B.Architecture Syllabus
For admitted batches of 2011-12 onwards

Department of Architecture
Andhra University College of Engineering (A)
Visakhapatnam
## 1/5 B.Arch

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Note: (06.1.1.8a): Workshop Practice, (06.1.1.8b): Surveying & Site studies will be conducted on alternate weeks.

06.1.1.7: English, the scheme of marks & no. of periods as per general scheme of other branches with A. U. C. E.

## 2/5 B.Arch (First Semester)

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**Note:** About 04.2.4.7: Environmental Studies the scheme of marks & no. of periods as per general scheme of other branches with A. U. C. E.

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**Note:** About 04.2.4.7: Environmental Studies the scheme of marks & no. of periods as per general scheme of other branches with A. U. C. E.
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**Note:** 20 Weeks of Practical Training in an Architectural Firm

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FIRST YEAR

06.1.1.1: INTRODUCTION TO ARCHITECTURE & BASIC DESIGN.

Basic Design provides the framework for understanding design as a new language by sensitizing students to the conceptual, visual and perceptual issues involved in the design process.

The Course provides with knowledge of the principles of design and design elements. Exercises complement the lectures and ensure that the students learn to develop a series of compositions in two and three dimension.

The Course also prepares ground for the students to gain an understanding into the fundamental issues in architectural design and develop the skill to create architectural solutions for simple problems.

Course Content:
Introduction to design: Meaning of design, importance of design. Fundamental elements of design and their definitions-point, line, shape, form, space, texture, value and colour. Introduction to the principles of design-unity, balance, symmetry proportion, scale, hierarchy, rhythm, contrast, harmony, focus etc. use of grids, creating repetitive patterns.

Colour theory, color wheel, primary, secondary, tertiary colors, color schemes, color value & intensity. Theoretical inputs to be followed by exercises to develop the ability to translate abstract principles into compositions in 2D & 3D.

Study of ornament in Architectural Design, different types of ornamentation in buildings and study of historic examples, Basic anthropometrics - average measurements of human body in different postures-its proportion and graphic representation, application in the design of simple household and street furniture
• Basic human functions and their implications for space requirements. Minimum and optimum areas for various functions, User data-Bubble and circulation diagrams
• Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet, etc. including the furniture layout, circulation, clearances, lighting and ventilation, etc.

References:
1. Francis, D.K.Ching – Form Space & Order
2. Wong Wucius – Principles of two dimensional design
3. Von Mesis – Elements of architecture
4. Robkrier – Architectural Composition
5. Johannes Itten – Design & Form
6. Donald E. Helper, Paul I. Wallach – Architecture Drafting & Design
10. Ikuyoshi Shibikawa and Yumi Takahashi – Designer s Guide to Colour

06.1.1.2: ARCHITECTURAL DRAWING & GRAPHICS –I

Course Overview:
The course introduces students to fundamental techniques of architectural drawing and develops the appropriate skills for visualization and representation.

Course Content:
Scale and measured drawing: introduction to drawing instruments their use and handing, simple exercises in drafting, dimensioning of lines and place figures.
Architectural presentation of materials on drawings, terminology and abbreviations used in architectural presentation. Use of scale in drawings. Scaling and measuring of simple objects and representing them in plan, elevations and sections.

Measuring and drawing to scale the following: furniture pieces, rooms, doors and windows, etc., reduction and enlarging of drawings, tracing in pencil, ink from simple drawings, use of tracing cloth. Lettering for titles and annotation of drawings

**Freehand drawing:**
Explanation of fundamentals of drawings and its practice. Object drawing (two exercises in the drawings), studies in light and shade of simple, natural and geometric forms (two exercises). Outdoor sketching of simple building forms (two exercises).

Architectural representation of the following on drawings: trees, hedges, foliage, human figures in different postures, cars, etc.

**Solid geometry:** study of points, lines, planes leading to simple solid geometrical forms in different positions (first angle projections).

Building geometry: study of isometric, axonometric and oblique views, use of circle in buildings – Ovule Covetta, Ogee, Lancet, Horseshoe, Moorish, Stilted, Rampant, Tudor, Three centered and Drop. Ionic volute (by Gibbs Rule), Entasis of column (by Conoid of Nicomedes Method). Reduction and enlarging of large forms such as site plans, etc.

**Sciography:**
Practical examples in the study of shade and shadows, points, lines, surfaces, geometrical solids of various forms and groups of forms leading to advanced examples of shades and shadows on buildings or parts of buildings.

**Perspective:**
Advance examples in one point or parallel perspective, two point or angular perspective, introduction to three-point perspective.

**Rendering:**
Introduction to the rules of composition and perspective in architectural rendering, color study, values, tones and general approach to rendering. Various colour schemes, water colour and poster colour rendering, pencil rendering and monochrome and wash rendering etc. treatment of sky, clouds, landscape elements, human figures, foreground and surroundings, shadow projections in renderings.

**References:**
2. Moris.I.H. “Geometrical drawing for Art students”.
9. Drawing architecture – Paul Hagarth
10. Drawings by architects – Claudius Conli
11. Perspective – H. Pranchlay
12. Pencil techniques in modern design – Alkin, Urbelleth and Lione
13. Perspective – space and design – Lance Bowen Bellings.
06.1.1.3: BUILDING MATERIALS – I

Course overview:
This course looks at the different materials that are available naturally, their properties, functions, grading and protective measures to be taken.

Classification of stones:
Granite, laterite, quartzite, marble and slates – properties and uses; stones, paving sets. Preservation of stonework, quarrying of building stones, quarry dressing tool used.

Clay bricks:
constituents, harmful constituents, and selection of clay, requirements and tests. Fire clay bricks ; varieties; sand lime bricks; paving bricks; Terra-cotta-its varieties; ordinary, glazed, porous, polished and fine-uses and properties. Building

Tiles: Roofing Tiles, flooring and wall tiles.
Sand: sources, classification, functions, properties, tests for silt and organic contents, size of sand and grading.
Mortars: Types, proportioning, mixing and grinding, mortar mills.
Surkhi mortar, cement mortar, methods of preparing, handling and uses of mortars, light weight mortars i.e. cinder, sawdust and fibrous plasters, gypsum, plaster, composition and uses, Plaster of Paris.
Portland Cement:
Raw materials, functions of cement ingredients, Setting action of cement, tests for strength and setting time.
Concrete:
Concrete and its constituents, aggregate: coarse and fine, properties of concrete, strength, durability, etc. Effect of age on strength, grading: importance, fineness modulus, combined aggregate, water cement ratio. Mixing; curing.
Timber:

References:
1. Brickwork and Associated studies – Hailey and D.W. Hancock
2. Engineering materials as used in India – K.P. Chowdary

06.1.1.4: BUILDING CONSTRUCTION-I

Elementary construction methods explaining basic principles of Load bearing and Framed structures. Walls – stone (in walling, rubble work, joints, plinths, lintels) clay bricks (brick work – English and Flemish brick bonds, stopped ends, quoins, piers, jambs, mortar joints).

Composite Masonry:
Brick lacked ashlars, rubble backed ashlar, concrete backed masonry, ashlar faced concrete walls, tile faced concrete, hollow block masonry, and marble faced masonry.

Partition walls: Brick partition, reinforced brick nogged partition, lath and plaster partition, precast concrete partition, glass block and glass Crete partition, and common wooden partition.
Lintels and Arches: lintels of wood, stone, brick; arches: terms defined, forms of arches, i.e. segmental, semi – circular, elliptical, three centered, flat and relieving arch, etc. rough and gauged arch.

Openings – wooden doors and windows (ledged and braced) with simplest and basic hardware. **Doors**: Definition of terms, types of doors: wooden, ledged, ledged and braced, paneled, flush doors. Hinged, single and double shutters, sliding folding, revolving, pivoted.

**Windows**: Ordinary casement, top and bottom hung, pivoted and sliding sash. Hardware: fixtures, locks, hinges, fastenings, etc.
Carpentry and joinery: Terms defined, mitring, ploughing, grooving, rebating, veneering, various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, etc.

The class and assignment work should include appropriate site visits by the students, and students will have to maintain field observation/record books. Three to four exercises to be done in the construction yard.

**References:**
2. Elementary Building Construction - Mitchell
4. The Construction of Buildings – Barry
5. A text book of Building Construction – Sushil Kumar

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**06.1.1.5: HISTORY OF CULTURE AND ARCHITECTURE**

**Course overview:**
The Course is intended to provide brief background knowledge of Culture and Art in different parts of the world.

**Course Content:**
- Evolution of mankind-its impact – on primitive arts and crafts in various countries and in India in particular.
- Evolution of shelter forms in different regions (deserts, thick forests, mountains, delta etc.)
- Growth of Human settlements and cultural influences with emphasis on India.
- Influence of religion and culture on domestic and civil architecture with special reference to India, Egypt, Europe.

