the following: Sectional plan, front elevation, sectional elevation and typical details showing fixing of aluminium framing members, glass panes roller position (in case of sliding window), hinge arrangement (in casement window), locking arrangement and related hardware.	6
9	Metal (steel) Casement Window: Study and Preparing Drawings of the following: Sectional plan; Elevation; Section; Details showing: Shutters and framing arrangement; joining of frame to wall; Fixing of arrangement glass panes	3
	Total	42

Recommended Reading: McKay W. B., 2000 Building Construction, Orient Longman — Sharma S. K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited — Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors — Arora S. P., Bindra S. P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
DEPARTMENT OF ARCHITECTURE, TOWN AND REGIONAL PLANNING
CURRICULAR STRUCTURE & SYLLABI FOR
FIVE-YEAR DEGREE COURSE IN BACHELOR OF ARCHITECTURE

With effect from intake of 2012-13

Part II (Third and Fourth Semesters)

Second Year (Part-II): Third Semester						
Code	Subject	Contact Periods			Marks	Credit
Theoretical Subjects		L	T	S		
CE 301A	Theory of Structures – I	3	0	0	100	3
CE 302A	Surveying	2	0	0	50	2
AR 301	Evolution of Architecture – II	3	0	0	100	3
AR 302	Materials and Methods of Construction – III	3	0	0	100	3
AR 303	Landscape and Site Planning	2	0	0	50	2
AR 304	Plumbing Services	3	0	0	100	3
	Sub Total	16	0	0	500	16
Sessional Subjects						
AR 351	Architectural Design Practice – II	0	0	10	250	6
AR 352	Details of Construction Practice – II	0	0	4	100	3
AR 353	Computer Aided Drawing Practice -- I	0	0	3	50	2
AR 371	Educational Tour – I	12 days			50	2
	Sub Total	0	0	17	450	13
TOTAL		16	0	17	950	29
		33				

Second Year (Part-II): Fourth Semester						
Code	Subject	Contact Periods			Marks	Credit
Theoretical Subjects		L	T	S		
CE 401A	Theory of Structures – II	3	0	0	100	3
EE 401A	Building Services I: Electrical Installations	2	0	0	50	2
AR 401	Evolution of Architecture – III	3	0	0	100	3
AR 402	Materials and Methods of Construction – IV	3	0	0	100	3
AR 403	Climatology	2	0	0	50	2
	Sub Total	13	0	0	400	13
Sessional Subjects						
AR 451	Architectural Design Practice – III	0	0	10	250	6
AR 452	Details of Construction Practice – III	0	0	4	100	3
AR 453	Computer Aided Drawing Practice – II	0	0	3	50	2
AR 454	Landscape and Site Planning Practice	0	0	3	50	2
CE 471A	Surveying	2 weeks			50	2
	Sub Total	0	0	20	500	15
TOTAL		13	0	20	900	28
		33				

THIRD SEMESTER

Theory of Structures – I (CE 301A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Theory of structures	3
2	Review of stresses on beams	3
3	Composite beams	3
4	Deflection in beams	3
5	Determinate and Indeterminate beams	6
6	Energy methods and their applications in beam problems	6
7	Theory of columns	3
8	Short and long columns	3
9	Empirical formulae	12
	Total	42

Surveying (CE 302A)

Half Paper: 2 – 0 – 0 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction, ;Types of Surveys, Chaining, Taping, Corrections, Angle and Direction Measurements,	6
2	Chain surveying; Principles, Methods of linear measurement; Instruments for Chaining; Chaining over uneven ground; Chaining tape corrections including sag corrections; Chain triangulation; Selection of stations, locating ground features; Plotting of chain survey' determination of area by chain survey, setting out of a building	10
3	Compass survey; Use of prismatic compass; Chain and Compass traversing, Plotting compass traverse	6
4	Plane table survey; Introduction and method; Errors in plane tabling	3
5	Levelling; Adjustment of dumpy level; Reciprocal levelling and profile levelling; Counteracting and interpolation of contour maps	3
	Total	28

Evolution of Architecture – II (AR 301)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: AR 201

Module No.	Module Name and Topics	No. of Classes
1.	Evolution of Temple Architecture in India (under Hindu, Buddhist and Jaina): Introduction – necessity, philosophy and interpretations, functions and nomenclature, forms, materials and constructions, iconography – Earliest Temples of India - Study of Gupta Temples - development of two main styles: South Indian (Dravida and Vesara) and North Indian (Nagara) – outline of temple architecture outside India	3
2.	Temple Architecture of Southern India: (a) Evolution of Dravida Temples – principles, functions and nomenclature, forms, different parts of temple, materials and constructions, iconography, scale and proportions – Temple development under Chalukya, Pallava, Chola, Pandya, Vijaynagar and Nayaka dynasties with appropriate examples, (b) Development of Vesara Temples under Hoysala dynasty	9
3.	Temple Architecture of Northern India: Evolution of Nagara Temples – principles, functions and nomenclature, forms, different parts of temple, materials and constructions, iconography, scale and proportions – Temple development in different regions like Bengal, Orissa, Central India, Rajasthan, Gujarat etc. with appropriate examples – overview of Jain Temples	9
4.	Evolution of Islamic Architecture in India: Birth of Islam and their spread, invasion in India – Evolution Islamic Architecture in India – vocabulary, principles and interpretations – Religious (Mosque) and Secular (Tomb, Gateways, Pavilions, Gardens, Forts) Structures – various components of structures and nomenclature of their parts (sahn, mihrab, qibla, maqsurah, squinch etc.), forms and functions, materials and construction techniques, site planning, fusion elements, scales of design etc. - outline of Islamic architecture outside India	3
5.	Islamic Architecture in and around the capital city of Delhi: (a) Sequential development of mosques, tombs and other structures during Sultani style (13 th – 16 th Century AD) under Slave, Khilji, Tughlaq, Sayyid and Lodi dynasties including contribution of Sher Shah Suri with appropriate examples – principles, scale and proportions, geometry, functions and forms, influence of Islamic styles outside India, fusion elements, evolution of different elements like domes, arches, squinches etc. – examples like quwwat-ul-islam mosque, Qutb minar, tomb of Giyasuddin Tughlaq, Sayyid and Lodi tombs etc. (b) Development of Islamic structures during Mughal style (16 th – 18 th century AD) under emperors like Babur, Humayun, Akbar, Jahangir, Shahjahan and later emperors – design philosophies and elements, concepts of Indo-Islamic architecture, functions and forms, materials and methods of constructions, context of social, political and religious issues – examples like Humayun's Tomb, Mughal garden, Fatehpur Sikri, Red Fort, Taj Mahal etc.	12
6.	Provincial styles of Islamic Architecture in India: Brief overview on provinces, design principles and interpretations, functions and forms, materials and construction, scale and proportion, fusion elements – appropriate examples	6
Total		42

Recommended Readings:

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. A History of Architecture / Sir Banister Fletcher / Butterworth Heinemann (Hb), CBS (Pb)
6. The Great Ages of World Architecture / G. H. Hiraskar / Dhanpat Rai
7. Iconography of Architectural Plans: A study of the Influence of Buddhism and Hinduism on Plans of South and Southeast Asia / F.W. Bunce / D.K. Printworld (pb)
8. Islamic Tombs in India: The Iconography and Genesis of Their Design / F.W. Bunce / D.K. Printworld (pb)

Materials and Methods of Construction – III (AR302)

Full Paper: 3 – 0 – 0 (L–T –S)

Full Marks: 100

Credit: 3

Prerequisite: AR 202

Module No.	Module Name and Topics	No. of Classes
1	Foundation: 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).	12
2	Damp Prevention and Water Proofing: Causes and effects of dampness in buildings; Methods of damp prevention - Membrane damp proofing, Integral damp proofing, Surface treatment, Guniting; Damp Proofing of Basement, Foundation & Plinth, Cavity walls, Projections, Expansion/Seismic Joints; Water proofing treatment - Flat Roofs & Terraces, Parapet Wall (Details of Coping and Drip course), Window Sill & Chajja (Detail of Drip course)	9
3	Spanning of 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.	9
4	Stairs: Components and requirements; Classification based on form, structural systems, materials; Typical construction details such as balustrade fixing, nosing, etc.	6
5	Upper 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.	6
Total		42

Suggested Readings:

1. McKay W.B., 2000 Building Construction, Orient Longman
2. Varghese P.C., 2005 Building Materials, Prentice' Hall of India Private Limited
3. Sharma S.K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited
4. Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors
5. Arora S.P., Bindra S.P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications
6. Duggal S.K., 2003, Building Materials, New Age International Publishers

Landscape and Site Planning (AR 303)

Half Paper: 2 – 0 – 0 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	<p>Introduction: Definition of Landscaping — Appreciation of scale in terms of garden, landscape and nature.</p> <p>Role of landscaping and landscape architect in architecture — Evolution of Landscaping— Elements of landscaping: Natural & Man-made</p> <p>An introduction to social and cultural dimensions of landscape.</p>	2
2.	<p>Evolution of Garden Patterns: An outline of the chronology of development and evolution of landscape and garden design in relation to architecture and city planning from the earliest period to the present day.</p> <p>Development of landscape design and gardens till the early 19th century: Detailed study of selected examples from Eastern, Central and Western traditions.</p> <p>Influences and linkages across cultures and traditions, e.g. Chinese tradition and the English Landscape style, influence of Persian traditions towards the West and East.</p> <p>Colonial landscape development in India</p> <p>Ancient Indian traditions; siting of structures, complexes and cities; traditional landscapes such as ghats, gardens, kunds, sacred groves etc. The comparative analysis of examples of landscape designs: siting, relationship to surroundings, use of landscape elements, function, scale, symbolism, etc. Illustrative range of examples from various geographic locations and periods, highlighting aspects of Form, Space and Order.</p>	10
3	<p>Guidelines for Landscaping of Specific Areas: Residential: Individual and group of buildings; Commercial: Shopping Mall; Recreational: Parks and Play Areas; Public Spaces: Plaza, Precinct and Squares</p> <p>Natural Elements of Landscaping: Rock & Landform — Water — Plants: Different types of trees, shrubs, ground covers & climbers with their characteristics mentioning the basis of their selection for different purposes</p> <p>Manmade Elements of Landscaping: Materials, construction details and maintenance of the following manmade elements of landscaping —</p> <p>(a) Paving: Hard and soft – Layout for formal and informal paving – Different kinds of paving materials: soil, stabilized <i>murrum</i>, brick & stone etc.</p> <p>(b) Outdoor Furniture – Outdoor Light Fixtures – Signage & Signboard – Sculpture – Fences</p> <p>(c) Artificial Rock – Artificial Waterfall</p>	8
4	<p>Site Planning: Site planning process and its significance; establishing relationship between site characteristics and design requirements. Inventory, documentation and site planning checklist.</p> <p>Site Survey and Appraisal; topographic surveys and their methodology, visualising landforms. Understanding contours and their characteristics, graphical representation, deriving contours by interpolation.</p> <p>Earthform Grading; symbols and annotations, basic grading principles, grading terraces, grading of roads across/along contours, Basics of road alignment (horizontal and vertical).</p> <p>Surface Drainage: Site planning for efficient drainage; understanding drainage pattern and watershed area, calculation of surface runoff, determination of catchments area and discharge rate; types of drainage systems</p> <p>Earthworks cut and fill processes, volume computations.</p>	8
Total		28

Suggested Reading:

1. Time-saver standards for LANDSCAPE ARCHITECTURE / Dines & Harris / McGraw-Hill
2. Landscape Architect's Portable Handbook / N. Dines / McGraw-Hill
3. Landscape Architecture / J. O. Simonds / Lliffee, London
4. Designs of the Landscape / Preece / CBS
5. Landscape Detailing Vol. I / M. Little wood / CBS
6. Landscape Detailing Vol. II / M. Little wood / CBS
7. Landscape for Living / G. Eckbe / F. W. Dodge Corporation, N.Y.
8. Kevin Lynch – Site Planning – MIT press, Cambridge
9. Sylvia Crowe Sheila Haywood, The Gardens of Mughal India, Vikas Publishing House
10. Testsuro Yoshida, Gardens of Japan, Jr. Marcus G. Sims, 1963
11. John O. Simonds – Earthscape, McGraw Hill Book Co., New York

Plumbing Services (AR 304)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Water Supply Sources & Requirements: Ground water, surface water, water supply requirements as per NBC — Potable Water & its Supply: Water Treatment, Direct & Indirect system, Constant or continuous & Intermittent supply — Design of Water Distribution Systems: General requirements of water distribution system, Estimate of demand load, Basic Principles of Water Distribution within the Premises, Water main, Service Pipe — Storage of Water & Down take Distribution Pipes	12
2	Sanitation and Drainage Sanitation Requirements: Sanitary fittings, Sanitary requirements as per NBC, Layout — House Drainage Pipes — Plumbing Systems — Traps — Chambers — Design Considerations for Drainage System: Sewage, Solid refuse, Sewerage, — Systems of sewage disposal Quantity of sewage, Systems of drainage — Disposal of Sewage from Isolated Buildings: Septic tank, Disposal of septic tank effluent	24
3	Materials, Fittings & Appliances Valves, Cocks, Taps, Fire Hydrants & Other Fittings — Jointing of Pipes & Pipe Materials	6
	Total	42

Suggested Reading:

1. SP 7: 2005 — National Building Code of India, Group 5 – Part IX Plumbing Services / BIS
2. Text Book of WATER SUPPLY AND SANITARY ENGINEERING / S.K. Hussain / Oxford & IBH Publishing Co.

