

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 401 ARCHITECTURAL DESIGN – III**  
**0-0-10 Credits-5**

## **Introduction**

Begins as a continuation of Architectural design II

## **Objectives**

1. To equip the students to design buildings / built environment of more complex nature emphasizing the importance of process of design through developing concepts and project briefs, site analysis,–circulation diagram, function, form, structural system, climate, materials and services especially sanitary and water supply, lighting and ventilation. The students are introduced to the application of principles of Architectural design in multi space/ multi functional spaces up to two storeys.
2. To develop Design brief, Case studies: Data collection, documentation and representation of data. Design concept: Graphical and verbal presentation of concept. Study models of class project. Site design. Design evaluation and final drawings. To emphasize the importance and need of Detailing in Design.
3. To create an awareness of Building rules/National Building code of India /other regulations
4. To apply Systems approach through developing design brief and check list for all projects.
5. To develop communication skill and its application in all projects.

## **Syllabus**

- a) Major Project 1: Design of more complex building such as residences/schools/primary health centres etc. incorporating circulation diagram, development of concept of design.
- b) Study tour of 3 days duration of selected buildings/ (historic or contemporary) settlements within the southern region, to understand the effect of culture on architecture. Preparation of necessary study reports, videos, power point presentations etc.
- c) Minor Project 1: Short duration (one day or less) Projects to boost imagination/innovation and speedy decision making
- d) Local site visit of buildings under construction/ completed (report to be prepared)

## **References:**

1. Jane4 drew., "Tropical Architecture"
2. Amos Rappoport., "House form and Culture"
3. Time saver standards for housing and residential development, De Chaira, Joseph,Ed, et al., Tata McGraw Hill Education Pvt. Ltd., New Delhi 1995
4. Neufert's Architect's data

**No University examination. Evaluation conducted as per manual.**

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 402 BUILDING MATERIALS AND CONSTRUCTION –III**  
**3-0-1 Credits-4**

## **Objectives**

- To create an understanding about the modern construction materials like glass and glass products, plastics, composite materials and industrial products and its application in construction industry.
- To introduce the basic knowledge about the roofs and roofing materials.
- To make the students familiar with elements of framed structure and behavior of RCC in building elements.
- To give an adequate knowledge about vertical transportation systems(lifts, escalators)

## **Module I**

**Study of Glass and glass products** – composition, types of glass – wired glass, laminated glass, double glazing, glass building blocks, their properties (including thermal and acoustics) and uses in buildings – Application of glass in construction – Structural glazing, curtain wall glazing-toughening-Insulation, applications in the building Industry with emphasis on energy efficiency. Natural and manufactured flooring materials, properties, uses. Applications.

**Study of plastics**– thermosetting and thermoplastics, resins, fabrication of plastics, polymerization and condensation - Application of plastic in building construction.

Thermoplastics and thermosets - properties and architectural uses of plastics - structural plastics – reinforced plastics and decorative laminates - plastic coatings, fabrications of plastics – FRP

**Introduction to modern composite materials. Polycarbonates. PVC**

**Industrial Timber products :**

Timber board – Veneers, Plywood, Block Boards, Particles Boards, Hard Boards, Fibre board, Block board and Laminated board , multiwood, techwood

Wooden flush door shutters, Wood finishes - Laminates-decorative laminates.

**Timber Floors** – Single, double and framed floors with joints between joist with wall plate, joist with beam and sub beam with main beam, strutting of joists.

## **Module II**

**Study of Roof structure** – Terminology - Wood, steel and timber trusses – Detailing, fixing and erection – space frames.

Roofing Tiles – clay and cement tiles different types - properties and method of fixing. Light roofing materials - Galvanised iron sheets, asbestos cement sheets, corrugated aluminium sheets, Sandwiched aluminum panels, PVC sheets and other light roofs like glass fibre reinforced plastic sheets, bituminous sheets with accessories shingles etc. and method of their fixing.