**Reference**: Story of Architecture.

**Case studies:**
The study of vernacular settlements and buildings of the region to understand construction methods, plans and building façade, organization in relation to aesthetic / religious/ social philosophy and environmental factors in the Visakhapatnam metropolitan region.

**References:**
1. A history of architecture – Sir Banister Fletcher
2. Introduction to architecture – Stephen Gardner.
3. A chronology of western architecture – Doreen Yarwood
4. The great ages of architecture – Bodo Lichy
5. Meaning in western architecture – Christian Nöberg Schulz
6. World architecture – an illustrated history – Trewin Copplistone and others
06.1.1.6: ENGINEERING MECHANICS

Introduction: forces, composition, resolution, moments and couples; transformation of couple; resolution of force into force and couple.

- Concurrent and non-concurrent co-planar force systems, resultant and equilibrate analytical and graphical solutions.
- Equilibrium of bodies acted upon by concurrent and non-concurrent co-planar force systems, forces and members of trusses by method of joints and method of sections.

- Simple stresses and strains, elasticity, stress, strain, types of stresses, elastic limit, modulus of elasticity, composite sections. Stresses due to change in temperature.
- Elastic constants, linear strain, lateral strain, Poisson’s ratio, volumetric strain, relation between E, N, and K.
- Beams: bending moment and shear forces; simply supported, cantilever and overhanging beams for various loads, relation between bending moment and shear force.
- Moment of inertia and section modulus for various structural shapes. Theory of simple bending; \( M/I = f/y = E/R \) application of flexural formula.
- Shearing stresses in beams-distribution of shear stress over different sections.
- Deflection of beams: cantilevered and simply supported with different loading, relation between slope, deflection and curvature, double integration method, moment area methods.

References:
- Engineering Mechanics_Ferdinand L.Sing
- Applied Mechanics_S.Ramamrutham.
- Engineering Mechanics_Timoshenko & Young
- Structural Mechanics_Junnarkar
- Engineering Mechanics_K.L.Kumar

06.1.1.7: ENGLISH

1. Vocabulary:
   - One word substitutes
   - Words often confused
   - Synonyms and Antonyms
   - Foreign Phrases
   - Phrasal verbs derived from the Dynamic verbs: Go, Put, Take, Look, Get, Hold, Give Run and Turn.
   - Idioms and Phrases

2. Grammar:
   - Tenses and Uses of Tenses
   - Verb
   - Spotting the errors in a sentence
   - Concord
   - Articles, Proposition and words followed by prepositions.

3. Reading:
   - Comprehension: Locating the topic sentence – main idea – subordinate idea, pick out definitions, factual information references and inferences.

4. Writing:
   - Précis writing, Note – making and note taking, letter writing, technical report writing, resume writing, business correspondence, preparation of CV and project reports.

5. Text:
   - An anthology of prose selections reflecting the Indian culture and the contemporary social problems and models of English prose by VK Maheswari and Sri. B. Srivastava
06.1.1.8(a): WORKSHOP PRACTICE

Course content:
Model making: Preparation of wooden base for model Making of three dimensional building blocks & forms using different types of materials such as paper, rubber, acrylic, polystyrene, FRP, etc. Three to four exercises to be done.

References:
1. Designing with models – Criss. B. Mills.

06.1.1.8 (b): SURVEYING & SITE STUDIES

Basic principles and chain surveying:
Definitions, scales and symbols, sources of error in surveying and theory of probability, measurement of distance, instruments used, ranging of survey lines, chaining a line with examples, chaining on sloping ground, errors in chaining, tape corrections, chain surveying principles, off-sets, field notes, instruments, obstacles in chaining, plotting chain survey with practical examples.

Traversing and plain table surveying:
Tape and chain traversing, instruments used, methods of traversing, bearing lines, local attraction, plotting, magnetic declination, precautions in using compass, traversing by theodolite, instruments used and methods, plain table surveying methods, two point and three point problems, exercise in preparation of base map of small areas.

Computation of areas and leveling
Computation of areas, from field notes and from plan with examples, leveling: instruments used, definitions principles, reduction of levels classification of leveling, errors in leveling contouring; characteristics of contour lines, interpolation and interpretation of contours, uses of contour lines.

Automated surveying
Introduction to the use of digital surveying technologies such as total station, G.P.S through demonstrations.

Site studies:
Plot, site, land and regions, size, shape of sites. Analysis of accessibility, topography, climate, landforms, surface drainage, soil, water, vegetation, ecology and visual aspects.

Note: Field book to be submitted at the end of the semester.

Viva Voce: Student should field book and they should attend a practical Exam and Viva voce conducted by both an external and an internal examiner.

References:
1. Surveying vol-I – B.C.Punmia
2. Planning design criteria- joseph de chiara & lee coppleman
3. Site planning – Kevin Lynch
SECOND YEAR, 1st Semester

06.2.3.1: ARCHITECTURAL DESIGN-I


Course content: The design issues to be addressed include,
• Integration of Form and Space
• Visual analysis of Built form
• Principles of Perception – Proximity, Similarity, Closure (Gestalt type).

The list of suggested topics to be covered as design problems including preparation of measured drawings and design elements are,
• Bus shelter, Milk booth, Security cabin, ATM center, Internet center, Gateway etc.
• Primary health center, village post office, a school gymkhana, nursery school, small cafeteria, Architect’s office.
• Case study of existing house and its redesign and design of simple building elements.

References:
1. Time Savers Standards.
2. Architect's Data- Ernst Neufert
4. Form Space & order – Frantis, K. Chary

06.2.3.2: BUILDING MATERIALS-II

Course overview: This course looks at the materials that are either extracted or synthetically made. The manufacturing process, properties and uses are to be deliberated.

Veneers and veneering: Resin bonded plywood, laminated wood, insulating boards and other miscellaneous boards. Varieties of Timber, Characteristics and Uses

• Painting & varnishes:
  Protective coating, paints, constituents of paints, their function, water paints, distempers, cement based paints, varnishes (oil and spirit), French polish, plastic emulsion paints, Anti corrosive paint, water proofing and damp proofing finishes.

• Glass & Glass Products:
  Composition, Glass fabrication, types of glass, wired glass, fiber glass, rock wool, laminated glass, glass Crete blocks, structural glass, their properties and uses in buildings.

• Rubber: Natural rubber, latex, coagulation, vulcanizing synthetic rubber.

• Adhesives:
  Natural and synthetic, their varieties, thermoplastic and thermosetting adhesives, epoxy resin.

• Asphalt & Bitumen:
  Natural and artificial products, forms to asphalt, emulsion, cement mastic bitumen felt, their properties and uses.

• Plastic:
  Types, thermo setting and thermo plastics, resins, common types of molding powders used fabrication of plastics, polymerization and condensation. Plastic coatings reinforced plastic, plastic laminates.

References:
06.2.3.3: BUILDING CONSTRUCTION- II

• Foundations:
  Types of foundations, i.e. spread foundation, raft foundation, grillage foundation, pile foundation, bearing piles, precast & cast-in-situ piles; pile driving, foundation for black cotton soil, elementary knowledge about RCC foundation.

• Temporary Structures:
  Shuttering and centering scaffolding, formwork, timbering for trenches. Shoring, racking shores, flying shores and dead shores, underpinning.

The class and assignment work should be supplemented with appropriate site visits. Appropriate exercises may be done in the construction yard.

References:
1. ISI codes to be followed where ever relevant.
2. Building Construction-Sushil Kumar.
4. The Construction of buildings-Barry Vol.2
5. Building construction-W.B. McKay Vol.4

06.2.3.4: HISTORY OF ARCHITECTURE – I

Course overview:
History of architecture to be studied as history of development of building forms (3D) ornamentation, structural solutions, construction methods, plans and building façade, organization in relation to aesthetic / religious/social philosophy and environmental factors.

The study should focus on the general trends and not on specific examples/ buildings.

Course content:
• Architectural development in the ancient civilizations in Egypt and Mesopotamia, study of pyramids, temples, mastabas, ziggurats, etc.
• Architecture in the classic Greek and roman periods, temples, agoras gateways, circuses, amphitheatres, basilicas, etc.
• Architecture in the early Christian, Romanesque gothic, Byzantine, periods in Europe and rest of the world excluding Asia.

Internal evaluation will be through tests and/ or a seminar to be presented by each student using maps, plans, section/ elevations/ views and other diagrammatic and graphic means.