Architectural Design Practice – II (AR 351)

Sessional: 0 – 0 – 10 (L – T – S) Full Marks: 250 Credit: 6 Prerequisite: None

The objective of this course is to facilitate the development of necessary skills in the student to create shelters of moderate complexity through a clear understanding of the interrelationships between circulation, functional uses of space (indoor as well as outdoor), area and proximity analyses, climatic and aesthetic considerations.

Sessional work through successful completion of at least two design assignments (avoiding repetition) and shall emphasize behavioural considerations in architectural design along with functional and aesthetic considerations through design of small detached structures such as residences or similar use, neighbourhood shops, clinic, cafeteria, place of worship, elementary schools and day care centres, etc.

Module No.	Module Name	No. of Classes
1	Design Problem 1	66
2	Design problem 2	66
3	Time Sketch	08
	Total	140

Details of Construction Practice – II (AR 352)

Sessional: 0 – 0 – 4 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Skin Section: Typical skin section through a two storied building on — (a) load bearing brick wall, and, (b) RCC framed structure, in 1: 50 scale.	4
2	Details of Foundation: Details of typical foundations up to plinth levels for the above two skin sections in — (a) Brickwork & (b) RCC showing typical damp proof treatments in foundation and plinth in suitable scale, minimum scale being 1:25.	8
3	Details of Spanning of Openings: Details of different typical methods of spanning of openings by — (a) Sill, (b) Lintel, and, (c) Semi-circular arch in suitable scale, minimum scale being 1:25. Details at sill and lintel levels are to be prepared in reference to the skin section drawn in Sheet no. 1.	8
4	Details of parapet: Details of a typical parapet showing coping, parapet wall, blocking course, cornice and frieze in suitable scale, minimum scale being 1:25. Details are to be prepared in reference to the skin section drawn in Sheet no. 1. ?	8
5	Details of RCC Stairs: Details of a typical RCC staircase showing fixing details of — (a) Balusters (metal & wood), and, (b) Nosing to steps in suitable scale, minimum scale being 1:25.	8
6	A. Water Proofing Treatment on Flat Roofs & Terraces using Lime Concrete: Details of water proofing treatments to flat roofs and terraces using lime concrete on flat tiles showing rain water pipe. Drawings are to be drawn in suitable scale, minimum scale being 1:25.	8
	B. Water Proofing Treatment on Flat Roofs & Terraces using Bitumen: Details of water proofing treatments to flat roofs and terraces using bitumen in four courses and six courses of grading showing rain water pipe. Drawings are to be drawn in suitable scale, minimum scale being 1:25.	8
7	Water Proofing Treatment to Parapet Wall, Window Sill & Chajja: Details of water proofing treatments to parapet walls, window sills and chajja showing coping, drip course, moulds etc. Drawings are to be drawn in suitable scale, minimum scale being 1:25.	4
	Total	56

Suggested Reading:

1. McKay W.B., 2000 Building Construction, Orient Longman
2. Sharma S.K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited
3. Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors
4. Arora S.P., Bindra S.P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications

Computer Aided Drawing Practice – I (AR 353)

Sessional: 0 – 0 – 3 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	GETTING STARTED AND DRAWING BASICS Introduction to various CAD Software and their Modules — Starting AutoCAD and understanding the AutoCAD interface; saving a file and existing from AutoCAD — Setting up a new drawing; using grid and snap, polar snap, ortho mode, object snaps	3
2	CREATING SIMPLE 2-D OBJECTS Drawing lines, circles, arcs, ellipses, point objects, construction lines, freehand sketches – Exercise.	3
3	CREATING COMPLEX 2-D OBJECTS Drawing rectangles, polygons, multi-lines, spline curves, donuts, solid-filled areas, creating regions. – Exercise Viewing tools	3
4	VIEWING A DRAWING Redrawing and regenerating a drawing; moving around within a drawing, changing drawing magnification, using aerial views, named views, multiple views; controlling visual elements.	3
5	WORKING WITH CO-ORDINATES Using Cartesian co-ordinates, 2D coordinates, 3D coordinates, point filters and tracking; Defining user coordinate system.	4.5
6	MODIFYING & EDITING OBJECTS Selecting, erasing, duplicating, rearranging, resizing, breaking and grouping objects; editing polylines, multilines and splines, exploding objects, chamfering and filleting objects	4.5
7	WRITING TEXT, DIMENSIONING & HATCHING Creating a line text, paragraph text; inserting text from outside AutoCAD, working with text style; editing and changing text; Understanding dimension styles and variables, managing dimension styles, dimensioning multiple objects. Adding hatch objects, modifying hatch objects, creating custom hatch pattern	6
8	ORGANIZING AND RETRIEVING DRAWING INFORMATION Organizing information on layers and working with linetypes; Specifying measurements and divisions, calculating areas, calculating distance and angles;	3
9	CHANGING PROPERTIES Changing object properties, using property window, matching object properties, renaming objects and elements.	
10	BLOCKS, ATTRIBUTES, EXTERNAL REFERENCES Working with blocks, attributes, external references, editing references in place	3
11	CREATING PLOT LAYOUT AND PLOTTING Using paper space and model space, creating layouts, working with layouts, using layout templates, creating floating viewports, editing in floating viewports, creating non rectangular viewports — Plotting a drawing, using plot-styles and batch plot utility.	6
	TOTAL	42

Educational Tour – I (AR 371)

Field Trip: 12 days

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics
1	Study of historic precincts/buildings, landscape and building interiors.
2	Documentation through mapping, hand-sketching, preparation of measured drawings and detailed-drawings, report writing and photography.

FOURTH SEMESTER

Theory of Structures – II (CE 401A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Steel structures: Permissible stresses; Design of truss members; Simple riveted and welded connections including beam-end connections	9
2	Built-up beams and columns: Design of base-plate, gusset plate and concrete footings for steel columns Grillage foundation	12
3	Reinforced concrete: Permissible stresses, Rectangular, T and L beams; Double reinforced beams One way slab; Columns and isolated footings Design of lintels and Chajjas Cantilever beams Distribution of base pressure; Middle third rules; earth pressure Design of simple retaining wall; Cantilever retaining wall.	21
	Total	42

Building Services – I: Electrical Installations (EE 401A)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Fundamentals of electricity, current, voltage; Distribution of electric power in towns / cities and house hold connections;	6
2	Elements of building wiring system – feeders, panel board, circuit breakers' fuses, switches etc.; Electrical symbols	6
3	Installations from meter board to individual point; Electrical wiring system; Distribution boards and layout of points; Different materials and specification; Earthing agreements; Lighting conductors	8
4	Fixtures and accessories used in electrical installation; Schematic layout of installations and points for different building types;	8
	Total	28

Evolution of Architecture – III (AR 401)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Architecture of Classical Greece: Democratic city-states, human scale, columnar & trabeated architecture, extrovert Space — Orders: Doric, Ionic, Corinthian — Elements of urban architecture: Acropolis at Athens with idea about agora, stoa, bouleutorion, theatre, odeion, stadium, hippodrome and gymnasia — Detail study of the Parthenon, Athens	9
2	Architecture of Classical Rome: Imperial nation-state, monumental scale, arcuated architecture, introvert space, use of new materials — Orders added: Tuscan and Composite or Roman — Comparative proportions of the Classical Orders — Idea about the temples, forum, basilicas, thermae & balneae, theatre, amphitheatre, circuses, triumphal arches & columns, aqueducts & bridges — Detail study of the Pantheon, Rome	9
3	Early Christian Architecture: Expression of Christian ethos through adaptation of existing building elements – Basilican Churches — Detail study of the Basilica of St. Peter, Rome with emphasis	2
4	Byzantine Architecture: Difference in the nature of Christ – Orthodox Churches & Greek Cross – Spanning square plan with pendentives – Use of large opening creating radiant interior — Detail study of the Hagia Sophia, Constantinople	3
5	Romanesque Architecture: Consolidation of Papal hierarchy – Development of stone vaulting into groined systems – Tracery admitting diffused light – Church plan as a Latin Cross — Detail study of the Pisa Cathedral with Baptistry & Campanile	3
6	Gothic Architecture: Medieval age – Structure conceived as framework of organised coherent system of pointed arches, flying buttresses & vaults – Rectangular church plans with high pinnacles — Detail study of the Notre Dame, Paris	6
7	Renaissance Architecture: Reformation movements – Revival of classical learning – Use of stucco for increasingly refined interiors – Systematisation of architectural drawing – Architects as important personalities – Detail study of the evolution of the plan of the Cathedral of St. Peter, Rome — Baroque: movement, spatial invention, drama and freedom of detail – Detail study of Piazza of St. Peter, Rome — Rococo	10
	Total	42

Suggested Reading:

1. Sir Banister Fletcher's History of Architecture (Century Edition)/ Butterworth Heinemann (Hb), CBS Publishers & Distributors (Pb)
2. The Story of Architecture from antiquity to the present/ Jan Gympel / Könemann (Pb) —
3. A World History of Architecture/ Marian Moffett, Michael Fazio & Lawrence Wodehouse / McGraw-Hill
4. Encyclopaedia of Architectural Technology: Ed. Pedro Guedes / McGraw-Hill
5. Crash course in Architecture/ Eva Howarth/ Caxton Editions
6. The Great Ages of World Architecture/ G. H. Hiraskar/ Dhanpat Rai

Materials and Methods of Construction – IV (AR 402)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Pitched Roofs: Nomenclature, Types - 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.	6
2	Finishes: Flooring – Brick, Stone, Concrete, Terrazzo, Tiled, Timber (Parquet), Asphalt, Rubber, PVC, Linoleum , Cork, Magnesite, Glass and Acid-Proof; Internal Wall and Ceiling Finishes - Cement Plaster, Gypsum Plaster, Wall putty, Gypsum Plaster Board; External Finishes - Cement Plaster (Smooth Wood Float Finish, Pebble Dash Finish, Textured Finish, Rough Cast Finish or Sponge Finish), Pointing; Cladding (external & internal) - Timber/Timber product, Brick Tiles, Ceramic Tiles, Stone Tiles, Metal, PVC, FRP, GFRC; Paints – Constituents, Functions, Types; White Washing & Colour Washing.	18
3	Partition walls, screen walls, structural glazing: Uses, Details of construction	6
4	False Ceilings: Uses, Details of construction	6
5	Thermal and Acoustic Materials: Types, Properties, Applications, Details of construction	6
	Total	42