Tensile membrane roofing.

## Module III

**Introduction to framed structures.** - Concrete floors, walls, beams and columns.

**Reinforced cement concrete**-Reinforcements used in RCC – Suitability & performance - Reinforcement details of RCC elements like column, beam, lintel, slab, waist slab etc. BIS specification. Details of construction joints, expansion joints in buildings – Method of construction – Filling of joints – Water proofing.

**Lifts** – Calculation of requirements and number of lifts considering quality and quantity of services – details of construction of lift shaft, lift pit, lift car – machine room etc. Standard sizes – Lifts of various types such as passenger, goods, hospital etc. Modern development in the field of vertical transportation – Capsule lift.

**Escalator** – Different types – provision to be made during construction – installation of escalator. Escalator details.

### Drawings

- (1) Steel – King post truss, Queen post truss-angular and tubular truss, details of covering and gutter details.
- (2) Reinforcement details of column, beam, lintel, slab & waist slab.
- (3) Construction and expansion, and joint details of column and beams.
- (4) Typical lift shaft, lift pit and machine room details, Capsule lift,

### References :

1. M.S. Shetty, 'Concrete Technology', S.Chand & Co. ltd, New Delhi,1986.
2. S.C. Rangwala, 'Engineering Materials', Charotar Publishing House, India, 1997.
3. Dr.B.C.Punmia, 'Building Construction', Laxmi Publications Pvt.Ltd., New Delhi, 1993.
4. P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005.
5. Don A.Watson, 'Construction Materials and Process', McGraw Hill Co.,1972.
6. Jack M. Launders, 'Construction Materials and Methods', Careers, South Holland, Illinois, Wilcox Co.Ltd.,1986.

### University Examination Pattern

#### PART-A

8 short questions 5 marks each from all modules, 40 marks

3 questions of 10 marks each from Module I, II & III, with choice to answer any two – 20 Marks

#### PART B

3 questions of 20 marks each from Module I, II, & III with choice to answer any two – 40 Marks

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 403 History of Architecture-III**  
**0-2-0 Credits-2**

**Objectives**

1. To introduce architectural vocabulary and provide an understanding of various architectural styles and their salient features.
2. To trace the developments in construction techniques and to illustrate the role of technology on architectural form.
3. To create an understanding and appreciation of visual aspects and principles of architectural design-spatial organization, composition, scale, proportion etc

**Module-I**

Mixed styles-Hindu-islamic styles-Rajput style, Colonial style in India under Portuguese, Dutch, French and English. Eg: Forts, Railway stations, Churches. Cross influences- Indian style in west.

**Module-II**

Modern architecture-Influence of new material and techniques, demand for new types of building, influence of technology- Chicago school, Eclecticism, Art and Crafts movement, Art Nouveau, Peter Behrens, Antonio Gaudi, Victor Horta, Louis Sullivans contribution to American architecture, Frank Lloyd Wright, Organic Architecture, European Modern Architecture, Auguste Peret, Adolf Loos.

**Module-III**

Influence of other visual arts on Architecture, The Bauhaus School, Walter Gropius, Erich mendelson, Mies van der rohe, Le corbusier, Alvar Aalto, Gio Ponti, Peir Luigi Nervi,, Philip Johnson, Eero Saarinen, Oscar Niemeyer, Kenzo Tange, Jorn Utzon,, B.V Doshi, Charles Correa, Geoffrey Bawa, etc-Post modern Architecture- Peter Eisenman, Frank Gehry, Zaha Hadid, Coop Himmelblau, Rem Koolhaas, Daniel Libeskind, and Bernard Tschumi.

**References:**

- (1) Sir Banister Fletcher,A History of Architecture, University of London,The Antholone Press,1986.
- (2) Pier Luigi Nervi, History of World Architecture Series. Harry N.Abrame Inc.Publication, New York,1972.
- (3) S.Lloyd/H.W.Muller, History of World Architecture - Series Faber Ltd., London, 1986.
- (4) Spiro Kostof, A History of Architecture - Settings and Rituals, Oxford University Press,London,1985.