References:
1. A history of architecture – Sir Banister Fletcher
2. Introduction to architecture – Stephen Gardner.
3. A chronology of western architecture – Doreen Yarwood
4. The great ages of architecture – Bodo Lichy
5. Meaning in western architecture – Christian Noberg Schulz
World architecture – an illustrated history – Trewin Copplistone and others

06.2.3.5: STRENGTH OF MATERIALS

Analysis of beams and frames
Fixed and continuous beams, application of clapperayon’s theorem of three moments, BM& SF diagrams, moment distribution method for continuous beams and frames including side away. Kani’s method of analysis for structural frames.
• Columns and struts
  Bulking and crushing failures, types of end conditions, Euler’s theory & equivalent length and
  slenderness ratio. Rankine’s equation and IS code formula for critical load on columns.
• Direct and bending stresses, eccentricity about both axes, symmetric and
  Unsymmetrical sections. Wind press on walls and chimneys, retaining walls subjected to
  earth press.
• Torsion of shafts – introduction to the basic equation \( T/j = fs/R = Co/l \)
• Arches- determination f horizontal thrust, radial shear and normal force, axial thrust, bending
  moment and shear force for three-hinged arch.
• Structural concepts in post & lintel construction and arch, dome, vault construction.

References:
1. Structural mechanics – Junnarkar
2. Structural mechanics – punmia
3. Basic structural analysis – CS Redd

06.2.3.6: WATER SUPPLY & SANITARY ENGINEERING

Sources of water supply, types of sources, surfaces sources, underground sources, types of well
construction, yield of a well, spacing of wells, sanitary protection of walls.

Quality of water: meaning of pure water, impurities in water, analysis of water, physical, chemical and
bacteriological tests, maintenance of purity of water, water borne diseases, suitability of water for trade
purposes.

Treatment of water:
  General theory and principles of sedimentation tank, coagulation of water, filtration of water,
  disinfect ion of water and water softening, colour, odour, taste and fluoridation.

Distribution system of water:
  Methods of distribution, service reservoirs, systems of supply of water, method of layout of
distribution pipes. Pipe appurtenances, air valves, reflux valves, relief valves, scour valves, sluice
valves, stopcocks,

Collection and treatment of refuse:
  methods of carrying refuse, system of sewerage, ventilation, clearing and maintenance, surface
  drains.

Sewage: meaning of the term, catch-basins, clear out, drop manhole, flushing tanks.

House drainage:
  Principles of house drainage, traps, sanitary fittings, systems of plumbing, drainage plans, testing
  of drains and pipes, maintenance of house drainage system.
  Miscellaneous topics: septic tanks, use of pumps in sanitation, biogas disposal, soil disposal
  without water carriage, rural sanitation.

Roads and pavements:
  Different types, water bound macadam tar bitumen, asphalt and c.c. Roads, soils stabilization,
murram, brick and stone paving, drainage of roads, sub drains, culverts, ditches and gutters.

Reference:
1. Water supply and sanitary engineering-RANGWALA.
2. Sanitary engineering –V.N.GHE
3. Water supply engineering and sanitary engineering- S.K.Husain

06.1.1.8: SEMINAR-1

Over view:
Architectural projects and presentations which are part of the first and second year curriculum
are taken as the basis of training of the following skills.
• Communication skills – understanding the difference between seminars, conference, convention, congress, panel discussion, etc.
• Reading and listening comprehension. Taking notes from lectures, speeches, debates, etc. Interpretation and analysis of reports, text, technical literature.

• Writing skills:
  Presentation ideas accurately and logically, précis writing preparation of letters, application forms and reports. Documentation and Presentation of Case Studies.

• Introduction to Computers:
  Broad overview of hardware and software. Simple operations such as creating, editing, formatting, saving and printing documents.
  Working knowledge of MS Word, Power Point and other word processing and presenting packages.

Assessment
• Each student is expected to individually present a review of an article from an architectural journal allotted to him/her by the faculty.
• Each student is also expected to present a written paper and a seminar at the end of the semester on a topic to be finalized in consultation with the concerned faculty.
  Group Discussion on selected topics.

Viva Voce:
  Student should field book and they should attend a practical Exam and Viva voce conducted by both an external and an internal examiner

References:
1. How to write and speak better (Reader's Digest.).
2. The ABC's of Window 3.1 Alan R. Neibaner.
3. Effective reports – Matra Treece.

SECOND YEAR, 2ND SEMESTER

06.2.4.1: ARCHITECTURAL DESIGN-II

Course Overview:
  This Course is designed to develop the skills of creative design synthesis for a single use, small span, single storey building.

Course content: The design issues to be addressed include:
  • Functions and their spatial implications.
  • Maximum and optimum areas for various functions.
  • Anthropometrics, furniture layout and horizontal circulation.
  • Interior volumes and material qualities.
  • Lighting and ventilation.
  • Integration of form and function.

The list of suggested topics to be covered as design problems including:
Balwadi, Kindergarten School, Primary Health Centre, Doctor’s Clinic, Small Cafeteria, Highway Restaurant, Village Post Office, Bank(branch office). Police Station, Architect’s Office, Department Store, School Gymkhana & Youth Club etc.,

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as design problems will have to be covered by the Studio faculty members through lecture/slide show sessions and site visits.
At least two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

References:
1. Time savers standards of Building Types-Joseph de chiara & others.
3. Architect’s Data-Ernst Neufert.
6. Time savers standards of Building Types-Joseph de chiara & others.
   Architect’s Data-Ernst Neufert

06.2.4.2: BUILDING MATERIALS – III

Course Overview: This course looks at the materials that are composite in nature and their unique properties.
Reinforced Cement Concrete:
   light weight concrete, Pre-cast concrete, solid and hollow blocks, their sizes, precast lintels, fence posts, sleepers, roof components, and partitions
   RCC slabs with single and two-way reinforcement, beams, singly & doubly reinforced beams, columns, staircase, balconies, railings, RCC pre-cast units.
   Innovative materials ex: composite materials generated from waste etc. Post tensioned structures, Composite material, tensile structures.
   Usage of metals like steel, Aluminum, brass, copper etc as Building Materials

References:

06.2.4.3: BUILDING CONSTRUCTION-III

• Flooring: brick on edge, concrete, wood, Indian patent floor, granolithic, terrazzo, pitch mastic, magnesium oxide, chloride, shahbad or flagstone.
• Ground and upper floors:
   solid floor, brick flooring, flag stone or shah bad stone flooring, floor finishing and floor coverings. Basement floor and retaining walls.
   • Wooden ground and upper floors – terms defined, bridging, joists, binder beams and girders, solid and herringbone strutting, floor boards, ceiling joists, trimming floors to accommodate fire place. Details of fireplace, Flat roofs Madras terrace, jack arch roofs.

The class and assignment work should be supplemented with appropriate site visits. Appropriate exercises may be done in the construction yard.

References:
1. Building Construction_- Sushil Kumar
2. Building Construction_-S.P Arora, S.P Bindra
06.2.4.4: HISTORY OF ARCHITECTURE-II

Course Overview:
History to be studied as history of development of built forms (3D) And ornamentation, Structural solutions, construction methods, plan and building façade organization in relation to Aesthetic/religious/social philosophy and environmental factors.

The study should focus on the general trends and not on Specific examples of building.

COURSE CONTENT:
HINDU ARCHITECTURE: Development of architecture in India and rest of Asia, from the earliest times up to the end of the fourth century: Indus valley, Buddhist Architecture, Rock cut Examples, Deccan School < ancient text on Hindu Architecture and art, Hindu and Jain examples from Orissa, Khajuraho, Gujarat etc., Chalukyan Architecture, south Indian Temple Development from the period of later Pallavas to later Cholas and Pandyas.

ISLAMIC ARCHITECTURE:
Early Saracen School in India: Imperial school at Delhi provincial schools at Gujarat and Deccan. Moghal Architecture in India.

References:
1. Art Architecture of India-Benjamin Rowl.
2. Indian Architecture-Percy Brown.
4. The history of Architecture in India-Christopher Tadgell.
5. Vistara-The Architecture of India

06.2.4.5: CLIMATOLOGY

Introduction to Building Climatology
Climate and built form interaction. Global climatic factors, elements of climate, graphic representation of climatic data, Mahoney’s Tables, macro & microclimate.

Tropical Climates
Definition, classification of tropical climates, characteristics of different climatic zones, Design considerations for warm-humid, hot-dry, composite and upland climates

Thermal Comfort
Thermal comfort factors physiological aspects body heat balance, comfort range, Comfort charts.

Heat Flow through Buildings
Basic principles of heat transfer through buildings, performance of different materials, Periodic heat flow.

Sun and Design Process
Solar geometry, solar charts, sun angles and shadow angles, orientation for sun, sun control, design of shading devices building form and heat gain, basic principles of day lighting, sun light and glare.

Natural Ventilation
Air movement around and through buildings, orientation for wind stack effect, including ventilation.
Passive Cooling

Passive methods of cooling, roof pond, Dessicant cooling, Vaporative cooling, earth sheltered buildings.

REFERENCES:
1. Manual of Tropical Housing and Building- Koenigsberger, Ingersoll, Mayhew and Szokolay.
Solar Control and Shading Devices – Olgyay and Olgyay

06.2.4.6: DESIGN OF RCC STRUCTURES

• Introduction to RCC design
  - Neutral axis; balanced, under & over reinforced sections.