Suggested Reading:

1. McKay W.B., 2000 Building Construction, Orient Longman
2. Varghese P.C., 2005 Building Materials, Prentice' Hall of India Private Limited
3. Sharma S.K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited
4. Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors
5. Arora S.P., Bindra S.P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications
6. Duggal S.K., 2003, Building Materials, New Age International Publishers

Climatology (AR 403)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	<p>Comfortable Built Environment: Orientation of Buildings</p> <p>Climate & weather Basic climatic zones: hot & arid, hot / warm & humid, cold Climatic factors: solar radiation & temperature, clouds, relative humidity, prevailing wind; measuring instruments and SI units Features of dwellings in tropics: aspects of daylighting, plantation of trees.</p>	4
2	<p>Comfort: The Desirable Conditions</p> <p>Requirement of ventilation Heat balance of body Sun path diagram — comfort zone & bio-climatic chart — comfort range Air change per hour — recommended values of air changes for different occupancies as per the NBC Methods of ventilation</p>	4
3	<p>Principles Of Thermal Design</p> <p>Thermal quantities – Heat flow, heat flow rate, density of heat flow rate — Sol-air temperature — Solar gain factor Heat Exchange Process: Conduction – Convection – Radiation through windows Evaporation — Calculation of heat loss & heat gain — Cooling & heating by air — Transmittance of Composite Walls, Thermal Gradient</p>	4
4	<p>Means Of Thermal Control: Natural Ventilation</p> <p>Principle of nature ventilation in buildings Cross-ventilation — position of openings – size of openings — control of openings: sashes, canopies, louvers wind shadow — humidity control: wind scoop</p>	4
5	<p>Means of Thermal Control: Structural Controls</p> <p>Solar control: internal blinds & curtains – heat absorbing glasses Sun's position: effects of angle of incidence – stereographic projection – shadow angles Shading devices: vertical & horizontal – design of shading devices</p>	4
6	<p>Principles of Lighting</p> <p>Aims of good lighting and realization of the same Planning the brightness pattern considering the visual task, the immediate background of the task (central field & visual field) and the general Surroundings (peripheral field) Glare: direct, reflected & veiling Recommended values of illumination level for different occupancies as per the NBC</p>	4
7	<p>Daylighting</p> <p>Sources of light of a point inside a building: skylight, externally reflected light, internally reflected light, direct sunlight — working plane Daylight factor — components of daylight factor: SC, ERC, IRC — daylight penetration</p>	4
	Total	28

Architectural Design Practice – III (AR 451)

Sessional: 0 – 0 – 10 (L – T – S) Full Marks: 250 Credit: 6 Prerequisite: None

The objective of this course is to understand the organization of spaces for uses at their moderate hierarchy, incorporating structural concepts, and building materials and their applicability in design. Volumetric studies of built form, and interrelationships between internal and external spaces.

Sessional work through successful completion of at least two design assignments (avoiding repetition) on built form of moderate complexity, including but not limited to guest house, school, community building, post office, banks, etc.

Module No.	Module Name	No. of Classes
1	Design Problem 1	66
2	Design problem 2	66
3	Time Sketch	08
	Total	140

Details of Construction Practice – III (AR 452)

Sessional: 0 – 0 – 4 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Details of Pitched Roofing: Details of a typical pitched roof on steel trusses showing their fixing details and roof drainage through gutter; roofing materials being — (a) Tiles, and, (b) Corrugated Galvanised Iron sheet. The scale of reference plan and reference section be drawn in minimum 1:50 scale, and, other details at ridge, eaves etc. in suitable scale, minimum scale being 1:25.	12
2	Partition Wall: Details of typical brick partition walls showing masonry openings in suitable scale, minimum scale being 1:25.	8
3	False Ceiling: Details of suspended type false ceilings in suitable scale, minimum scale being 1:25.	8
4	Curtain Wall: Details of curtain walls using suitable scale, minimum scale being 1:25.	6
5	Wall Cladding	6
6	Municipal drawing involving preparation of set of drawings as per provisions of Bye laws of different municipalities including, but not limited to KMC, HMC, Bidhannagar, HIDCO, West Bengal Municipal Act, etc.	16
	Total	56

Suggested Reading:

1. McKay W.B., 2000 Building Construction, Orient Longman
2. Varghese P.C., 2005 Building Materials, Prentice' Hall of India Private Limited
3. Sharma S.K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited
4. Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors
5. Arora S.P., Bindra S.P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications
6. Duggal S.K., 2003, Building Materials, New Age International Publishers

Computer Aided Drawing Practice – II (AR 453)

Sessional: 0 – 0 – 3 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Drawing in 3D environment: 3D CAPABILITIES OF CAD SOFTWARE - Conceptual framework of drawing in 3D	3
2	Drawing Basic 3D Objects: Drawing 3D from 2D shapes and objects: Extrusion of lines and surfaces.	6
3	3D Solids: Properties, Draw, Edit, Join, Attributes.	9
4	3D Surface: drawing 3d surfaces with edge criteria. creating and editing 3d mesh	6
5	Publishing a drawing: Export, Import, Plot and Publish Drawing	3
6	Rendering in CAD: Use of Camera, Lights and View. Various rendering techniques.	9
7	Introduction to LISP	6
	TOTAL	42

Landscape Practice (AR 454)

Sessional: 0 – 0 – 3 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Landscaping of A Residential Space Students are required to prepare landscaping schemes for a given residential space which has a recreational space attached to it in the form of a park and/or a playground. Each student is to select his or her site in consultation with the teacher-in-charge, which may be designed by the student in the previous semesters or a one designed by any other architect collected from primary or secondary source.	21
2	Landscaping of a Commercial / Recreational Space Each student is required to prepare landscaping schemes for a given commercial/ recreational space.	21
	Total	42

Suggested Reading:

1. Time-Saver Standards for Landscape Architecture / Dines & Harris / McGraw-Hill
2. Landscape Architect's Portable Handbook / N. Dines / McGraw-Hill
3. Landscape Architecture / J. O. Simonds / Liffie, London
4. Designs of the Landscape / Preece / CBS
5. Landscape Detailing Vol. I / M. Little wood / CBS
6. Landscape Detailing Vol. II / M. Little wood / CBS
7. Landscape for Living / G. Eckbe / F. W. Dodge Corporation, N.Y.

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
DEPARTMENT OF ARCHITECTURE, TOWN AND REGIONAL PLANNING
CURRICULAR STRUCTURE & SYLLABI FOR
FIVE-YEAR DEGREE COURSE IN BACHELOR OF ARCHITECTURE

With effect from intake of 2012-13

Part III (Fifth and Sixth Semesters)

Third Year (Part-III): Fifth Semester						
Code	Subject	Contact Periods			Marks	Credit
		L	T	S		
Theoretical Subjects						
CE 501A	Design of Structures – I	3	0	0	100	3
AR 501	Contemporary Architecture – I	3	0	0	100	3
AR 502	Materials and Methods of Construction – V	3	0	0	100	3
AR 503	Estimation and Specification	2	0	0	50	2
AR 504	Building Services II: Architectural Acoustics	2	0	0	50	2
AR 505	Architectural Illumination	2	0	0	50	2
	Sub Total	15	0	0	450	15
Sessional Subjects						
AR 551	Architectural Design Practice – IV	0	0	12	300	8
AR 552	Working Drawing – I	0	0	4	100	3
AR 553	Estimation Practice	0	0	3	50	2
AR 571	Educational Tour – II	12 days			50	2
	Sub Total	0	0	19	500	15
	TOTAL	15	0	19	950	30
		34				

Third Year (Part-III): Sixth Semester						
Code	Subject	Contact Periods			Marks	Credit
		L	T	S		
Theoretical Subjects						
CE 601A	Design of Structures – II	3	0	0	100	3
ME 601A	Building Services III – Mechanical Services	2	0	0	50	2
AR 601	Contemporary Architecture – II	3	0	0	100	3
AR 602	Disaster Resistant Architecture	3	0	0	100	3
AR 603	Energy Efficient Architecture	2	0	0	50	2
AR 604	Valuation of Real Properties	2	0	0	50	2
	Sub Total	15	0	0	450	15
Sessional Subjects						
AR 651	Architectural Design Practice – V	0	0	12	300	8
AR 652	Working Drawing – II	0	0	4	100	3
AR 653	Interior Design Practice	0	0	4	100	3
	Sub Total	0	0	20	500	14
	TOTAL	15	0	20	950	29
		35				

FIFTH SEMESTER

Design of Structures – I (CE 501A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Theory of structures; Indeterminate beams, trusses and portal beams; Moment distribution method	15
2	Reinforced concrete; Two way slabs; Continuous beams; Columns with moment; Flat slab, Grid floor; Column footings – Combined footing, Raft foundation; Pile foundation;	18
3	Study of B.I.S. and Design Codes.	9
	Total	42

Contemporary Architecture – I (AR 501)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Architectural types/styles/ period – definition – timeline of developments in Architecture — Era of Colonial expansion — Georgian Architecture: Background – features – examples. Including introduction to colonial buildings in India/abroad – Special mention to colonial buildings of Kolkata.	4
2	Neoclassic/ Idealist Architecture: Background – International movement – features – study of some examples — 19th Century Gothic revival Architecture: Background – features – examples — Greek Revival Architecture: Background – features – examples — Victorian Architecture: Background – features – examples — Arts and Crafts Movement in Architecture: Background – features – examples — Art Nouveau Architecture: Background – features – examples.	18
3	Industrial Revolution and its impact: Background – features – examples — Neo classic Indo-Saracenic Architecture: Background – features – examples — Art Deco and Architecture: Background – features – examples.	20
4	Modern Architecture: Background – features – examples. (May include but not limited to) Life, philosophy and works of Louis Sullivan; F. L. Wright – Prairie style, Usonian style, Organic Architecture; Adolf Loos – Raumplan; Walter Gropius – Bauhaus; Erich Mendelson; Le Corbusier – five points in Architecture; Mies Van Der Rohe; Alvar Aalto; Philip Johnson; Oscar Niemeyer; Buckminster Fuller – Geodesic; Kenjo Tange; Hassan Fathy; Louis Kahn; and other renowned architects. Modern Architectural trends in India — Introduction to Post Modern Architecture: Background – features – examples.	20
Total		42

Suggested Reading:

1. Adolf Loos – Ornament and Crime.
2. Charles Jenks – Introduction to Post Modern Architecture.
3. Christopher Crouch – Modernism in Art Design and Architecture.
4. Edward R. Ford – The Details of Modern Architecture.
5. F. L. Wright – The future of Architecture.
6. Hugh Honour – Neoclassicism.
7. James Stevens Curl – Georgian Architecture.
8. J. M. Richards – 800 Years of Finnish Architecture.
9. Kenneth Frampton – Modern Architecture: A Critical History.
10. Le Corbusier – Le Modulor.
11. Le Corbusier - Towards a New Architecture.
12. Marion Moffett, Michael Fazio and Lawrence Wodehous – World History of Architecture.
13. Marvin Trachtenberg and Isabelle Hyman – Architecture: From Prehistory to Postmodernity, 2nd edition.
14. Neil Leach – Rethinking Architecture: A Reader in Cultural Theory.
15. Spiro Kostof – History of Architecture: Settings and Rituals.
16. Sigfried Giedion – Space, Time and Architecture.
17. Udo Kultermann – Architecture in the 20th Century.
18. Ulrich Conrads – Programs and manifestos on 20th century architecture.
19. Veronica Biermann et al. – Architectural Theory: From the Renaissance to the Present.
20. William Curtis – Modern Architecture since 1900.