**University Examination Pattern**

**PART-A**

8 short questions 5 marks each from all modules, 40 marks

3 questions of 10 marks each from Module I, II & III, with choice to answer any two – 20 Marks

**PART B**

3 questions of 20 marks each from Module I, II, & III with choice to answer any two – 40 Marks

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 404 STRUCTURAL DESIGN – III**  
**0-3-0 Credits-2**

**Objectives**

- To give an introduction to the analysis of cables and arches.
- To familiarize the students with indeterminate structures and methods of analysis.
- To create an understanding about the analysis of frames and trusses subjected to various types of loading
- To enable students to use software like STAAD PRO and ETABS

**Module I**

**Arches and Cables:** Theoretical arch-Eddy's theorem- analysis of three hinged arches –support reactions-normal thrust-radial shear.

**Cables** General cable theorem-analysis of cables under concentrated and uniformly distributed loads-anchor cables.

**Module II**

**Indeterminate structures-** static and kinematic indeterminacy - introduction to force and displacement methods of structural analysis.

**Force method of analysis** -analysis of propped cantilever, fixed and continuous beams - Method of consistent deformation, Clapyron' s theorem of three moments- Shear Force Diagrams and Bending Moment Diagrams.

**Displacement method of analysis:** Moment Distribution Method - analysis of continuous beams & portal frames (with sway and without sway) - Shear force and bending moment diagrams.

**Module III**

**Approximate methods of frame analysis:** Frames under lateral loading-portal method – cantilever method. Frames under vertical loading –substitute frame method.

**Trusses and Space frames** – tension coefficients-tension coefficient method applied to trusses and space frames

Introduction to software's- STAAD, ETABS,

Note: The teacher is also expected to expound the structural concepts introduced in non- mathematical terms with examples and application in architectural design.

**REFERENCES:**

1. Devdas Menon, Structural Analysis, Vol.1, Narosa, Chennai.
2. Bhavikatti S.S , Structural Analysis Vol. I, Vikas Publishing House (P) Ltd.
3. Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.
4. Wang C.K.& Solomon C.G., Introductory Structural Analysis, McGraw Hill.1968.
- 5 Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
6. Timoshenko S.P, Young D.H., Theory of structures, McGraw Hill
7. Punmia B.C., Strength of materials and theory of structures, Vol. II, Laxmi publications.

**University Examination Pattern**

PART-A

8 short questions 5 marks each from all modules, 40 marks

3 questions of 10 marks each from Module I, II & III, with choice to answer any two – 20 Marks

PART B

3 questions of 20 marks each from Module I, II, & III with choice to answer any two – 40 Marks

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 405 COMPUTER APPLICATION IN ARCHITECTURE-II**  
**0-0-3 Credits - 2**

**Objective;**

- To understand the applications in documentation, computer aided design.
- Applications of software in architecture and planning. Computer as a tool for design thinking

**Module I**

**Computer Graphics**

Understanding 3D co-ordinate system – Using view ports. 3D drawing & editing commands, solid modeling – Advanced solid modeling commands – Editing solids.

Introduction to rendering in 3D – Rendering process, animation and virtual reality. Enhancing-digital images from CAD applications using other packages.

3D Modelling – Rendering & animation with 3D studio – Architectural Desktop and Macromedia Applications.

**Module II**

**Computer Aided Data Analysis**

Database management systems, Basics of data analysis, Software for data analysis-Requirements of Engineering/Architectural databases, Office management systems. Analysis of structural problems, cost estimation and analysis. Analysis of project network, Analysis of environmental aspects such as lighting and sound. Distribution using simplified models.

**Module III**

**Introduction to Building Information and Management Systems (BIMS)**

Introduction to Geographic Information System (GIS), History, Domains for GIS, Definitions of GIS, Components of GIS, Comparisons of various software, hardware requirements, Digital cartography and conventional CAD.