  Design of Flexure Members
  - Design of beams for flexure, shear & bond.
  - Design of doubly reinforced beams.
  - Design of one way & two way reinforced slabs.
  - Design of lintels, cantilever beams and slabs.
  - Design of T beams.

  Design of columns & footings
  - Design of R.C.C. columns, axially & eccentrically loaded Columns, columns subjected to BM about one & two axis.
  - Design of staircase.
  - Design of R.C.C. footings for columns.

Reference:

06.2.4.7: ENVIRONMENTAL SCIENCES

Module 1: Introduction Definition, scope and importance Measuring and defining environmental development : indicators (1 Lecture)

Module 2 : Ecosystems
  Introduction, types, characteristics features, structure and functions of Ecosystems - Forest, Grassland, Desert, Aquatic (lakes, rivers, and estuaries) (2 Lectures)

Module 3 : Environment and Natural Resources Management Land resources:
  Land as a resource, Common property resources , Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer-pesticide problems Forest resources: Use and over-exploitation, Mining and dams-their effects on forest and tribal people Water resources: Use and over-utilization of surface and ground water, Floods, draUGHTs, Water logging and salinity, Dams-benefits and costs, Conflicts over water Energy resources: Energy needs, Renewable and non-renewable energy sources, Use of alternate energy sources, Impact of energy use on environment .(8 Lectures)

Module 4: Bio-diversity and its conservation
  Value of bio-diversity – consumptive and productive use, social, ethical, aesthetic and option values. Bio-geographical classification of India – India as a mega diversity habitat .
Module 5: Environmental Pollution – Local and Global Issues
Causes, effects and control measures of Air pollution, Indoor air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, composting, vermin-culture, Urban and industrial wastes, recycling and re-use Nature of thermal pollution and nuclear hazards, Global Warming, Acid Rain, Ozone depletion (8 Lectures)

Module 6: Environmental problems is India
Drinking water, Sanitation and public health, Effects of activities on the quality of environment, Urbanization, Transportation, Industrialization, Green revolution Water scarcity and Ground Water depletion, Controversies on major dams – resettlement and rehabilitation of people problems and concerns, Rain water harvesting, cloud seeding and water shed management (5 Lectures)

Module 7: Economy and Environment
The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practice, Limits to Growth, Equitable use of resources for sustainable lifestyles, Environmental Impact Assessment (4 Lectures)

Module 8: Social Issues and the Environment
Population growth and environment, Environmental education, Environmental movements, Environmental Development (2 Lectures)

Module 9: Institutions and Governance

Module 10 : International Conventions
Stockholm Conference 1972, Earth Summit 1992, World commission for environmental Development (WCED) (2 Lectures)

Module 11: Case Studies
Chipko movement, Narmada Bachao Andolan, Silent Valley project, Madhura Refinery and Taj Mahal, Industrialization of Pattancheru, Nuclear reactor at Nagarjuna Sagar, Tehri dam, Ralegaon Siddhi (Anna Hazare), Kolleru lake – aquaculture, Florosis in Andhra Pradesh (3 Lectures)

Module 12: Field work
Visit a local area to document and mapping environmental assets – river / forest / grass land / hill / mountain Study of local environment – common plants, insects, birds, Study of simple ecosystems – pond, river, hill slopes etc., Visits to Industries, Water treatment plants, affluent treatment plants. (5 Lectures)
THIRD YEAR, 1st Semester

06.3.5.1: ARCHITECTURAL DESIGN – III

Course overview: This course focuses on buildings of residential use. It aims to enhance the students understanding of the complexities of architectural design for residential needs and develop creative design solutions for good living environments.

Course Content:
- Organisation of functional activities in relation to user requirements and the site.
- Relating the system of horizontal & vertical circulation, open spaces, parking etc.
- Responding to socio-economic factors such as income levels, privacy, territoriality, socializing etc.
- Considering materials, structure and services in relation to the design proposal.
- Integration of plan forms & three dimensional compositions.
- Detailing for the physically handicapped and the elderly.

The list of suggested topics to be covered as design problems include:
Large guest house, students hostels, small hotel, holiday resort, motel, row housing, block of flats and residential complexes at an intermediate scale such as staff housing, housing for specific communities in urban and rural areas such as home for the aged, fishermen’s housing etc.

Necessary theoretical inputs to be given highlighting the norms and design issues

The topics not covered, as design problems will have to be covered by the studio faculty members through lectures/slide shows and case studies.

Atleast two major exercises and two minor design/time problems should be given. The final submission shall necessarily include a model for at least one of the two main problems.

References:
1. Time Saver Standards of Building Type Joseph De Chiara & others.
3. Architect’s Data Ernst Neufert
4. Hand Book of Planning and Design Data
5. Barrier free Residential Design Albert Peloquin
6. Site Planning for Cluster Housing Richard Untermann and Robert Snall

06.3.5.2: BUILDING CONSTRUCTION – IV

Staircases: Terms defined, Tread, riser, stringer, nosing, flight, landing, head room, handrail, types of stairs i.e., straight, doglegged, open well geometrical, circular, spiral, bifurcated, balusters, newel post etc., wooden stairs, stone stairs metal stairs and elementary knowledge of R.C.C. stairs.

Roofing, flooring and ceiling materials: roofing tiles asbestos cement products, sheets, fiber board and wood fiber boards, gypsum boards etc.

Wall Finishes: Acoustic treatment, insulation etc.

Modular components: offices, kitchens, toilets etc.

The class and assignment work should be supplemented with appropriate site visits. Appropriate exercises may be done in the construction yard.
06.3.5.3: HISTORY OF ARCHITECTURE-III

Course Overview:
- History to be studied as development of built forms (3D) and ornamentation, structural solutions, construction methods, plan and building façade organization in relation to aesthetics/religious/social philosophy and environmental factors.
  - The study should focus on the general trends and not on specific examples of buildings.
  - Course Content:
    - Renaissance, Baroque and other architectural styles preceding the advent of Industrial Revolution in Europe.
    - Influence of architectural Revolution on building materials, Construction Technology, evolution of new building types and increasing user requirements.
    - Characteristic styles of modern architecture up to First World War.
    - Steel structures, Arts and crafts movement, Art Nouveau Vienna school, Chicago school, Monumentalism. Expressionism and beginning of R.C.C.
    - Pre-Independence architecture in India: Development of secular architecture from the end of the 18th century to the middle of the 19th century.

REFERENCES:

06.3.6.4: SPECIFICATIONS, ESTIMATING AND COSTING

Course overview: This course is intended to impart training in the preparation of Specifications and Estimation for a building.

Course content: Definitions and terms used principles of measurements in estimating. Methods of preparing approximate estimates on plinth area and cubic contents (volume) basic differences and advantages.
Method of obtaining detailed quantities for earth works, building items and other allied structures (P.W.D. system to schedule of rates, standard mode of measurements. Example and exercise in obtaining all items from excavation to painting including RCC and steel works.

Specifications: brief specication of different items in a building.
  - Defining specifications; Purpose of specifications
As a contract document
As a guide to builder and supervisors
Importance of specifications in the execution of building projects with respect to drawings.
Types of specifications
Manufacture's specifications

Detailed clause writing of specifications of any three items of work for a normal standard building with at least three other items as part of the internal assessment from the following:

a) Earth work excavation in all types of soils including blasting operations.
b) Foundation in CRS and UCRS in RCC
c) Superstructures in brick masonry.
d) RCC work in slabs, sunshades, lintels, etc.
e) Doors and windows in wood and steel.
f) Finishing work (I) painting, (II) flooring,

(iii) Cladding,

g) Built in furniture.
h) Partitions.
i) Modes of measurements.

Knowledge of manufacturer’s specifications as a database for writing specifications for the following materials, components of the building based on surveys:

- Glass
- Plywood and laminates
- Hardware
- Electrical wires and accessories
- Water supply and plumbing: fittings and fixtures
- Flooring and cladding

NOTE: This has to be taken by the students in the form of surveys monitored by the teacher. The end output should be in the form of a report submitted by the students consisting of the specifications writing as given above.