Materials and Methods of Construction – V (AR 502)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Formworks: Materials used in formwork; Requirements of good formwork; Rules to be followed in the removal of formwork at different locations; Comparison of Steel & Timber formwork; Typical details of formwork for footing, wall, column, beam-slab, staircase, arches, domes etc.	6
2	Joints in Structures: Types of Joints - Expansion Joints, Construction Joints, Sliding Joints, Isolation joints; Details of treatment & finishing.	6
3	Miscellaneous Materials: Gypsum and allied products; Blast Furnace Slag; Fly Ash; Fibre Glass; Composite Materials—matrix and fibre; Composite materials in construction.	9
4	Miscellaneous Structures: Domes and Vaults, Shell structures, Folded plate structures, Tensile structures, Space frames, pneumatic structures – Fundamental principles and applications.	9
5	Structural Steelwork: Standard sections (Rolled and Hollow) used in steel work; Methods connections; Fabrication and Erection	6
6	Construction equipment: Excavation equipment; Compaction equipment; Hauling equipment; Hoisting equipment; Pumping equipment – Applications and principles of operation.	6
Total		42

Suggested Reading:

1. McKay W. B., 2000 Building Construction, Orient Longman
2. Varghese P.C., 2005 Building Materials, Prentice' Hall of India Private Limited
3. Sharma S. K., 2000 A Text Book Of Building Construction, S. Chand & Company Limited
4. Kumar Sushil, 2000 Building Construction, Standard Publishers Distributors
5. Arora S. P., Bindra S. P., 2000 A Text Book Of Building Construction (Planning Techniques And Methods Of Construction), Dhanpat Rai Publications
6. Duggal S. K., 2003, Building Materials, New Age International Publishers

Estimation and Specification (AR 503)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and topics	No. of classes
1	Introduction to Estimating: Definition, Purpose, Types, IS:1200	2
2	Introduction to Specification Definition — Purpose of Specification — Principles of writing specification — Types of Specification: General specifications & Detailed specifications	2
3	Introduction to Rate Analysis Definition, Purpose, Factors affecting the rate per unit of an item	4
4	Principles of Estimating: General items of work, Principle units of measurement, rate, mode. Methods for estimating, Problems	4
5	Approximate Estimate: Purpose, types. Problems in PAR estimate	4
6	Specification of Buildings: General, Detailed specifications for Earthwork in Excavation – Earthwork in Filling – Brick Soling – Plain Cement Concrete – Reinforced Cement Concrete – Damp Proof Course – First Class Brickwork – Patent Stone Flooring – Terrazzo or Mosaic Flooring laid in situ – Cement Plaster Skirting – Glazed Tiles in Skirting and Dado – Woodwork for door and window frames – Woodwork for door and window shutters – Cement Plastering – Cement Pointing – Lime terracing – White washing – Colour washing – Distempering Detailed specifications	8
7	Estimate of Buildings Detailed quantity estimate of a double storied apartment building including doors and windows, plumbing and sanitary works, electrical works, and rate analysis	4
	Total	28

Suggested Reading:

1. Estimating, Costing, Specification and Valuation in Civil Engineering / M. Chakraborti.
2. Estimating & Costing in Civil Engineering Theory & Practice Including Specification & Valuation / B. N. Dutta / UBSPD

Building Services – II: Architectural Acoustics (AR 504)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and topics	No. of classes
1	Nature of Sound: Sound Waves, Sound Levels- Power, Intensity and Pressure, Auditory Range- thresholds of hearing & pain, Decibel scale, Sound Effects on Human; Incidence of Sound- reflection, absorption & transmission; Noise, Sound in Open Air- effects of wind flow & temperature gradients, acoustic shadow ; Sound in Enclosed Space- air-borne & structure-borne (impact) sound, direct & reverberant components, reverberation time using Sabine's formula (dead & live room), echo, resonance.	6
2	Environmental Acoustics: Various Noise Sources, Planning Against Noise- zoning, distancing & screening, green belts & landscaping, noise barriers, Outdoor Noise Regulations in India, Open-air Auditorium.	4
3	General Building Acoustics: Acceptable Indoor Noise Levels, Transmission Loss and insulation against air-borne sound, Various Sound Absorbents, Reduction of Noise, Noise isolators in Construction- hollow & composite wall, resilient surface materials, floating floor construction for concrete & wooden floors, suspended ceiling, Acoustic treatment of skirting, windows & ventilators.	8
4	Residential Buildings: Sources of Noise and Recommendations- site planning, internal planning, sound insulation.	2
5	Educational Buildings: Sources of Noise and Recommendations- site planning, internal planning, noise reduction within rooms, sound insulation.	2
6	Auditoria and Theatres: Sources of Noise- outdoor and indoor, Recommendations- geometry & shape, seating arrangement, design criteria for different purposes; Electro-acoustic installations.	6
	Total	28

Suggested Readings:

1. Manual of Tropical Housing and Building Part 1 Climatic Design / O. H. Koenigsberger, T. G. Ingersoll, A. Mayhew, S. V. Szokolay / Orient Longman
2. SP 7 (4): NATIONAL BUILDING CODE OF INDIA 2005 Group 4, Part 8 Building Services, Section 4: Acoustics, Sound Insulation & Noise Control / Bureau of Indian Standards
3. Architectural Acoustics- M. David Egan/ J. Ross Publishing (2007)

Architectural Illumination (AR 505)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and topics	No. of Classes
1	Introduction: What is Light, Electromagnetic Wave Theory, Ultraviolet Light, Visible Light, Color Models, Infrared Light, The Power of Light, Quantum Theory, Flat Response, Visible Light, Effective Irradiance, How Light Behaves, Reflection, Transmission: Beer-Lambert or Bouguer's Law, Refraction: Snell's Law, Diffraction, Interference, Manipulating Light, Diffusion, Collimation, Transmission Losses, Focusing Lenses, Mirrors, Concave Mirrors, Internal Transmittance, Prisms, Diffraction Gratings	4
2	Daylighting: Points to remember about daylighting, Integrating daylighting and electric lighting, Top lighting, Side lighting, Basic principles of daylighting design and awareness.	4
3	Light Sources: Qualities of light sources, how light is generated, the spectrum of light, Color classification of light sources, Point source, Line source, or Area source, Ballast or Transformer, Lamp Size, Voltage, Bulb Temperature, Operating Temperature, Operating Position, Starting, Warming Up, and Restarting, Dimming Characteristics, Energy Efficiency, Incandescent and Halogen, Fluorescent lamps -- Standard Straight and U-bent Lamps, Compact Fluorescent Lamps, Metal Halide Lamps, Sodium Lamps, Mercury Vapor Lamps, Other light sources -- Induction Lamps, Light-Emitting Diodes, Neon and Cold Cathode Lamps.	2
4	Luminaires: How to choose basic luminaire types, Styles of luminaire – Downlights, Troffers, Commercial Fluorescent Fixtures, Industrial Luminaires, Linear Lighting Systems, Architectural Lighting Fixtures, Wall washers, Wall Grazing Fixtures, Accent Fixtures, Cove Lights, Task Lights, Decorative Lighting.	2
5	Lighting Calculations: Basic Theory – Lamps, Luminaires and Directional Lamps, Initial Versus Maintained Light Levels, Predicting Lighting Results In Design -- Predicting General and Ambient Light Levels, Predicting Task Lighting and Focal Lighting Levels, Rough Calculations for Architects and Interior Designers -- The Watts-per-Square-Foot Method, A Very Simple Lumen Method, A Very Simple Point Method.	4
6	Documenting Lighting Design: Drawings and Contract Documents -- Lighting Documents, Base Plans -- Floor Plans, Reflected Ceiling Plans, Combined Ceiling/Floor Plans, Creating A Lighting Plan -- Lighting Symbols, Lighting Tags, Circuits, Switching and Dimming, Details, Lighting Legends and Schedules -- Lighting Legends, Lighting Schedules, Lighting Specifications.	2
7	A Basic Approach to Lighting Design: Sequential Steps To Successful Lighting Design Solutions, Determination of Lighting Design Criteria, Recording of Architectural Conditions and Constraints, Determination of Visual Functions and Tasks to Be Served, Selection of Lighting Systems to be Used, Selection of Luminaire and Lamp Types, Determination of Number and Location of Luminaires, Placement of Switching and Other Control Devices, Consideration of Aesthetics and Other Intangibles.	3
8	Residential Lighting Design: Living Room Lighting, Dining Room Lighting, Small Kitchen Lighting, Lighting the Larger Kitchen, Bathroom Lighting, Bedroom Lighting,	3
9	Outdoor lighting Design: outdoor and landscape lighting design	2
10	Energy Codes: Energy Code Structure, Lighting Power Limits, Outdoor Lighting Power Limits, Calculation of Installed Lighting Power, Mandatory Switching Requirements, Mandatory Control Specifications, Optional Lighting Control Credits, Compliance Documentation,	2
Total		28

Architectural Design Practice – IV (AR 551)

Sessional: 0 – 0 – 12 (L – T – S) Full Marks: 300 Credit: 8 Prerequisite: None

The objective of this course is to undertake design development with the areas of emphasis being (1) climate response, energy efficiency and sustainability, (2) design for special user groups with behavioural considerations, and (3) barrier free environments, etc.

Sessional work through successful completion of at least two design assignments (avoiding repetition) which may include design problems involving different user groups in institutional, commercial typologies. Sustainability and energy efficient philosophies shall be addressed through design problems such as energy efficient/"green" office buildings, commercial complexes, etc. Emphasis on behavioral considerations with respect to special user groups and incorporation of barrier free philosophies in design shall be addressed through design problems such as educational and vocational facilities for mentally/physically challenged, through inclusive design, facilities for elderly, such as old age and respite care homes, retirement communities, etc.

Module No.	Module Name	No. of Classes
1	Design Problem 1	78
2	Design problem 2	78
3	Time sketch	12
	Total	168

Working Drawing – I (AR 552)

Sessional: 0 – 0 – 4 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Working Drawing of a single storied Load Bearing Structure - A set of working drawings in 1:50 scale (unless otherwise mentioned) drawn manually consisting of foundation plan, floor plan, roof plan, elevations and sectional elevations - The architectural design may be one designed by the student in the earlier semester, or may be provided by the faculty-in-charge.	16
2	Working Drawing of a Framed Structure (preferably G + at least upto 4 stories) - A set of working drawings in 1:50 scale (unless otherwise mentioned) consisting of foundation plan, floor plan/s, roof plan, elevations, sectional elevations, and appropriate construction details (if any) - The architectural design may be one designed by the student in the earlier semesters, or may be supplied by the faculty-in-charge.	40
	Total	56

Estimation Practice (AR 553)

Sessional: 0 – 0 – 3 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name	No. of Classes
1	Detailed quantity estimate of a double storied apartment building including sanitary works and electrical estimation (on point basis) with annual repair and maintenance estimate	42
	Total	42

Educational Tour – II (AR 571)

Field Trip: 12 days

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics
1	Study of historic precincts/buildings, landscape and building interiors.
2	Documentation through mapping, hand-sketching, preparation of measured drawings and detailed-drawings, report writing and photography.