Introduction of environmental problems –land use studies- mapping.

**Text Books**

1. Mitchell, 'Computer Aided Architectural Design', Van Nostrand
2. Omusa, George – Advanced techniques in AutoCAD

**References**

1. DH Sanders, 'Computers Today' Mc Graw Hill
2. Head, George – AUTOLISP in Plain English
3. Elliot, Steven, Miller, Philip & Pyros, Gregory – Inside 3D Studio
4. Vaughan, Tay – Multimedia – Modeling it work
5. Fry, Andrew & David Paul – How to Publish on the Internet
6. Gvadecki, Joe – The Virtual Reality Construction Kit
7. Coruich, Tim – Computer Integrated Building Design
8. Principles of Geographic Information System – Peter A. Burrough Idrissi Manual
9. An introduction To GIS- Ian Heywood, Surah Cornelus, Steve Carner

**University Examination Pattern**

Practical examination of 3 Hours duration is to be conducted.

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 406 LANDSCAPE ARCHITECTURE**

**0-1-2 Credits –3**

**Objective**

The objective is to introduce Landscape Architecture as an integral and essential extension of architecture and Interior Design for a wholesome environment. Unlike the popular notion of being more for aesthetics, the subject should be presented as a tributary with definite functions in enhancing quality of spaces and life. Aesthetic impacts, Articulation of spaces, providing definition, privacy etc or act as a focal point. Providing screens/shelter- shades, wind breaks, with shadow patterns to add interest Enflaming views. The potential of the subject to be a discipline in its own right and a popular sought after service should be addressed. At the end of the semester a deep respect for the field coupled with an understanding about its important aspects and confidence to address enquiries of small and medium scale projects independent or in connection with general architectural projects is what is envisaged.

**Module-I**

- Introduction to Landscape Architecture and its implementation in Architecture.
- Elements of Landscape Design

**Elements of Landscape Design**

- i. **Landforms** - Topography & terrain, Contours, Elevation, Soil Types, Rockery etc
- ii. **Flora Fauna** - Plants, trees, shrubs, bushes, seasonal, groundcover, lawns, planting in plant containers etc.
- iii. **Water** - Natural & artificial water bodies, fountains, reflection pools etc
- iv. **Man made elements** - Built forms - Pavements, Fences, Sculptures, outdoor Furniture, Drainage and all other objects created by human.
- v. **Abstract elements** - Weather, Lighting, cultural and other context of the site

**Design / Drawings**

- Indoor landscape as in a central courtyard of a residence- (Any small single space project ideally something they have done from their design work) concept sketches and Design Drawings
- Roof garden for a residence with flat terrace approx 8M X 4M with special emphasis on water proofing, drainage etc and labeling of flora (Project of approximate equal be given)
- Visit to Botanical garden or Horticultural institutions asserted by a knowledgeable person.



## Module-II

- **Designing and execution of landscape proposal:- Methodology**

- i. Analysis of site & topography
- ii. Identification of functional requirements
- iii. Site development by exploiting mutual forms
- iv. Conceptual Design Sketches
- v. Drawing Sketches
- v. Detailing of special features

- Field identification of minimum 20 common Indian trees and 25 common Indian shrubs for different climates zones- Guest Lecture.

- **History of Landscape architecture**

- i. Moghul
- ii. Renaissance
- iii. English –Legendary
- iv. 19th century - Botanical Garden
- v. Japanese Landscape

### Design / Drawings

- Residential garden for a beautiful frontage with inclusion of a water body approx. 1500 ft<sup>2</sup>. Any project of approximate same size can be given
- Children play area in a neighborhood approx. 3000 ft<sup>2</sup>. Any non-residential project of approximate same size can be given

## Module-III

- **Interior Landscaping**

- i. Indoor landscape (General)
- ii. Atriums and Courtyard
- iii. Roof Gardens

- **20th century urban landscape**

- i. Streetscapes - Road side plantation, avenues, street furniture
- ii. Cityscapes

- **Concept and use of national parks**

### Design / Drawings

- Outdoor plaza for an extravagant mall approx 4000 ft<sup>2</sup> driveway, walkway, visitors drop off, multilevel plaza, relevant floor, former water body to celebrate. (Any project of approximate same size with mlti use.)