REFERENCES:
1.) Estimating and costing in Civil Engineering by B.N. Dutta
2.) Standard Schedule of Rates – C.P.W.D

06.3.5.5: LANDSCAPE DESIGN AND SITE PLANNING


• Site studies and site planning:
  Understanding different site characteristics and evaluation of their potential for development.
  Philosophical and design issues related to site development – i.e. siting of buildings, spatial and contextual relationships of built and out door spaces, site and its relationship to its surroundings. Importance of climatic, social factors in development of site.
  Process of design development. Identifying functional requirements of site, development of site by mutual exploitation of forms and use of grading principles. (study should include atleast two exercises in site planning)

• Elements in Landscape design:
  Use of landform, water, vegetation as elements of Landscape design and types of garden furniture, lighting and water feature Pavement types, patterns, and hard landscapes
  Sculptures and architectural features and elements Design concept related to use of landscape elements in outdoor design - Grouping of elements, visual effects etc.
• **Plants and design:**
  
  Botanical nomenclature, anatomy and physiology
  Plant growth and development, plant communities and their environments in Indian Context
  Plants and landscape - Basic principles, appearance of plants, functional and visual effects with plants in landscape
  Landscape layout and planting techniques
  Planting design and practice

• **Landscape Construction:**
  
  Elementary knowledge of grading cut and file, shaping the site
  Use of materials use in landscape and their details
  Laying paths with different materials like pebble paving slabs, stone etc
  Construction of garden steps
  Construction of screen, trellis, wall fences, gates, decks
  Construction and detailing of drain inlets, curbs and gutter details
  Fountain and pool construction
  Elementary knowledge of irrigation systems, and water supply, lighting systems

**Reference:**

1. Site planning – Kelvin Lynch
2. An introduction to Landscape Architecture – Michael Laurie
3. Landscape Construction and detailing – Alan Blanc
4. T.S.S. for Landscape Architecture
5. Planting Design – Bian Hacheat
6. Land and Landscape – Brenda Colise
7. Common trees – Snatapaer
8. Beautiful Shrubs – Prathiba Devi

06.3.5.6: **DESIGN OF STEEL STRUCTURES**

**Introduction to Steel Structures:** Steel structural shapes, Introduction to IS 800; Rivets, Design of steel structural members – tension, compression and bending members

**Design of Beams, Columns & Footings:** Design of beams; checks for shear and deflection, define plate girders Design of built-up beams (with flange plates only)
Design of connections: Design of riveted and welded connections including the beam end connections

**Design of Columns:** Design of axially loaded steel columns Design of built-up columns (Lacing)
Design of foundations: Design of base plate, gusset plate and concrete footings for steel columns
Design of grillage foundations
The class and assignment work should be supplemented with appropriate site visits

**Reference:**

1. Design of Steel structures – Ramamrutham
2. Analysis, design and details of structures Vol. III: Steel structures – Vazirani
06.3.5.7 ELECTIVE – I

1. COMPUTER APPLICATIONS IN ARCHITECTURE

1. Computer as a drafting tool: Productivity tools in CAD, organization of layers for working drawings, use of blocks and symbols hatch patterns. Dimensioning systems extracting of areas from drawings, concept of paper space plotting the drawings
2. Computer as a design tool: Repetition of forms mirroring, coping, and array etc. calculation of areas, volumes.
   - Computer as visualization tool: 3D modeling, rendering, and animation for basic building forms of block models.

Customizing of CAD Software:
- Creating and using templates, blocks, symbols and using them in architectural drawings.
  - Managements of large drawing files.
  - Working in a network environment-Security systems-converting drawing files into Internet compatible files.

Allied applications:
- Use of spreadsheet and for various architectural calculations-estimation, area calculations, project reports, scenarios, and accent etc-preparations of templates for regular repetitive functions.
- Working with word-processing software creating and using templates for regular Office Communication-letters, reports documents etc.
- Database management software creating and using database for materials, workers, drawings, clients etc.

Presentation Drawings:
- Preparation of Presentations for large gatherings, corporate clients-using CAD drawings, pictures, 3D images, text etc.

Reference:
1. Engineering drawing with Auto CAD 2000-T. Teyapoovan
2. Inside Auto CAD-Daniel Rather and Habert rice.

06.3.5.7 ELECTIVE - I HOUSING

Review of different forms of housing globally-particularly with reference to the third world countries.
Review of housing standards and norms. Brief acquaintance with some strategies such as upgrading existing shelter, stimulating private-sector production, developing building materials and alternative technologies, improving architectural design, protecting inner city renters land sharing, resettlement etc. case studies of public and private sector housing.

Review of rural housing schemes and the use of indigenous building materials. Infrastructure Layout: Layout in housing areas design of housing layout for different income groups.

References:
2. Reading Material on Housing-ITPI.
06.3.5.8: SOFT SKILLS

Communication:
  Importance of communication, Non verbal communication, Personal appearance
  Posture, Gestures, Facial expressions, Eye contact, Space distancing

Goal Setting:
  Immediate, short term, long term,
  Smart goals, strategies to achieve goals

Time Management:
  Types of time, Identifying time wasters, Time management skills

Leadership and Team Management:
  Qualities of a good leader, Leadership styles, Decision making
  Problem solving, Negotiation skills

Group discussions:
  Purpose (Intellectual ability, creativity, approach to a problem, solving, tolerance, qualities of a leader)
  Group behaviour, Analysing performance

Job interviews:
  Identifying job openings, Preparing resumes & CV
  Covering letter, Interview (Opening, body-answer Q, close-ask Q),
  Types of questions

Reference books:
1. ‘Effective Technical Communications’ by Rizvi M. Ashraf, McGraw–Hill Publication
2. ‘Developing Communication Skills’ by Mohan Krishna & Meera Banerji, Macmillan
3. ‘Creative English for Communication’ by N.Krishnaswami & T.Sriraman, Macmillan

06.3.5.9: FREE ELECTIVE – INERIOR DESIGN

Elements of interior design - Form, scale, texture, colour and light. Style and furniture, plant material, painting, sculpture, light fixture, floor covering, draperies, ways of achieving unity among these various uses designed by architects and designer. Discussion on economics, maintenance, durability, flexibility and environmental affects, colour scheme and interior arrangement for different spaces. Hotel rooms, office spaces, class rooms, etc.


Project: Case studies of each space type presented in seminar format.

Design of Interior Spaces : Residential, Commercial i.e., showroom.

Reference books:
THIRD YEAR, 2nd Semester

06.3.6.1: ARCHITECTURAL DESIGN – IV

Course overview:
This course focuses on the discipline of institutional design and detailing skills required for the design of institutions in urban contexts.

Course content: the following issues relating to institutional design will be addressed to:
• Nature of contemporary institution, correlation to urban structure.
• Development control and urban infrastructure affecting design.
• Various attitudes to building in urban context.
• Integration to function and movement, climate, and sound, structure and services into group of buildings
• Landscaping and site planning.
• Institutional character – from abstract to detail.
• User behavior and requirements pertaining to the physically handicapped.

Necessary theoretical inputs to be given highlighting the norms and design issues The topics not covered as studio faculty members through lecture/slide shows and site visits may cover design problems.
The topics to be covered as design problems may include:
• Institution of learning – colleges with it’s various departments such as medical, engineering, law, business, music, and dance colleges, vocational training institutes etc.
• Institutions of life such as hospitals, reformatories and rehabilitation institutes for the disabled.
• Institutions of research in various disciplines.
• Local/legal institutions such as the high courts, secretariat, development authorities, directorates etc.

At least two major exercises and two minor design / time problems should be given .the final submission shall necessarily include a model for at least one of the two main problems.

REFERENCES:
1. Libraries - Allan Konya.
3. Hospital Architecture and Beyond – Isodore Rosenfield.
4. Time savers standards of building types – Joseph De Chiara & others
5. A History of Building Types – Nikolaus Pevsner
6. Architects` Data - Ernst Neufert
7. Handbook of Planning and Designing Data.

06.3.6.2: BUILDING CONSTRUCTION-V

Structural steel work: general principles and terms defined, standard sections i.e. beams, joists, angles, channels, tees, bolts, rivets and welding.
Plate girder, lattice or warren girder, details of jointing, steel trusses for various spans. Steel frame structure: stanchions, main and secondary beams, details of connections by riveting, welding, bolts and nuts.

Tubular steel roof truss, monitor roof, north light truss, lantern light (wooden and steel), dome light, dormer windows, structural practice and drawings as per IS code.

The class and assignment work should be supplemented with appropriate site visits. Appropriate exercises may be done in the construction yard.

References:

06.3.6.3: DEVELOPMENT OF CONTEMPORARY ARCHITECTURE

Course Overview:
• Contemporary Architecture to be studied as development of built forms (3D) and ornamentation, structural solutions, construction methods, plan and building façade organization in relation to aesthetic/religious/social philosophy and environmental factors.
• The study should focus on the general trends and not on specific examples of building.

Course Content:

2. Understanding of contemporary directions in architecture in the rest of the world through studies of the ideas and works of Robert Stern, Charles Moore, Goeffery Bawa, Michael Graves, Richard Meyer, Aldo Rossi, Frank Gehry, Rob Krier, Hassan Fathy, Renzo Piano, Richard Rogers, Norman Foster, Tado Ando etc.

References:

06.3.6.4: WORKING DRAWINGS

COURSE OVERVIEW:
• This course is intended to impart training in the preparation of working drawings for buildings with specific reference to the code of practice for architectural and structural drawings as per IS CODE. NO.962 of 1969 and actual writing of detailed clause-by-clause specifications as complimentary to the working drawings.
COURSE CONTENT:
• Preparation of working drawings to suitable scales indicating clearly:
  The method of giving dimensions: architectural and structural, on plans at various levels, elevations and sections.
  The brief specification of materials of finishes on the drawings.
  Architectural details to a large scale showing application of materials of finishes and other constructional details.
  Location of built up areas in the site plan showing approach roads, paths and layouts of all services such as water supply, sewage disposal and electrical connections.