SIXTH SEMESTER

Design of Structures – II (CE 601A)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Theory of structures	6
2	Wind load	3
3	Analysis of multi storied frames-portal method	6
4	Beams curved in plan	6
5	Plastic analysis of structures	6
6	Pre-stressed concrete; Principles, materials, tensioning, methods and devices; Anchorages, pre-tensioning, post-tensioning; Cable profile; Losses in pre-stresses;	9
7	Study of B.I.S. and Design Codes	6
	Total	42

Building Services – III Mechanical Services (ME 601A)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Mechanical Ventilation: Fan: propeller & centrifugal — Installation of fans: local & central — Systems of ventilation: exhaust, plenum (positive ventilation) & combined — Filters: dry, wet, washing & electrostatic — Determining Rate of Ventilation	6
2	Air Conditioning: Properties of air and water vapour mixture – Psychometric Charts – Mechanical Cooling (heat- pump circuit): refrigerant, compressor, condenser, pressure release valve, evaporator — Refrigerator & Air cooler — Simple air-conditioner: propelling, filtering, washing, humidifying, cooling, dehumidifying, heating or re-heating — Ton of refrigeration — Cooling and Heating loads for summer and winter air-conditioning — Simple load calculation of air-conditioning system in building — Building installation of air-conditioners: central handling, local handling & induction system — Control Systems: sensors, control unit, servo-mechanisms	6
3	Lifts: Classification, Essential components, Design considerations, Installation	6
4	Escalators: Essential components, Design considerations, Installation	4
5	Firefighting: General Classification: Criteria of Fire Resistance — Combustible Material — Occupancy or Use Group — Types of Construction Requirements for Fire Protection for different building categories and typologies Exit requirements	6
Total		28

Suggested Reading:

1. SP 7 (4): NATIONAL BUILDING CODE OF INDIA 2005, Group 4 – Part VIII Building Services / Bureau of Indian Standards
2. Manual of Tropical Housing and Building Part 1 Climatic Design/O. H. Koenigsberger, T. G. Ingersoll, A. Mayhew, S. V. Szokolay / Orient Longman
3. William H. Severns and Julian R. Fellows, Air-conditioning and Refrigeration, John Wiley and Sons, London, 1988
4. A.F.C. Sherrat, Air Conditioning and Energy Conservation, The Architectural Press, London, 1980

Contemporary Architecture – II (AR 601)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Architectural types/styles/ period – definition – timeline of developments in Architecture from 1950s to the Present day.	3
2	Tall buildings: Evolution of structural systems leading to tall structures and buildings – examples.	6
3	Late Modernism: Formalism, Brutalism and High Tech — Examples, Architects and contextual reference of such buildings	9
4	Art and Architecture of Post Modern Movement: Architecture as a form of art, functionalism in architecture. Post Modern thinking in various forms of art.	9
5	Tradition and Deconstruction: Pluralism, Relativism, Constructivism – meaning and contextual reference — Works of architects that may include but not limited to Robert Ventury, Charles Moore, Hans Hollein, Philip Johnson, Louis Kahn, James Stirling, Michael Graves, Aldo Rossi.	9
6	Architecture of the future: Green Architecture; Technology and social changes; Environmental issues; Global and Local Paradigm; Scope of Vernacular architecture	6
Total		42

Suggested Reading:

1. Charles Jenks – *The Language of Post Modern Architecture*.
2. Marvin Trachtenberg and Isabelle Hyman – *Architecture: From Prehistory to Post-modernity, 2nd edition*.
3. Neil Leach – *Rethinking Architecture: A Reader in Cultural Theory*.
4. Spiro Kostof – *History of Architecture: Settings and Rituals*.
5. Sigfried Giedion – *Space, Time and Architecture*.
6. John Summerson – *The Classical Language of Architecture*
7. Veronica Biermann et al. – *Architectural Theory: From the Renaissance to the Present*.
8. William Curtis – *Modern Architecture since 1900*.
9. Robert Venturi – *Complexity and Contradiction in Architecture*
10. Robert Venturi, Denise Scott Brown, and Steven Izenour – *Learning from Las Vegas*
11. Rem Koolhaas, *Delirious New York*
12. Peter Cook – *Plug-in City(1962)*

Disaster Resistant Architecture (AR 602)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Classification of disasters: natural and man-made — Impact of disasters in world and India with special reference to built environment	1
2	Occurrence of earthquakes - a geological perspective: Structure of the Earth — Plate tectonics — Evolution of the Indian subcontinent — Types of earthquakes — Seismic zones in global and Indian context	3
3	Earthquake Basics: Basic Terms: fault line, focus, epicenter, epicentral distance, focal depth, peak ground acceleration — Consequences of earthquake ground motion — Seismic waves and their characteristics — Measurement of Earthquake: measuring instruments, magnitude and intensity — Various scales of magnitude and intensity	6
4	Seismic effect on structures: Inertia force in structures: effect of deformations in structures, horizontal and vertical shaking, flow of inertia to foundations — Building configuration: overall building aspect ratio in horizontal and vertical planes — Irregularities in buildings: reentrant corners, torsional irregularity, staggered grid lines, vertical setback, soft and weak storey, sloped ground, hanging or floating columns, discontinuity of load transfer path, pounding — Allowable levels of asymmetry	9
5	Philosophy of seismic design: Earthquake resistant buildings — Ductile and brittle material: importance of flexibility — Survival of non-engineered vernacular buildings	1
6	Design of buildings for earthquake resistance: Factors affecting earthquake loading: mass, natural period, damping, ductility — Brick masonry buildings: low and tall wall, long and short wall, in-plane and out-of-plane failure mechanism, horizontal bands and connecting adjacent walls, brick bonding and mortar, wall opening and vertical reinforcement — RCC buildings: role of floor slab and infill wall, strength hierarchy between beams, columns and foundations, role of RCC beams and columns	12
7	Occurrence of tropical cyclones: Formation of tropical cyclones — Intensity classification of cyclones — North Indian ocean — Indian wind code zones	3
8	Effect of cyclones on buildings: Velocity of wind: effect of terrain category, effect of height and structure, effect of topography — Interaction between wind and building: air flow around buildings, air flow through buildings	4
9	Improving cyclone resistance of vernacular structures: Principal damage feature: failure at different junctions — Study of undamaged buildings — Simple guidelines: bracing, bolting, anchorage, lashing	3
Total		42

Suggested Reading:

1. SP 7 (2005): National Building Code of India/ Bureau of Indian Standards
2. IITK BMTPC Earthquake Tips by C.V.R Murty
3. Earthquake Design Concepts by C.V.R Murty and Andrew Charleson
4. Seismic Conceptual Design of Buildings—Basic Principles for Engineers, Architects, Building Owners and Authorities by Hugo Bachmann

Energy Efficient Architecture (AR 603)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction to Energy-forms of energy, Non-renewable and Renewable sources, present scenario and prospects in India, Energy Conservation and the relevant act in India Consumption of energy in building sector, Conservation of building materials – embodied energy	4
2	Fundamentals of heat transfer, Insulation and glazing. Solar energy, Passive solar building systems- design principles and examples	6
3	Passive cooling strategies in reference to climatic potential and comfort requirements with examples	4
4	Fundamentals and Design of active systems, Solar water heating systems- Factors affecting the performance of solar heating systems, Absorber plates and heat transfer fluids- flat plates, box collector etc., Use of Photovoltaic cells in buildings.	4
5	Building energy management system and energy audit of buildings.	4
6	Green Buildings and Rating systems, Introduction to Energy Conservation Building Code and its significance in energy conservation in future buildings.	6
	Total	28

Suggested Readings:

1. Manual of Tropical Housing and Building Part 1 Climatic Design / O. H. Koenigsberger, T. G. Ingersoll, A. Mayhew, S. V. Szokolay / Orient Longman
2. Environmental Science in Building (4th Edition) / Randall McMullan / Macmillan Press Ltd.
3. Official website of Bureau of Energy Efficiency, Govt. of India / <http://www.beeindia.in/>

Valuation of Real Properties (AR 604)

Half Paper: 2 – 0 – 0 (L – T – S) Full Marks: 50 Credit: 2 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction Cost, price, value and valuation – Purposes of valuation – Factors affecting valuation of properties.	4
2	Common Concepts associated with Valuation Income: Gross and Net, Perpetual and Deferred, Outgoings – Market Value and Book Value, Scrap Value and Salvage Value – Depreciation and Obsolescence, Gilt-edged securities – Annuity: annuity certain, annuity due, deferred annuity – Year's Purchase and Capitalized Value, problems – Sinking Fund, problems.	6
3	Valuation of Building Methods of calculating depreciation: straight line method, constant percentage method or declining balance method, sinking fund method, quantity survey method, problems – Cost from record, Cost by detailed measurement – Methods of Valuation: Rental Method of valuation, Direct comparison with capital value, Valuation based on profit, Valuation based on cost, Development method of valuation, Depreciation method of valuation – Cost of Land – Valuation Tables and use – Problems on valuation of building.	6
4	Property and Lease Property: real estate property and personal property – Real Estate Property: freehold property and leasehold property – Lease: lessee and lessor – Building Lease, Occupational Lease, Sub-lease, Life Lease, Perpetual Lease – Mortgage – Easement – Problems.	6
5	Rent Rent, Types of rent – Fixation of Rent – Valuation and Rent fixation of Government Building, problems – Writing valuation report.	6
	Total	28

Suggested Reading

1. Estimating, Costing, Specification and Valuation in Civil Engineering/ M. Chakrabarti.
2. Estimating & Costing in civil engineering Theory & Practice including Specification & Valuation/ B. N. DUTTA / UBSPD

Architectural Design Practice – V (AR 651)

Sessional: 0 – 0 – 12 (L – T – S) Full Marks: 300 Credit: 8 Prerequisite: None

The objective of this course is to undertake design development of a complex nature with emphasis on the articulation of interior and exterior spaces through detailing and finishing materials, textures, and with special emphasis on (1) building services and, (2) response to socio cultural issues. The design assignments may be in the context studied during study tour.

Sessional work through successful completion of at least two design assignments (avoiding repetition) including integration of building services as intrinsic for an efficient design solution. Building typologies may include hotels, resorts and tourist facilities or similar, halls of residence in university campuses, places of worship, cultural complexes, arts and crafts villages, etc.

Module No	Module Name	No. of Classes
1	Design Problem 1	78
2	Design problem 2	78
3	Time sketch	12
	Total	168

Working Drawing – II (AR 652)

Sessional: 0 – 0 – 4 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Continuation of preparation of a set of working drawings in 1: 50 scale (unless otherwise mentioned), of the framed structure started in AR-552 (WORKING DRAWING – I) – Structural Details – Details of openings (door / window etc.) – Kitchen and Toilet Details – Electrical layout – Water Supply and Sewerage layout – appropriate details of various non-structural components	56

Interior Design Practice (AR 653)

Sessional: 0 – 0 – 4 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Sessional works should include market survey of all interior materials for flooring, wall finishing, furniture, lighting, kitchen and toilet fixtures and interior landscaping elements. Design problem can include but are not limited to apartments, bungalows, shopping units, hotel suits, banquet halls, lounge, restaurants, cyber café, office spaces etc.