## CONCLUDING NOTE

- Lectures should interestingly and creatively introduce the basics of the subject. Guest lecturers with audio - visuals presentation can be very effective. Possibility assignments with mood boards highlighting different elements from existing examples after each lecture should be considered. Visit to a botanical garden assisted by an expert is recommended. Preliminary conceptual presentation can mature in details alongside lecture hours on important subjects.
- Design Projects be done in relation with earlier or parallel architectural design exercises with real sites and strong design briefs. Importance to be given to selection of elements and material choices. Emphasis on labeling of flora, Inclusion of ornamental and other plants, lawn, potted plants, creepers etc and soil preparation for those to be given special attention. Water body live fountains etc can be experimented upon in a creative way with details. Projects should give real room for students to be creative and take ideas to whatever extent they want to explore. Encourage to include a variety of elements and details. Submissions to include a presentation layout in colour 2 pocket views/ sketches to highlight 2 important areas etc. Table of flora used and materials for soft and hard capes to be listed and presented. The plaza project is to basically make students think of urban landscapes for masses. Stylish new trends as applicable today as well as a need to appeal to mixed crowds all with a utilitarian concept and approach.

### Reference books

1. Design on the Land: T
2. The Development of Landscape Architecture by Norman T Newton
3. Living Systems: Innovative Materials and Technologies for Landscape Architecture by Liat Margolis
4. A Pattern Language: Towns, Buildings, Construction by Christopher Alexander
5. Kevin Lynch and Gary Hach, 'Site Planning'
6. Jellicoe & Jellicoe, 'Landscape of Man'
7. Brinck M., 'Japanese Gardens'
8. Kassler, 'Modern gardens and the Landscape'

**No University examination. Evaluation conducted as per manual**

**M G UNIVERSITY**  
**B. ARCH COURSE - FOURTH SEMESTER (S4)**  
**2011 AR 407 BUILDING SERVICES- I**  
**(PLUMBING, WATER SUPPLY AND FIRE FIGHTING)**

**0-2-0 Credits - 2**

**Objective:**

- To understand the sources and quality of water supply
- To emphasize the importance and method of rain water harvesting
- To create an understanding of water and waste water treatment.
- To equip students to understand plumbing system and importance of fire safety of buildings.

**Module I**

**Sources of water supply:** Quantity of water-forecasting population-rate of consumption for various purposes-factors affecting the consumption of water

Quality of water: impurities in water, drinking water standards- physical, chemical and biological analysis.

Rain water harvesting, storm water collection, computation of storm water runoff. Ground water recharging- sustainability of local natural water systems (brief description only).

**Module II**

**Treatment of water:** Sedimentation-coagulation-filtration and disinfection, Design of sedimentation tank-slow sand filter and rapid sand filter, Distribution system of water: Methods of distribution-design of distribution system-method of layout of distribution pipes-pipe appurtenances.

**Sewage:** Types of sewage-quantity of storm water-characteristics of sewage

Sewerage systems: Drains- catch basins-manhole-flushing tanks-sewer materials- inspection chamber-traps- Waste water treatment: Principles and techniques-disposal of treated water-design of septic tank and oxidation ponds- solid waste treatment. Principles of house drainage,

**Module III**

**Principles of Plumbing:** Systems of plumbing in buildings- hot water plumbing in buildings- solar water heating systems.

Accessories used in plumbing systems- Pumps- types- technical features and application.

Plumbing layout –details of ducts Drainage system.