NOTE: Atleast two working drawing sets preferably one for a small residential building and one for multistoried building, based on the design done by students shall be prepared.
Following detailed drawings should be prepared in each set:
• Centre line plan
• Foundation plan
• Structural grid plan (in case of framed structures)
• Basement floor plan
• Ground floor plan
• Typical floor plan
• All elevations
• All sections: one atleast through staircase and one through toilet
• Terrace floor plan giving details of surface drawing etc
• Sanitation drawings showing fixtures etc
• Electrical layout plan
• Typical wall profiles sections
• Detailed drawings of special rooms like kitchens, toilets, staircase etc
• Structural drawings giving all details

• In addition to the above, students are expected to prepare a detailed clause by chance specifications for atleast one of the 3 projects Specifications writing include the following aspects:
  • Materials
    • Pre and post installation work
    • Test, if any
    • Mode of measurements
  • Knowledge of manufacturers specifications as a database for writing specifications for the following materials, based on surveys:
    Glass
    Plywood and laminates
    Hardware
    Electrical wires and accessories
    Water supply and plumbing: fittings and fixtures
    Flooring and cladding

Viva Voce: Student should submit drawings and they should attend a practical Exam and Viva voce conducted by both an external and an internal examiner

REFERENCES:
• Building construction specification – Jack Lerrs
• Standard specification of state governments
• Specification in detail –Frank W.Makay
• Building Drawing – M.G.Shah, CM,Kale, S.Y.Paoui
• Architectural Working Drawings –Ralph W.Liebing, Mimi Ford, Raul
06.3.6.5: ELECTIVE – II : ELECTRICAL & MECHANICAL UTILITY SERVICES

Electrical services:
Fundamentals of electricity, voltage, generation and distribution of power, HT and LT. Three- (3) phase current sub station, generator, UPS.

Building using system:
Electricity, circuit, service wires, household, meter and circuit breakers, ISI standard materials switch boards, light circuits and power circuits using for general buildings.

Domestic Application: Construction and working of atleast six domestic appliances.
- Voltage
- Electric motor types
- Safety
- Location in a building.

Lighting:
- Comparison, advantage and disadvantages
- Types of Artificial light source,
- Methods of lighting Direct, Indirect.
- Lighting system adapted in building, eg: suspended lighting, concealed lighting, spot lighting, under water lighting & task lighting.
- Illumination level (NBC) nominal calculations of lighting for small application.
- Decorative lighting, flood lighting of buildings.

Air Conditioning:
• Different types of air conditions single zone, Multi zone, Equipment and Systems.
• Condenser, Compressor, evaporator, heat exchanger
• Window air conditioning, Split air conditioner, Duct able air conditioner.
• Central air conditioning
-All air system
- Chilled water system.
- FC unit. Ducting.

References:
1. Electrical Wiring & Contracting (Vol.1 to Vol.4)
2. Electrical Engineering Hand Book by Dr. Frith Abnwos & Others.

06.3.6.6: HUMAN SETTLEMENTS

CONTENT: Brief review of the origin of early human settlements, factors responsible, Brief introductory study of the development of various settlement forms up to and after the industrial revolution in Europe, U.S and India in particular.

Type and classification of settlements of Urban and Rural, according to formal, administration norms (census etc.) and according to planning theories

Physical differences and relationships between Urban and Rural settlements

Out of economic and other functional factors implication in settlement planning a very brief introduction to the theory of ‘EKISTICS’
Urbanization – Fact, elementary theories and problems related to urbanization with social reference to India.

Ecological, social and economic aspects of town planning in India. Brief introduction to the town planning organization in India (National & Local) and contemporary policies/programs related to urbanization and urban development at the national level in India. Brief introduction to the implication to town forms in urban planning and development processes.

Introduction to the various levels of planning National, Regional, Urban, Rural, Local etc. emphasizing the differences and relationship among them
Basic terms & definitions used by town planners in describing urban areas and their development – such as gross density, net density, floor space index, central business district, land use etc.,

Transportation and communication, potentials and limitations of road-ways, railways, airways and water ways in the development of settlements
Introduction to the concepts of green belts, satellite towns, neighborhood, roads in solving some of the problems in urban development.
Indian context: Growth pattern of urban and rural settlements; problems and potentials.

NOTE: The main aim of the subject is to make the student aware of the factors that constraint and assist in architectural design of the settlements.

References:
1. Ekistics-An introduction to the science of Human Settlement- C.L.Doxiadis.
2. House, Form and Culture- Amos Rappoport.

06.3.6.7: STRUCTURAL ENGINEERING

Retaining Walls:
Cantilever and Counter fort types, Design of Cantilever types of Retaining wall.


FOURTH YEAR, 1st Semester

06.4.7.1: ARCHITECTURAL DESIGN-V

Course over view:
This course focuses on the design of multi-use and multi-span buildings and aims to develop skills required for evolving suitable designs for large public use complexes.

Course content: The design issues to be addressed include:
• Site and climate conditions, • Socio-economic conditions, • User behaviour and requirements, • Space conservation in urban areas, • Form and function, • The system of horizontal and vertical circulation, • Landscaping and site planning, • Structure and services, • Communication, • Design details pertaining to the disabled,

The topics to be covered as design problems may include:
• Inter state or inter city bus terminal, • Cinema theatre, • Multipurpose hall.
• Sports complex, • Auditorium, • Community center, • Kalyana mandapam.
• Information center, • Entertainment center, • Museums and art galleries.

Introduction to Standard Software packages for estimating Structural Analysis and Design.

At least two major exercises and two minor design/time problems should be given. A model must be submitted along with at least one of the two main problems.

Necessary theoretical inputs to be given highlighting the norms and design issues. The topics not covered as the studio faculty members through lecture/slide shows and site visits may cover design problems.

Viva Voce: Student should submit drawings of the design problem and they should attend a practical Exam and Viva voce conducted by both an external and an internal examiner

REFERENCES:
1. Central City Malls- HARVEY M.RUKNITEIN.
2. Play Ground and Recreational Spaces- HEDDERMAN, ALFRED.
4. Time Savers Standard of Building Types-JOSEPH DE CHIARA & OTHERS.
5. A History of Building Types- NIKOLAUS PEVSNER.
6. Architect’s Data- ERNST NEUFERT.
7. Architect’s Hand Book- CHARANJIT .SHAH.

06.4.7.2: BUILDING CONSTRUCTION – VI

Constructional details of various structures in steel, pre stressed concrete. Portal frame, folded plates, stadium stands etc.
Geodesic principles and cellular structures, cable net construction and tensile structures.
Building failures, maintenance and renovation; causes of decay and damage in old buildings:

Preliminary inspection: general observations, general decayed elements, difference between decay and damage.

Timber: use of timber, moisture content, control, prior to installation, strength reducing factors; approach to the repairs to the roofing system.

Bricks: strength of brick work; effect of ageing; weathering, temperature variations on brick work, joints and cracks, construction errors, repairs and maintenance.

RCC Concrete: mixing at site, structural design in repair job, causes of failure in concrete structures, guniting, pressure grouting.
Propping; strutting, underpinning and wedges.

Methodical approach to problems of repairs: decayed ends of floor joists; cracks over openings; sinking and sagging of balconies; repair to floors; jack arch, Madras terrace; foundation sinking; repairs to wall stair cases, WC blocks etc.

Some unusual problems: In situ brackets for supporting floor joists, repair to big span rooms; water proofing to terrace; case studies and site visits.
Renovations: provision of chajja; renovation of balconies, external lintels; removing old flooring and providing alternate flooring. Multistoried structures and extensions, above one or two storeyed buildings without actually loading it. False ceiling, Shelves and Built in mesh.

The class and assignment work should be supplemented with appropriate site visits. Appropriate exercises may be done in the construction yard.

References:
1. Shell Structures by Felix Candella
2. Learning From Failures (Vol 1 and Vol 2) – Raikar.
3. Failure and Repair of Concrete Structures – S.Champio.

06.4.7.3: BUILDING ACOUSTICS

Need to study acoustics; pioneers and their works.
• History of acoustics examples from the part, buildings and methods used for good acoustics.
• Generation, propagation, transmission; reception of sound; sound waves, sound pressure and other factors, decibel scale.
• Characteristics of sound in speech and music-loudness, frequencies etc.
• Sensibility of human ear, subjective effects.
• Behavior of sound in enclosed spaces.
• Resonance, reverberation time, simple exercises using Sabine’s formula, acoustical requirements of different types of building.
• Effects of geometry and shape; acoustical properties of building materials, absorption coefficient; choice of materials.
• Echoes, reflectors; sound amplification and distribution.
• Principles of acoustical design process.
• Source and type of noise in and around buildings, methods of noise control.
• Sound isolation, speech, privacy, and electronic sound systems, Case studies of auditorium.