Module No.	Module Name	No. of Classes
1	Module 1: Market survey of all interior materials	16
2	Module 2: Design problem	40
	Total	56

**INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
DEPARTMENT OF ARCHITECTURE, TOWN AND REGIONAL PLANNING**

**CURRICULAR STRUCTURE & SYLLABI FOR
FIVE-YEAR DEGREE COURSE IN BACHELOR OF ARCHITECTURE**

With effect from intake of 2012-13

Part IV (Seventh and Eighth Semesters)

Fourth Year (Part-IV): Seventh Semester						
Code	Subject	Contact Periods			Marks	Credit
		L	T	S		
Theoretical Subjects						
AR 701	Theory of Architecture	3	0	0	100	3
AR 702	Housing	3	0	0	100	3
AR 703	Urban Design	3	0	0	100	3
AR 704	Architectural Conservation	3	0	0	100	3
AR 705	Elective I AR 705/1: Vernacular Architecture AR 705/2: Architectural Psychology	2	0	0	50	2
	Sub Total	14	0	0	450	14
Sessional Subjects						
AR 751	Urban Studies Sessional	0	0	4	100	3
AR 752	Architectural Design Practice – VI	0	0	12	300	8
AR 771	Urban Studies Fieldwork	Not exceeding 3 working days			50	2
	Sub Total	0	0	16	450	13
	TOTAL	14	0	16	900	27
		30				

Fourth Year (Part-IV): Eighth Semester						
Code	Subject	Contact Periods			Marks	Credit
		L	T	S		
Theoretical Subjects						
AR 801	Principles of Human Settlements	3	0	0	100	3
AR 802	Professional Practice and Entrepreneurship Development	3	0	0	100	3
AR 803	Project Management	3	0	0	100	3
AR 804	Elective II AR 804/1: Real Estate Development AR 804/2: Transportation Planning	2	0	0	50	2
	Sub Total	11	0	0	350	11
Sessional Subjects						
AR 851	Architectural Programming	0	0	3	50	2
AR 852	Architectural Design Project	0	0	12	300	8
AR 871	Grand Viva Voce	Examination Only			100	2
	Sub Total	0	0	15	450	12
	TOTAL	11	0	15	800	23
		26				

SEVENTH SEMESTER

Theory of Architecture (AR 701)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction to architecture and meaning in architecture: Introduction to the factors that lend meaning to architecture- architectural expression and symbolism- character and style- movements, philosophies, ideologies and theories- meaning and interpretation of architecture	6
2	Ordering elements and principles of architecture: visual and emotional effects of geometric forms and their derivatives — Elements, rules of combination, Typology — Philosophy & ideology as basis for abstraction and universality. Unified ideologies — Mathematics, geometry and systems of proportion. Symmetry, axially and regularity as tools of a universal order — Proportion, scale, balance, rhythm, axis, symmetry, hierarchy, datum, unity, harmony, dominance with respect to architecture. Architectural configurations and elements.	6
3	Organisation of form and space: Spatial relationships, spatial organization — Spatial organisation and form character as an expression of social and political order: Scale, geometry, form distinction as architectural tools and disciplines — Architectural form expressive of the cosmology and philosophy of a culture;	6
4	Introduction to design: Definition and understanding of design — Design as codified principles applied to circumstantial variation. Design as the application of evolved elements, typology. Design as a self-conscious creative activity — Design as a multi-variety problem solving process. Theories of Program and Function,	6
5	Design methodology movement: The machine age and industrialization, mass culture — The development of the empirical and analytical approach — Problem solving as a design principle based on analysis into sub systems and rules of assembly — Design parameters, principles, processes, methods and programme formulation — Design matrices and system integration. Process of Design synthesis.	6
6	Creative thinking: Understanding the term creativity- theories on thinking: left brain/ right brain, convergent and divergent thinking, lateral and vertical thinking- design spectrum from the logical to chance - blocks in creative thinking- various techniques to generate creativity — Thinking techniques, information processing and research methods, generators of creativity, design matrices and system integration. Critical thinking and architectural practice. The questioning of the premises of modernism – universality standardization — Impact of critical thinking from other fields – literature, philosophy, sociology and anthropology. Structuralist and post-structuralist approaches. Phenomenology, linguistics, and Post-modern thinking — Concept of pattern language-participatory approach to design - design as process.	6
7	Contemporary processes in architecture: Introduction, aspect of digital architecture, contemporary process, geometries and surfaces.	6
Total		42

Suggested Reading:

1. Leon Battista Alberti, *The Ten Books of Architecture* (London: Alec Tiranti, 1955) Translated by Cosimo Bartoli
2. Le Corbusier, *Toward a New Architecture* (New York: Dover Publications, 1986) Translation by Frederick Etchells
3. Karsten Harries, *The Ethical Function of Architecture* (Cambridge, MA: The MIT Press, 1997)
4. K. Michael Hays (Ed.), *Architecture | Theory | Since 1968* (Cambridge, MA: the MIT Press, 1998)
5. Louis Kahn, *Essential Texts* (New York: W. W. Norton & Company, 2003) Robert C. Twombly (ed.)
6. Aldo Rossi, *The Architecture of the City* (Cambridge, the MIT Press, 1984)
7. Robert Venturi, *Complexity and Contradiction in Architecture* (New York: MOMA, 1977)
8. Mark Wigley, *The Architecture of Deconstruction: Derrida's Haunt* (Cambridge, the MIT Press, 1993)
9. Peter Zumthor, *Thinking Architecture* (Birkhauser Basel, 2006)

Housing (AR 702)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Definition of house and housing; Housing and its importance in Architecture; Housing and its relationship with neighbourhood and city; Global and National housing scenario; Housing demand in India.	6
2	Housing typologies; Density factors; Housing standards; Slums and squatters; Social imperatives on housing.	8
3	Site considerations in housing; Land and environmental considerations; Sustainable housing principles; Elements of Housing costs and cost sensitivity; Low cost and alternative technologies and materials; Housing and energy issues.	9
4	Housing design approaches; Housing layout, road and other services in housing; Redevelopment and urban renewal in housing sector; Rural housing.	7
5	National housing policy; organizations in housing sector, finance and management of housing.	6
6	Case studies on various types of housing projects.	6
	Total	42

Suggested Reading:

1. Golland, A; Blake, R. 2004. *Housing development: theory, process and practice*. Routledge.
2. Mumford, Lewis. 1972. *The City in History: Its Origins, Its Transformations, and Its Prospects*.
3. Woo-Jin Kim. 1996. *Economic Growth, Low Income and Housing in South Korea*.
4. Hamish Main, Stephen Wyn Williams (Editor); 1994. *Environment and Housing in Third World Cities*.
5. Robert M. Buckley. 1997. *Housing Finance in Developing Countries*.

Urban Design (AR 703)

Full Paper: 3 – 0 – 0 (L – T – S) Full Marks: 100 Credit: 3 Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction to Urban Design: Definitions and interrelationships with architecture, planning and other disciplines-scope and objectives of urban design as a discipline and profession.	2
2	Dimensions of urban design: Grain, texture scale, socio spatial schema etc. Urban design vocabulary.	2
3	History of World Urbanism: Early cities; Medieval cities and the fortification of space; The city as a work of art from Sixtus V's Rome to Camillo Sitte; The Industrial City; Garden City; New Towns and Urban Utopias.	9
4	Postmodern Approaches: Neo Rationalism: Aldo Rossi, Leon & Rob Krier, Ricardo Bofill — Neo Empiricism: Kevin Lynch, Robert Venturi, Gordon Cullen, Colin Rowe	3
5	Socio-cultural and Behavioural Issues in Urban Design: Territoriality, Safety and Defensible Space, Manifest and Latent functions of Urban spatial elements with reference to Jane Jacobs, Oscar Newman, Edward Hall, Amos Rapoport, others.	3
6	Perceptual Approach to Urban Design: Imageability - Elements of the City with reference to the work of Kevin Lynch	2
7	Morphological approach to Urban Design: Figure Ground, Linkage and Place Theories of Urban Design with reference to Roger Trancik; Urban solids and Voids; Fumihiko Maki's classification of urban space organization.	3
8	Christopher Alexander and Pattern Language	3
9	Urban Spatial Elements: Hierarchy and nature, effect of light, sense of enclosure, design aspects with respect to Private social space, Open space between buildings, the building edge to the street, the neighbourhood street or square, the street network, natural features.	3
10	Guidelines for Urban Design: Codes and Standards of Urban Design—Urban design at micro level: Campus planning, City centres, Transportation corridors, and Residential, neighbourhood.	6
11	Urban Design Surveys: Methods, documentation and representation	3
12	Case studies in Urban Design	3
	Total	42

Suggested Reading:

1. Jacobs, Jane. The Death and Life of Great American Cities
2. Lynch, Kevin. The Image of the City
3. Charles Correa. The New Landscape
4. Rob Krier: Elements of Architecture
5. G. R. Whitzman and C. Whitzman. Safe Cities: guidelines for planning, design and management
6. Urban Design Since 1945: A Global Perspective

Architectural Conservation (AR 704)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	General concepts of conservation	3
2	Historical background and different charters, theory of conservation	6
3	Types of interventions on artefacts, historical buildings-its meaning, evaluation, historic value and cultural value analysis, procedure of conservation work	6
4	Characteristics of traditional building materials, adobe, brick, wood, stone, metal, plastering, etc. Conservation of traditional materials, conservation chemistry	9
5	Indian conservation policy and legal tools	6
6	Conservation case studies from Europe and other countries	6
7	Conservation case studies in India	6
	Total	42

Suggested Reading:

1. Conservation of Historic Buildings/ Bernard M Feilden/ Butterworth-Heinmann Ltd.
2. Guidelines For Conservation A Technical Manual/ Bernard M Feilden/ INTACH
3. Building Evaluation for Adaptive Reuse and Preservation/ Stanley Raburn/ Wiley, John and Sons
4. Historic Preservation Technology: A primer/ Robert Young/ Wiley, John and Sons
5. Time honoured: A Global View of Architectural Conservation: Parameters, Theory and Evaluation of an Ethos/ John Stubbs/ Wiley, John and Sons
6. Dictionary of Building Preservation/Ward Bucher/ Wiley, John and Sons
7. Historic Preservation: Curatorial Management of the Built World/James Marston Fitch/University of Virginia Press
8. Historic and Philosophical Issues in the Conservation of Cultural Heritage/Nicholas Price/Getty Publications

Elective - I: Vernacular Architecture (AR 705/1)

Half Paper: 2 – 0 – 0 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Definition and classification of Vernacular architecture – Vernacular architecture as a process – Survey and study of vernacular architecture: methodology – Cultural and contextual responsiveness of vernacular architecture: an overview	6
2	Approaches and concepts: Different approaches and concepts to the study of vernacular architecture: an over view – Aesthetic, Architectural and anthropological studies in detail	4
3	Vernacular architecture of the western northern region of India: Forms spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the following: Deserts of Kutch and Rajasthan; Havelis of Rajasthan Rural and urban Gujarat; wooden mansions (havelis); Havelis of the Bohra Muslims Geographical regions of Kashmir; house boats	4
4	Vernacular architecture of south India: Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of the following: - Kerala: Houses of the Nair & Namboothri community; Koothambalam, Padmanabhapuram palace. Tamil Nadu: Houses and palaces of the Chettinad region; Agraharams.	4
5	Vernacular architecture of East and North East India: Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of the following: - West Bengal, Orissa.	6
6	Western influences on vernacular architecture of India: Colonial influences on the Tradition Goan house, Evolution of the Bungalow from the traditional Bangla, Victoria Villas – Planning principles and materials and methods of construction. Settlement pattern and house typologies in Pondicherry and Cochin.	4
Total		28

Suggested Reading:

1. Paul Oliver, Encyclopaedia of Vernacular Architecture of the World, Cambridge University Press, 1997
2. Amos Rapoport, House, Form & Culture, Prentice Hall Inc. 1969.
3. R W Brunskill: Handbook on Vernacular Architecture
4. V. S. Pramar, Haveli – Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad, 1989.
5. Kulbushanshan Jain and Minakshi Jain – Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad 1992.
6. G. H. R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.
7. Carmen Kagal, VISTARA – The Architecture of India, Pub: The Festival of India, 1986.
8. S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000

Elective - I: Architectural Psychology (AR 705/2)

Half Paper: 2 – 0 – 0 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	The Nature and Scope of Environmental Psychology: Reciprocal relationship between the environment and human behaviour, and its translation into the design process. Behaviour is defined as human response to environmental stimuli that is physical as well as social.	4
2	Environmental Perception and Cognition - Privacy in the Built Environment - Personal Space – Crowding -	10
3	Defensible Space - Territoriality and Community Design	4
4	Environmental Attitudes, Attachments and Preferences	2
5	Urban Public Space	2
6	Behavioural Programming: Defining Behaviour Settings and their characteristics.	2
7.	Applications in design - Design for special user groups such as the elderly, cognitively challenged, etc.	4
	Total	28

Suggested Reading:

9. Robert Sommer., Social Design., New Jersey
10. John Zeisel, Inquiry by Design., Cambridge
11. Environmental Psychology, Charles Holahan. McGraw Hill

Urban Studies Sessional (AR 751)

Sessional: 0 – 0 – 4 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Urban design is about making connections between people and places, movement and urban form, nature and the built fabric. Urban design practice areas range in scale from small public spaces or streets to neighbourhoods, city-wide systems, or whole regions. The objective of this course is to investigate urban design issues are investigated in the context of morphological and socio-economic parameters within an urban community. The ultimate goal is to explore the integration of social, programmatic and physical development interventions in ways that reinforce community revitalization efforts, and to apply this knowledge through the development of a formal neighbourhood revitalization plan that addresses community needs.