**Drawing** – Water supply and plumbing layout at the building level

**Fire safety of buildings** – Fire resistance of building elements, fire rating and assessment, means of escape and their design, building byelaws regulating the height and spread of buildings – fire fighting equipments – Automatic sprinklers.

*Note: Student is expected to carry out a term paper covering the design and detailing of water supply and waste water system for a residential building of their choice. (25% credit for assignment may be given)*

### **References**

1. S. K.Garg, 'Water supply and Sanitary Engineering', Delhi
2. K. N. Duggal, 'Elements of Public Health Engineering', New age international
3. S. K. Hussain, 'Water supply and Sanitary Engineering'
4. Chatterjee, 'Water supply and Sanitary Engineering'

### **University Examination Pattern**

#### **PART-A**

8 short questions 5 marks each from all modules, 40 marks

3 questions of 10 marks each from Module I, II & III, with choice to answer any two – 20 Marks

#### **PART B**

3 questions of 20 marks each from Module I, II, & III with choice to answer any two – 40 Marks

# **M G UNIVERSITY**

## **B. ARCH COURSE - FOURTH SEMESTER (S4)**

### **2011 AR 408 HUMAN SETTLEMENTS & STUDY OF SOCIOLOGY, ECONOMICS AND CULTURE**

**0-2-0 Credits - 2**

**Course objective:** This course covers topics on settlements in the development of human civilization, the architecture of settlement in development of human civilization, development concepts and human settlement planning; and approaches in analyzing human settlement problems.

#### **Module 1**

##### **Introduction to sociology**

Primary concepts- society, family, community, Association, Institution, Religion etc. Social process – cooperation, conflict, competition, Accommodation, Assimilation, Progress and evolution - Relating these concepts to architecture - Relevance of study of sociology for architects.

Principles of human settlements: ancient, medieval, modern.. Ancient text, treatise on settlement and area planning.

#### **Module II**

Culture and society, cultural lag, Deviant sub culture, Culture and civilization, Society and environment, Social change, Factors of social change, Social stratification, rural & Urban, class & cast, social change in Kerala-structural, occupational, rural, religious, housing and Urbanization Man Environment and Society. Unity and diversity in India. Rural society, Village community, traditional patterns and trends of change. Society, architecture and settlement pattern of Kerala. Cultural anthropology, Culture and architecture. Concept of social structure. Relation between social structure and spatial structure. Social aspects of housing. Social problems of slums

#### **Module III**

##### **Economics**

Definition and scope of economics-basic terms and concepts -goods, utility, value-wealth-factors of production-law of diminishing marginal utility – indifference curve analysis – law of demand -law of supply Production possibility curve and technological choice

**References:**

1. Binkerhoff, David & White, Lynn K, Sociology
2. Bart, Pauline & Frankel, Linda, The students sociological handbook
3. K. Singh, Principles of sociology
4. Dr. Vatsyan, Urban sociology
5. J.B. Chitamber, Introductory rural sociology
6. K. Singh, Applied sociology
7. James V Mc Connel, Understanding human behaviour
8. Harry Gold, The sociology of urban
9. S. Chand- Dewett K.K & Varma J.D, Elementary Economic theory
10. Brtrthwal R.R, Industrial Economics-An introductory textbook
11. Vidya Bhushan, 'An Introduction to Sociology'
12. K. Singh, 'Principles of Sociology'
13. Dr. Valsyayan, 'Urban Sociology'
14. James V. Mc Cannel, 'Understanding Human Behaviour'
15. Dr. K. Kumar, 'Rural Sociology'
16. Amos Rappoport., "House form and Culture"

**University Examination Pattern****PART-A**

8 short questions 5 marks each from all modules, 40 marks

3 questions of 10 marks each from Module I, II & III, with choice to answer any two – 20 Marks

**PART B**

3 questions of 20 marks each from Module I, II, & III with choice to answer any two – 40 Marks