References:
4. The Architecture of Sound by Peter Lord, Duncan Templeton.

06.4.7.4: TOWN PLANNING

• A brief introduction to the implication of town forms in urban planning and development processes, Introduction to the various levels of planning: national, regional, urban, rural, local etc; emphasizing the differences and relationships among them.
• A general and introductory study of inputs, objectives, preparation and outputs of Master plan for a city; land-use classification, features and relationships with transportation. Meaning and use or implication of O-D surveys, desire line diagrams trip generation, attraction, distribution and model split.
  • Introduction to housing and community facilities; role of F.S.I, densities in housing.
  • Basic methodology for planning of industrial areas and recreation areas.
• Brief introduction to redevelopment schemes and urban renewal, problem of slum and shanty areas and a review of the concepts regarding solutions: clearance, rehabilitation and improvement.
• Standards and norms evolved by TCPO.
• Ecological, social and economic aspects of town planning in India.
• Brief introduction to the town planning organization in India (national and local) and contemporary policies/programmes related to urbanization and urban development at the national level in India.

At least one exercise related to the preparation of a layout for a residential neighbourhood of about 5000 populations.

• General aim and principles of development control in urban areas, legislation as a tool in town planning; aim and general principles of building byelaws.
Rules, regulations, and other laws related to urban development and planning, like: land acquisition, land ceiling, model town and regional planning acts, etc; with special reference to Andhra Pradesh.

References:
1. Town Planning- Rangwala.
10. Regional Planning in India by Mahesh Chand., Vinay Kumar Puri.

06.4.7.5: BUILDING ECONOMICS AND SOCIOLOGY

General and brief introduction to the economics of each of the following inputs into building, land, labour, capital, and materials.

Lands: Basics of urban land economics, land uses, and land values, values vs. price influence of government policies and action (ethnic, Socio-economic) in the building industry – efficiency. Skills – case for labour intensive vs. capital

Capital: Capital accumulation, sources of finance, (public and Private) interests, rents, taxes insurance recurring costs, disposable income, and expenditure Patterns.

Materials: Traditional Vs industrial- high technology, demand and supply performance vs. cost factors

General Economics concepts: Cost and cost indices, cost control preliminary cost analysis – financing for projects – economic feasibility reports, returns, etc., cost appraisal, cost projection, elements of valuation reports.

Elementary idea of economics planning – broad features of the ongoing five year plan with special reference to social and economics factors effecting location, construction and financing of the building industry and housing in particular.
Agencies /institutions/organizations – directly or indirectly influencing economic aspects of an architectural project.

**Part – B SOCIOLOGY**

Family as the basic units of ‘society’ – Differences in life styles due to regional background, religion, caste, income etc., and their implication in architectural design of the housing unit.

1. Sociological aspects in the history of the evolution of housing /shelter forms. Sociological problems of interaction, isolation /privacy, accessibility, conflict, alienation- related to the planning and design of different buildings with reference to the people of the different Age groups

Socio-Spatial problems- Migrants – slums high density, high rise living, power structure in society.

**References**

1. Amos Rappoport, House Form and Culture

**06.4.7.6: STRUCTURES SEMINAR**

The following topics will be introduced to students in the classroom, later on they have to choose one topic each work on it and present a Seminar.

**Introduction to Standard Software packages for estimating Structural Analysis and Design.**

1. Introduction to Limit state method and practicing design of structural elements slabs, beams, columns and foundations.
2. Industrial Structures in Steel.
4. Large Span Construction-flat slabs-shell structures, folded plates, portal frames space frame & trusses; tensile structures.
5. Pre fabricated construction & Pre-engineered building.
6. Earth Quake resistant design.
7. New Material Construction.
8. Cold form sections, FRR.

**Guest lectures are arranged for the latest topics.**

A report must be submitted, containing all the topics before the practical Viva-voce Examination.

**Viva Voce:** Student should field book and they should attend a practical Exam and Viva voce conducted by both an external and an internal examiner.

**Reference:**

1. Shell Structures-Rama Swamy.
2. Prestressed Concrete-Krishnam Raju.
3. Great Engineers-Derek Walker
5. Precast Concrete-Design and Applications-A.M.HASS
6. Development in Structural form-Rowland Mainstone

06.4.7.7: ELECTIVE- 1: BUILDING CONSTRUCTIONN MANAGEMENT: 1

Introduction to Numerical Techniques:
Linear programming, sensitivity analysis Transportation problems, Inventory control cost benefit analysis, Input-Output analysis, Queuing theory, Simulation, sequencing problem.

Management Techniques:
Role of construction manager, Organization, responsibility & authority, functions in the management process. 
Project Management Techniques, Planning, Project planning & control, levels of details & time scale Resource scheduling, smoothing & leveling, project execution, monitoring & progress reporting.

Graphical Representation Histograms, Bar charts
Introduction to PERT/CPM/PNET Time scheduling – construction of networks computation of scale time & float.
Introduction to construction equipment, performance, characteristics of equipment used in the earth moving plants, pile driving, high rise structures, prefabricated & large construction, concrete placing, material handling, mechanical and electrical equipment.

Building Services & Construction Technology:
Advanced and automated Technology in building services, advanced construction technologies. Introduction to IT in construction industry-software packages.

References:
1. Project management through network technologies M. Thyagarajah
2. ARCHITECTURAL CONSERVATION - I

Module 1:
Heritage: Heritage definition, classification of heritage (UNESCO), world heritage sites

Module 2:
History and theory of conservation: Conservation, concepts, history, principles and methods, development of theory conservation and various International charters like Charter of Venice (1964) and the Burra Charter

Module 3:
Types of threats, causes of Decay in Cultural Property, External Causes of Decay, Biological and Botanical Causes, Natural disasters and manmade causes of decay

Module 4:
Role conservation architect, documentation, norms for grading and enlisting, parameters for consideration for world heritage sites by UNESCO.
Values in conservation, Ethics of Conservation, Degrees of intervention such as prevention of deterioration, preservation, consolidation, restoration, rehabilitation, reproduction and reconstruction.

Module 5:
Basic principles and its approach to conservation: Broad concepts of terms such as reuse, rehabilitation, revitalization, regeneration, upgradation, redevelopment of historic areas and cities.

Module 6:
Concept of integrated conservation: planning and management such as inspecting of historic buildings, inventory, initial inspection of buildings, new constructions in heritage/conservation areas/ planning for conservation and urban management.

Module 7:
Conservation scene in India: Conservation Practice and Legislations in National & local levels i.e., Andhra Pradesh State, INTACH Charter. Recent works case studies, different agencies of conservation in India.

Reference
FOURTH YEAR, 2nd SEMESTER

06.4.8.1: PRACTICAL TRAINING

Every student must work in an Architect’s Office a full-time trainee for a period of 16 calendar weeks (excluding Viva-voce) from the date of commencement of training.

The Chief Architect in the firm should be registered with the Council of Architecture and have a minimum of five years of practical/professional experience after her/his graduation. The student should involve herself/himself in various aspects of work in an office like working drawings, presentation drawings, quantity estimating, site supervision, municipal drawings, etc. Detailed instructions regarding the training will be issued at the end of the Ninth Semester, regarding the frequency of reporting to the department, etc., which the student must strictly follow.

After completion of training, every student will have to submit a detailed report with a set of drawings on at least two projects on which she/he has worked during the twenty calendar weeks of the practical training period. A jury will evaluate this report at a viva-voce. After submission of the report the department at its convenience will arrange for the conduct of the viva-voce examination.

Viva Voce:
Student should submit the drawings done in the respective office along with a report. They should attend a practical Exam and Viva voce conducted by both an external and an internal examiner.

FIFTH YEAR 1st SEMESTER

06.5.9.1: ARCHITECTURAL DESIGN-VI

Course Overview:
This Course will be dealing with the design of large scale multistory complex projects and aims to develop skills for a comprehensive design approach in the areas of URBAN DESIGN, HOUSING DESIGN and CAMPUS DESIGN.

Course Content:

Urban Design: The issues are to be addressed for the Design Project pertaining to Urban Design includes:

- Issues of urban structure, urban space and form.
- Issues of conservation.
- Issues in zoning, land use, density, development control.
- Issues of building in context, urban infill.
- Integration of diverse functional needs, access systems, parking, services etc.

Housing Design:
Some of the issues to be addressed for the design project pertaining to Housing design include:

- Urban density, land use, ground coverage, development controls.
- Urban systems, services and their integration with the project.
- User requirements (derived from surveys)
• Issues of hierarchy, identity, public, private, scale of space.
• Integration of community institutions etc.
• Detailing for the disable and the elderly.

Campus Design: Some of the issues to be addressed for the design project pertaining to Campus design include:
  • Issue of Master Plan preparation: academic, administrative, staff housing, student hostels etc.

Phase – wise development
  • Environmental considerations.
  • Safe and Comfortable vehicular and pedestrian movement.
  • Issues of character and landscaping.
  • Scope for expansion for future developments.
  • Details pertaining to the disabled.