Sessional work will include (1) Context Studies, (2) Area Appreciation and critical analysis, (3) Preparation of Project Brief, and (4) Proposal covering the aspects of (a) Basic History to know the place and relation with the city, (b) Ecology and Landscape, (c) Morphology, (d) Functional Districts, etc.

Module No.	Module Name	No. of Classes
1.	Urban Studies Problem 1	28
2.	Urban Studies Problem 2	28
	Total	56

Architectural Design Practice - VI (AR 752)

Sessional: 0 – 0 – 12 (L – T – S)

Full Marks: 300

Credit: 8

Prerequisite: None

The objective of this course is to undertake problems requiring physical surveys, data collection, and analysis. The emphasis shall be on integrating the building and group of buildings with uses at higher level of hierarchy within the community, and surrounding context with special emphasis on socio-economic considerations. The second broad focus shall be on preservation or conservation of architectural and cultural heritage through heritage responsive architectural design solutions.

Sessional work through successful completion of at least two design assignments (avoiding repetition) which shall include, but are not limited to (1) housing design problems for various socio-economic groups of society and (2) community facilities and amenities such as specialized buildings, shopping centres, hospitals, commercial developments, and institutional building typologies, art galleries, museum at higher level of hierarchy etc., (3) Parks, open spaces and recreational facilities, etc. and (4) public transportation facilities involving mass transit systems.

Module No.	Module Name	No. of Classes
1.	Design Problem 1	76
2.	Design Problem 2	76
3.	Time Sketch	16
	Total	168

Urban Studies Fieldwork (AR 771)

Sessional: Field trip of 3 days

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name
1	Study of historic precincts/buildings, and landscape elements.
2	Study of urban design of historic towns and cities.
3	Documentation through mapping, hand-sketching, preparation of measured drawings

EIGHTH SEMESTER

Principles of Human Settlements (AR 801)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Introduction: Concept of human settlements; Origin of early human settlements; Factors responsible for development of settlement forms. Historical determinants; Mobility, Socio-cultural Beliefs, Climate, Technology, Political situation, Geographic location contributing to development of human settlement system during different periods.	6
2	Early Settlements: Brief introduction to development of settlements in Ancient world; Early settlements in Asia, Europe, and North America.	6
3	Technological advents and Settlement patterns: Industrial Era; Impact of industrialization and technological developments in modifying settlement system. Contributions of Eminent Theoreticians and their works: Ebenezer Howard, Patric Geddes, Lewis Mumford, Clarence Perry, F. L. Wright, Le Corbusier, C.A. Doxiades, and others in Human Settlement Planning.	6
4	Land use and Zoning: Von Thunen's theory of agricultural land use; Land use and different types of Land uses in a town or city; Morphology of a town according to types of land uses; Classical theories on Land use; Density patterns in settlements; Concept and purpose of zoning.	9
5	Physical planning mechanisms: Indian Scenario: National, State and local level plans. Various plan preparation mechanisms – Rationalistic and Incremental plan; Master Plan, Structure Plan, Perspective Plan.	9
6	Case Studies and Projects: Case study of some cities – Old cities, New Towns.	6
	Total	42

Recommended Reading:

- 1) Urban Pattern: A. B. Gallion
- 2) Town Planning in Hot Climates: A. Rimsha Mir Publication
- 3) Town Planning Techniques: Lewis Keeble
- 4) Town Planning: Rangwala, Ahmedabad

Professional Practice and Entrepreneurship Development (AR 802)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100 Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Introduction to the Architects Act and Architects (Professional Conduct) Regulations	6
2	Conditions of Engagement and Scale of Charges: Comprehensive Architectural Services – Scope of work, Architecture and Allied fields, schedule of services, Letter of Appointment, Schedule of Payment, Architectural Competition Guidelines. Client's Role and Responsibilities, Indemnification, Termination of Agreement, Interpretation, Arbitration. Architects' Professional liabilities, Professional negligence and Deficiency in Services, Disciplinary action under the Architects Act, Civil and Criminal action in the Courts of Law.	9
3	Contract – Essential clauses, various types for execution of construction works with their applicability, advantages and disadvantages; Tender and relevant documents; Work Order; Earnest money, Security Deposit; Duties and liabilities of Owner, Engineer and Contractor	6
4	Arbitration Act, Need for arbitration, Essential qualifications of Arbitrator, Procedure of settlement of dispute by Arbitration, Advantages of Arbitrations over Court decision	6
5	Fundamentals of Management Principles, Entrepreneurial opportunities in Architecture and allied fields, Intellectual Property Rights and its protection, Nature of emerging practices - BPO, KPO, Sustainability etc., Social obligations of an Architect as professional, Professional Ethics, Future Professional directions	9
6	Office Organization and Business Management for small and medium Architectural enterprises - Types of Offices and their Structure, Roles of various personnel at different levels, Proprietorship and Partnership, Expenses and Tax liabilities, Role of Professional bodies like IIA	6
	Total	42

Suggested Reading:

1. Official website of the Council of Architecture (<http://www.coa.gov.in/>) OR, Handbook of Professional Documents 2011, Council of Architecture
2. Estimating, Costing, Specification And Valuation In Civil Engineering by M. Chakraborti

Project Management (AR 803)

Full Paper: 3 – 0 – 0 (L – T – S)

Full Marks: 100

Credit: 3

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Introduction to Project Management: What is a Project, Project Management process, Project Constraints, Understanding the Nature of Projects, Understanding the risks of Projects The Project Life Cycle, Project Identification, Benefits of structured project management process	3
2	The Project Initiation Stage: Identifying the necessity of the Project, Project Management Roles, The Project Definition Document, The Product Description, Determining Project Goals, Determining Project Specifications, Determine Project Deliverables, Determining Project Constraints, Determining Project Assumptions, Presenting the Business Case, Completing the Project Definition Document	3
3	The Project Planning Stage: Determine the Scope of Work, Scope Management Plan, The Work Breakdown Structure (WBS), Purpose of WBS, Creating the Work Breakdown Structure, WBS, Unique WBS Identifiers, Using the WBS to estimate effort and costs, Determining Deliverable-Specific Task List, Defining Task Descriptions, Assigning Resources and Responsibility, Planning the Cost Element, Resource Identification, Cost Estimation Methods, Administrative Costs, Buffer Costs, Procurement Plan, Human Resource Management Plan, Project Cost Constraints and Assumptions, Planning the Quality Element, Decision Making and Risk Taking Skills	6
4	Project Scheduling, Controlling and Managing Project Schedules: Converting effort estimates into activity duration, Developing schedules, Planning the Time Element, Time Estimates, Network diagramming techniques, PERT and CPM, Gantt charts Mathematical Method, PERT, Calculating schedules, PERT Calculations, Buffer Time, The Project Schedule, Project Schedule Charts, Updating Project Assumption & Time Constraints, Using schedules to monitor and control projects, MS project based scheduling	6
5	Cost Planning, Tracking and Control, Change Management: Developing project estimates and budgets, Managing/ controlling project budgets, Earned value management, Change management, Scope management, Change control plans	6
6	Project Procurement Management: Project Procurement and Materials Management, Contracts procurement management, Claims and Contracts management in Projects, Commercial aspects in project	3
7	Project Risk Management: Planning risk management, Identifying risks, Qualitative risk analysis, Quantitative risk analysis, Planning risk responses, Monitoring and controlling risks	3
8	Team Building for Project Leaders: Team Building, Leadership vs. Management, Responsibilities of a Team Leader, Team Building Benefits, Team Selection, Team Communication, Conflict Resolution, Motivating Teams, Coaching Teams	3
9	Implementing the Project Plan: Implementing the Procurement Plan, Quality Control and Assurance Measures, Business Communication Model, Performance Tracking, Earned Value Analysis, Change Management, Budgetary Control Measures, Implementation Stage, Project Management Areas	6
10	The Closing Stage: Scope verification, Acceptance of Deliverables, Transferring	3

	deliverables to the customer, Releasing Resources, Post-project review Acceptance of Contracts, Disassembling Project Team Members, Project Documentation	
	Total	42

Suggested Readings:

1. Clifford Gray, Erik Larson, Project Management: The Managerial Process, (McGraw-Hill International Editions: Management & Organization Series), 2003
2. Meredith & Mantel, Project Management: A Managerial Approach, 3rd edition, John Wiley & Sons, Inc, 1995
3. S. Choudhury, Project Management, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1998
4. L. S. Srinath, PERT and CPM-Principles and Applications, Affiliated East-West Press Pvt. Ltd, New Delhi, 1975
5. Parameshwar P. Iyer. Engineering Project Management with Case Studies, Vikas Publishing House Pvt. Ltd. New Delhi, 2005
6. Project Management Institute (PMI). A Guide to the Project Management of Knowledge (PMBok). Newton Square, PA. 1996

Elective - II: Real Estate Development (AR 804/1)

Half Paper: 2 – 0 – 0 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1.	Introduction: Overview of the development process and calculating Net Operating Income.	4
2	Cash flow: Calculating before-Tax Cash Flow: revenue, operating expenses, debt service and debt coverage.	4
3	Development Budget: The Development Budget including Hard Costs, Soft Costs, Construction Interest, Developer's Fees, and; Sources of Financing including Bank Loans, Bond Finance, Equity and Govt. Subsidies.	6
4	Tax: Low Income Housing Tax Credits, Ownership and Managing Entities; After Tax Cash Flow: Tax Effects (Depreciation), Future Benefits of Real Property Ownership.	6
5	Investment: The Mathematics of Real Estate Investment: Future Value, Present Value, Net Present Value, Internal Rate of Return.	4
6	Project: assignment on study of a real world situation and simulating real estate development project.	4
	Total	28

Suggested Reading:

1. Adukia, Rajkumar S. 2013. *Real Estate – Law, Practice and Procedures: A complete Encyclopaedia on Real Estate in 2 Volumes*. Jain book depot. New Delhi.
2. Bernstein, Peter. 1998. *Against the Gods (The Story of Risk)*, John Wiley & Sons.
3. Caro, Robert. 1975. *The Power Broker*. Vintage Books.
4. Field, Charles G. 1997. The Nehemiah Strategy: Bringing it to Boston - Building Consensus for Affordable Housing, *Housing Policy Debate*, Vol. 8, Issue 4, pp. 801-832.
5. Friedman, Thomas. 2000. *The Lexus and the Olive Tree*. Anchor Books edition.
6. Jacobs, Jane. 1992. *The Death and Life of Great American Cities*, Vintage Books Edition.
7. Kiyosaki, R. 1998. *Rich Dad, Poor Dad*, Warner Books.
8. Malkiel Burton. 2003. *A Random Walk Down Wall Street*. W. W. Norton & Company.
9. Narwade, Prashant. 2011. Development and redevelopment of all real estate properties. Jain book depot. New Delhi.
10. Rybczynski, Witold, 2007. *Last Harvest, From Cornfield to New Town*, Scribner.
11. Sangvi, K. S. 2012. *A practical guide to construction and real estate*. Jain book depot. New Delhi.
12. Talbot, John. 2004. *The Coming Crash in the Housing Market*, McGraw Hill.
13. The National Development Council, 2006. *Rental Housing Development Finance, HD 420*.