Students would need to undertake one of the design subjects for the studio exercise. Students may be required to develop a brief, translate it into requirements and realize it, in which the student will take approval of the project brief. The evaluation shall be through periodic internal reviews. The final submission will also include a brief report of about 1000 words. Explaining the concept and design proposals along with the main portfolio. It will also include a model. Students should also to attempt a time problem of similar scale.

Viva Voce:
  Student should submit their drawings and they should attend a practical Exam and Viva voce conducted by both an external and an internal examiner.

References:
  1. Campus Architecture.
  2. Timesavers Standard for Housing and Residential Development.
  3. Image of the City-Kevin Lynch.
  4. Pattern Language- Christopher Alexander.

06.5.9.2: WORKING DETAILS

Course Overview:
  The course is intended to improve the student’s ability of detailing by focusing on Design and Visual aspects and will be oriented towards the development of Architectural Design after the preliminary/schematic stage.

Course Content:
  Based on the Design Portfolio of the previous semester, students will have to under take in depth design development for various space / rooms, considering various functional and visual aspects. Every design should specifically come up with minute detailing for Architecture Elements such as Walls, Ceiling, Floors, Columns, Windows, Doors, Staircases, Storage, Balconies, Shading devises, Parapets, Railing etc, good details to be studied from literature and site visits.

Details to be explored through sketches and drawing, Preparation of details to large scale showing materials used and their treatment.
The final portfolio must reflect the students’ skill in detailing a project in a professional manner.

References:
1. Architects Working Details - Lance Wright & Daca Boyne.
2. Contemporary Details - Nonie Nirdwand.

06.5.9.3: ADVANCED SERVICES

• **Lifts:** Working methods as per NBC and industry standards.
  - Capacity
  - Parts of lift and location of them in the building
  - Types of lifts, passenger, capsule, hospital, goods
  - Introduction to escalators.

• **General working following of specific services and provision to be made in building:**
  - Telephones and EPABX
  - Security system like burglar alarm services and CCTV’s
  - Fire fighting, potable fire fighting equipment and build in wet riser system, sprinkle system for fire fighting
  - Cooking gas distinction for bulk cooking application and houses as per NBC.
  - Elevated flooring for computer application

• **Swimming pools:** general layout, tank, finish, filtration plant and water circulation

• **Alternate energy sources of buildings**
  - Wind energy systems, - Photo voltaic cells, - Bio-mass

• **Waste disposal**
  - Industry – types of wastes, solids, liquid, and gas type of disposal facilities
  - Hospital – types of water generation, precaution and disposal system

• **Hotel service**
  - Laundry service, - Kitchens

References:
1. Heating and Air Conditioning of Buildings – Oscar Fabes and others
2. Water and Energy Resources – Satish Tiwari
3. Refrigeration and Air Conditioning – Manohar Prasad

06.5.9.4: DESIGN WORKSHOP

This course is designed to introduce and expose students to those special topics/themes, which require interaction with an expert in a focused way.
The main objective of this course is to enhance learning through a combination of lectures, demonstration and interactive practical exercise sessions.
The choice of the topic for the workshop will depend on the resource persons available.
Necessary theory background on the subject will be given to the students in the beginning. The students are required to involve themselves on a design focused on a specific theme for duration of one week to ten days. The students will produce outputs in the format as decided by the resource persons conducting the workshop; for assessment.

Suggested topics:
Climate Responsive Architecture
Alternative Technologies
Furniture Design
Intelligent Architecture

**Viva Voce:** Student should field book and they should attend a practical Exam and Viva -voce conducted by both an external and an internal examiner

**06.5.9.5: ELECTIVE – III**

**06.5.9.5A: URBAN DESIGN**

Discussion on architecture/Urban design/town. Planning Interface Urban Morphology and Elements of Urban Design
Physical determinants during ancient, medieval and modern periods in India and abroad.
Forms of classical cities, medieval towns, neoclassic cities, and industrial towns. Characteristics of settlements built by Muslim and Hindu rulers
Changing structure of urban scope due to variation in life style through ages: sectors, blocks, streets, squares, houses and gardens

Colonial inheritance, growth of port towns as primate cities, civic lines, cantonments, railways, resort towns and Design of New Delhi
Modern movements in city design such as ‘city-beautiful, Garden city utopian and model towns in the west.
Role of planning agencies such as Development Authorities, Urban Arts Commission in the design of cities
Influence of City Development Policies namely Master plans, Zoning regulations, Transportation, and Resource allocation on urban design.
Built form and space requirements in different: Land-uses-Residential, offices, commercial, industrial and recreational activities.
Nature of Urban design projects in private and public developments.
Elements of Utility services in the cityscape. Patterns of subdivision and land-development

Role of private real-estate activity in Urban-scape

**References:**
2. Design of Cities-Bacon, Edmund.
4. Urban Space-Rob Krier
6. Urban Design Street & Square-Moughtin, Cliff
7. Urban Design Ornament & Deocotation-Moughtin, Cli
06.5.9.5B: DISASTER RESISTANT BUILDINGS

- Types of disasters: Man-made: disasters, hazards caused by world climate change.
- Characteristics of particular hazards and disasters: earthquakes, cyclones, floods, environmental accidents, and other disasters.

- Assessment for different disaster types:
  - Case Studies: Projects implemented general description of projects carried out in India following natural disasters. Disaster Resistant Buildings & Measures. Recent Developments. Case studies in the rest of the World- Bangladesh, Elsalrado

References:
1. Building Configuration and Seismic Design-Christopher Arhold & others.

06.5.9.6: STRUCTURES THESIS

Each group of minimum of 3 students in each is required to detail out a structural design projects mentioned below independently by taking framed structure of a small residence.

1. Structural design project in R.C.C including design calculations and structural drawing complete.
2. Structural design project in steel including design calculation complete.

Viva Voce:
Student should submit a thesis book and they should attend a practical Exam and Viva voce conducted by both an external and an internal Examiner.

FIFTH YEAR, 2nd SEMESTER

06.5.10.1: ARCHITECTURAL DESIGN THESIS

Each student is expected to prepare a design thesis based on the preliminary work under taken in the Architectural Design sixth Studio under a department approved guide/adviser.

The thesis should be a design-oriented project approved by the department. The thesis should reflect the knowledge gained from the entire course under taken by the student in all the previous semesters. The topic should be preferably related to the students’ elective stream.

The particulars of schedule, content, presentation, formal, etc., as decided by the department time to time, shall be strictly followed.
At the end of the semester, each student is expected to submit all original drawings prepared as per the departments specifications, three copies of the report in the specified format and a modern should be submitted to the department after obtaining the approval of the respective guide/adviser.
The department shall schedule the final viva-voce, at its convenience, only after the thesis submission by a student.

Viva Voce: Student should submit a thesis book and they should attend a practical exam and Viva voce conducted by both an external and an internal examiner.
06.5.10.2: PROFESSIONAL PRACTICE AND LEGISLATION

Contents:
Introduction to Architectural profession, Role of professional bodies, The Architect’s registration act 1972.

• The duties, liabilities and relationships of client, contractor and other technicians.
  The code of professional conduct and conditions of engagement of Architects
  Scale of remuneration for Architectural services and mode of payments

• Types of tenders and their process. Execution of contract. Problems in operation of contract
• Architectural competitions.
• Introduction to Valuation, arbitration and dilapidations

Role of Architect in society; Architectural Profession as compared to others professions; difference between profession and Mode/business; architect’s registration, COA, and other organisations related to architectural profession.

CODE PROFESSIONAL CONDUCT; COA rules; Scale of charges; units and mode of measurements clerk of work and his duties; inspection of work during construction; certificate of payment to contractor; skills of quantities; schedule of rates, tenders; public, limited and negotiated tender documents and allied formalities.

General principles of Indian contract Act; Building contracts generally, conditions and forms of contract, study of standard contract of the Indian Institute of Architects. Principle of Arbitration, Powers and duties of arbitrators, revoking authority; umpire, award

Easement: definition; various types of easements; document and servant owners essential conditions for enjoyment of easement; fire insurance’s definition, cover note; insurance for new work and additions; insurable value of property, claim for damage due to fire.

Accidents during progress of work and after completion, damage to persons and properties affected; scope of torts Act and workmen’s compensation Act with regards to the affected persons and properties; Consumer protection Act and related acts on Architects.
Practice Architects Act 1972; Professional Practice Regulation and architectural education regulations under the Architects Act. Role of consultants and coordination between different consolations on a big project. Study building by laws to unable to design and prepare drawings for submission to concerned bodies.

REFERENCES:

1. Theory and Practice of Valuation- Roshan Namavati
2. Professional Practice- Dr.Roshan H.Namavati
3. Principles and Practice of valuation- Mr.D.N.Banerjee
4. Land Law- By Patrick J.Dalton
5. Professional Practice- Roshan Namavathi