Elective - II: Transportation Planning (AR 804/2)

Half Paper: 2 – 0 – 0 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No.	Module Name and Topics	No. of Classes
1	Introduction: Historical development, Importance and Scope	2
2	Road Network Planning: Historical development; Road classification, Alignment planning; Fundamentals of geometric design and construction; Intersections and grade separations; Road markings, Illumination.	12
3	Traffic Engineering: Fundamentals of traffic flow, Concepts of LoS and capacity	4
4	Parking: Traffic and Parking Problems; Parking demand assessment; On street and off-street parking; Planning of truck terminals and Bus terminals	4
5	Mass Transport Terminals: Overviews on planning of Airport, Major Railway Terminal and Dockyard	4
6	Urban Transportation: Overviews on transportation scenarios and major planning issues in Indian towns and cities	2
	Total	28

Suggested Reading:

12. Traffic Engineering and Transport Planning / L. R. Kadiyali / Khanna Publishers Transportation Engineering: An Introduction / C. Jotin Khisty, B. Kent Lall / PHI
13. Highway Engineering / S. K. Khanna & C. E. G. Justo/ Nem Chand & Bros.
14. Airport Engineering / Rangwala / Charotar Publishing House, Delhi

Architectural Programming (AR 851)

Sessional: 0 – 0 – 3 (L – T – S)

Full Marks: 50

Credit: 2

Prerequisite: None

Module No	Module Name and Topics	No. of Classes
1	Introduction: architectural programming (the need for methods, design failures, facility programming and evaluation. Behaviour Programming: Systems approach, personal space, elemental level, goals, users, activity circuits.	6
2	Definition, approaches: HECTTEAS—Human, environmental, cultural, technological, temporal, economic, aesthetic, safety.	3
3	Preparing the program: pre-design services, architectural programming, discovering crucial issues, program planning. Behavioural Programming: Defining Behaviour Settings and their characteristics.	6
4	Information gathering: Literature search and review, diagnostic interviewing, diagnostic observation, questionnaires and surveys, site and climate analysis. Behavioural Programming Continued: Creating site zones/ settings.	6
5	Program Evaluation: Discuss program evaluation, design evaluation (Post-Occupancy Evaluation), Adjacency analysis, matrix and bubble diagram.	6
6	Sample Programs: Sample Architectural Programs, Post-occupancy evaluations	6
7	Programme preparation and Report: Program form, content, preliminaries, executive summary, values and goals, design considerations, project requirements, space identification and allocation, relationship matrices and diagrams, space program sheets, budget and cost analysis, project schedule, design analysis.	9
	Total	42

Suggested Reading:

1. Duerk, Donna P. Architectural Programming: Information Management for Design. New York, Van Nostrand Reinhold.
2. Building and Place Assessments: Augustin, S. and Cackowski, JM, Available free on- line as pdf file
3. Palmer, M. A (1981) The Architect's Guide to Facility Programming. DC: A. I. A. & Arch. Records Books.
4. Nasar, J. L. (1999) Design by Competition: Making Design Competition Work. Cambridge, NY.
5. Moore, G. (ed.) Emerging Methods in Environmental Design and Planning. Cambridge, MIT Press.
6. Broadbent, G. (1981). Design Architecture: Architecture and the Human Sciences
7. Broadbent, G. and A. Ward (eds.) (1969) Design Methods in Architecture. London: Lund Humphries.
8. Jones, J. C. (1980) Design Methods: Seeds of Human Futures. John Wiley and Sons, NY

Architectural Design Project (AR 852)

Sessional: 0 – 0 – 12 (L – T – S) Full Marks: 300 Credit: 8 Prerequisite: None

The objective of this course is to integrate the building/group of buildings with highest level of hierarchy considering complexity of detailed design, varied user groups, corporate inputs, advanced structural systems, intelligent building techniques, complex building services etc.

Sessional work through successful completion of one design project at an urban design scale requiring physical surveys, data collection, and analysis. Considerations of applicable development regulations and building bye laws, phase wise design development, solutions for the treatment of interior spaces and landscaped areas towards achieving harmony/contrast/identity with relation to immediate/broader surrounding /environment will have to be addressed at this stage.

The Design Project shall include solutions for structural systems, sewage treatment system, water management system, solid waste management system, power supply, communication system, fire alarm systems, solar energy uses, energy efficiency, etc.

Design problems can include but are not limited to referral hospitals, commercial/cultural complexes (e.g., City centre within 20-30 acre land area), large housing projects, educational facilities (e.g., university campus), industrial facilities, Sports facilities etc.

Module No.	Module Name	No. of Classes
1,	Architectural Design Project	168
	Total	168

Grand Viva Voce (AR 871)

Sessional: Examination only Full Marks: 100 Credit: 2 Prerequisite: None

The Grand Viva-Voce Examination shall be conducted to assess the breadth and depth of domain knowledge acquired from the beginning of the course. It shall be conducted by a Board of Examination comprising seven members amongst which five shall be from the Department of Architecture, Town and Regional Planning and one from an allied departments, and one external examiner from the architecture profession, to be nominated by the DAC.

**INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
DEPARTMENT OF ARCHITECTURE, TOWN AND REGIONAL PLANNING**

**CURRICULAR STRUCTURE & SYLLABI FOR
FIVE-YEAR DEGREE COURSE IN BACHELOR OF ARCHITECTURE**

With effect from intake of 2012-13

Part V (Ninth and Tenth Semesters)

First Year (Part-V): Ninth Semester						
Code	Subject	Contact Periods			Marks	Credit
Sessional Subjects						
AR 971	Professional Training	24 weeks duration			300	6
AR 972	Training Report	Examination only			100	2
AR 973	Training Viva-Voce	Examination only			100	2
TOTAL		24 weeks duration			500	10

First Year (Part-V): Tenth Semester						
Code	Subject	Contact Periods			Marks	Credit
Sessional Subjects						
AR 1051	Architectural Thesis-I	0	0	16	450	12
AR 1071	Architectural Thesis-II	Examination only			350	9
AR 1072	Architectural Thesis Viva-Voce	Examination only			200	6
TOTAL		16			1000	27

NINTH SEMESTER

Professional Training (AR 971)

Sessional: 24 weeks duration

Full Marks: 300

Credit: 6

Prerequisite: None

Each student shall undergo training in an architectural office under architect(s) registered with the Council of Architecture, who shall award the marks as per the following break up:

Assessment Criteria	Marks
(1) Regularity and general conduct	60
(2) Creativity and originality	60
(3) Ability to work independently and follow directions	60
(4) Ability to work in teams	60
(5) Quality of work	60

Evaluation will be sought from employer imparting training against five assessment criteria stated above having equal importance in an Eleven Grade Scale as under:

Grade	Marks (%)
I	100-95
II	94-90
III	89-85
IV	84-80
V	79-75
VI	74-70
VII	69-65
VIII	64-60
IX	59-55
X	54-50
XI (FAIL)	< 50

Training Report (AR 972)

Sessional: Examination only Full Marks: 100 Credit: 2 Prerequisite: Passing AR 971

Each student is required to prepare a Training Report depicting various aspects of his/ her training, recorded in a format provided by the Department.

Assessment of this examination shall be held in conjunction with a Viva-Voce Examination (AR 973) by a Board of Examination comprising three internal examiners, out of whom one shall act as Head Examiner and remaining two as Examiners, from amongst the faculty members of the Department to be nominated by the Departmental Academic Committee (DAC).

Training Viva-Voce (AR 973)

Sessional: Examination only Full Marks: 100 Credit: 2 Prerequisite: Passing AR 971

Each student is required to make a presentation of the various aspects of training that he/ she has undertaken in front of the same Board of Examination as was constituted for AR 972.

TENTH SEMESTER

Architectural Thesis I (AR 1051)

Sessional: 0 – 0 – 16 (L – T – S) Full Marks: 450 Credit: 12 Prerequisite: None

'Architectural Thesis' is the final undergraduate dissertation where the students are required to take up individual architectural design problems and work under the supervision of *Thesis Supervisor/s* as decided by Departmental Academic Committee (DAC). The number of supervisors assigned to each student shall be uniform in a particular academic session. The DAC will also select from among its members a faculty who would act as *Thesis Coordinator*. The Thesis Coordinator will not supervise any student. In addition to the Thesis Supervisor, the DAC will also assign another person for each student who will act as the 'Internal Member, Board of Examination'.

Evaluation is a continuous process and is comprised of three Interim Reviews as detailed below in the sub-section 'Distribution of Marks'.

REQUIREMENTS FOR INTERIM REVIEWS:

Interim Review 1

Each student is required to prepare a PowerPoint presentation for the review and also a hard copy of the same. Each presentation will consist of the following:

1. Brief of the Project Thesis, consisting of its *Title, Objective and Methodology*;
2. Space Programming through studies consisting of *Case Studies* from primary and secondary sources of information, and study of relevant *Standards and Codes*;
3. Site Analysis including Regional Setting, Access, Orientation, Topography, Climate etc.;
4. Design Guidelines Inferred; and
5. Preliminary Zoning

Interim Review 2

Each student is required to prepare his/ her presentation for the review as per the following submission requirements:

1. Final Zoning, a sequence to the Preliminary Zoning of 'Interim Review 1'
2. Site Plan and Elevation from Approach Road in an appropriate scale
3. Block Model showing the site in the midst of the height and volume of the built-up spaces in its immediate context; and,
4. Single line plan(s), elevation(s) and section(s) of individual designed spaces that together constitute the proposed design in at least 1:200 scale.

Interim Review 3

Each student is required to present double line drawings of the architectural design that he/ she has undertaken as per the following submission requirements:

1. Site Plan at appropriate scale
2. All floor plans including roof plan in 1:200 scale
3. At least two elevations and two sections as may be required to explain the design.
4. Block Model showing the site in the midst of the height and volume of the built-up spaces in its immediate context
5. Blow ups, views, walk-through and design details of significant elements.

Distribution of Marks

The Board of Examination for each student is comprised of five members, namely, 'Thesis Coordinator', 'Thesis Supervisor/s', 'Internal Member, Board of Examination', and two External Examiners who shall be professional architect/ academician registered with the Council of Architecture. The External Examiners

need not be same for all the three Interim Reviews. The 'Thesis Coordinator' will act as the Head Examiner of the Board. The award of marks for the Reviews will be as follows:

Architectural Thesis I	Marks
Interim Review 1	100
Interim Review 2	150
Interim Review 3	200

The weightage of marks to be awarded in each review will be as follows:

'Faculty Supervisor/s': 20%; 'Thesis Coordinator': 20%; 'Internal Member, Board of Examination': 20%;
'External Examiner 1': 20%; 'External Examiner 2': 20%.

Architectural Thesis II (AR 1071)

Sessional: Examination only Full Marks: 350 Credit: 9 Prerequisite: Passing AR 1051

Architectural Thesis II is the examination of the final deliverables of the sessional subject AR 1051 to be held after the successful completion of the sessional AR 1051. This examination shall be held in conjunction with a Viva-Voce Examination (AR 1072) by a Board of Examination as detailed below in the sub-section 'Distribution of Marks'.

Each student is required to present his/ her Thesis Project in the following sequence:

1. Site
2. Design Concept
3. Design Programme
4. Design Proposal to be presented through Drawings (site plan: appropriate scale; other drawings: 1:200 scale; blow-ups/ details: appropriate scale)
5. Model(s).

Distribution of Marks

The Board of Examination for each student is comprised of seven members, namely, 'Thesis Coordinator', 'Thesis Supervisor/s', 'Internal Member, Board of Examination', and three External Examiners who shall be professional architect/ academician registered with the Council of Architecture, and a member of the faculty in the Department of Civil Engineering, BESUS, as nominated by the Department of Civil Engineering.

The faculty from the Department of Civil Engineering will award marks out of 50 based on (2) below. All other examiners shall award marks out of 300 based on (1) below. Break-up of marks shall be as follows:

(1) Architectural Drawings, Report, Model: 300

- (a) Design: 200
- (b) Report: 50
- (c) Model: 50

(2) Structural solution 50

Architectural Thesis Viva- Voce (AR 1072)

Sessional: Examination only Full Marks: 200 Credit: 6 Prerequisite: Passing AR 1051, 1071

Assessment of AR 1072 shall be done by the same Board of Examination as for AR 1071. The faculty from the Department of Civil Engineering will award marks out of 50 and each of the remaining examiners will award marks out of a total of 150.