AR12-31 ARCHITECTURAL DESIGN I

Teaching scheme

9 hrs per week

Credits: 5

The Course prepares the students to gain understanding into basic functional aspects in architectural design and develop skills to create architectural solutions for simple problems.

Objectives:

• To understand space requirements related to human activities and study anthropometric data
• To introduce students to rules and regulations related to building design
• To introduce concept to the process of design
• To introduce students to standards and norms related to different functions
• To conceive 3 dimensional forms and establish relation to functional requirements which will result in optimal utilization of space
• To develop a basic understanding of building materials

Projects:

Two projects- one minor and one major- shall be completed during this semester and these shall have minimum complexity in terms of design and site challenges.

Minor Project: Design of simple structures like Bus Shelter/ fast food Kiosks/ Entrance Gateways/Park Shelters etc.

Major Project: Design of a residence within a set of limited specific requirements

Process & Deliverables:

Students should attempt data collection from various reference books, carry out adequate number of relevant case studies. The concepts of architectural programming shall be introduced to assist the design process. Handmade sketches, manual drafting and scaled study models shall be made part of the design process.

Deliverables shall be manually drafted presentation drawings including free hand perspectives, scaled working models etc.

Reference:

Time saver standards, Neufert’s Architectural data, KMBR

JURY WILL BE CONDUCTED AS PER THE B.ARCH DEGREE COURSE MANUAL
AR12 – 32 BUILDING CONSTRUCTION MATERIALS & STRUCTURAL SYSTEM- II

Teaching scheme

1 hr lecture and 2 hrs drawing per week

Credits: 2

Objectives: Understanding of materials of construction, concrete and its properties, basic principles of construction and elements of building through theory and drawing

Module I (10Hrs)


Module II (10 Hrs)

Iron and Steel – Iron-Brief study on manufacture, composition, properties and uses of cast iron, wrought iron, pig iron – Steel: Composition, Properties, anticorrosive measures, mechanical and heat treatment of steel - Market forms of steel: Steel for Reinforcement - Hot rolled bars, CTD Bars, TMT bars, Welded wire fabrics; Steel for Pre stressed concrete; Structural steel; Stainless steel, steel alloys, current developments.

Doors and windows and Ventilators: Types - steel and aluminium- construction details - fixing of doors, windows and ventilators

Detailed drawings: Steel and Aluminium doors, windows and ventilators

Module III (15 hrs)

Lintels and arches – types and construction details. Roofing: Pitched and flat roofs - timber and steel trusses - fink truss and north light truss - RCC slab roof jack arch, shell, dome and folded plate roofs - Roof covering - thatching, tiling, AC sheets, GI and Aluminium sheets, FRP and RMP sheets and modern roofing.

Detailed drawings – Types of Arches, Truss – King post truss, Queen post truss, Steel-angular and tubular truss, details of covering and gutter details.

Module IV (12hrs)

Text books

1. Punmia B.C., “Building construction”
2. Arora &Bhindra, “building construction”
4. Shetty M.S., “Concrete Technology”

References

1. Huntington W.C., ”Building Construction ”
2. Mackey. ”Building construction”
5. Neville A.M.and Brooks J.J, “Concrete Technology,”
6. Krishna Raju N, “Design of Concrete Mixes”
7. Relevant BIS Codes

Sessional Requirements

Assignments = 70 marks
2 Tests = 20 marks
Regularity = 10 marks
Total = 100 marks

University examination pattern

Q I -8 short type questions of 5 marks, 2 from each module.

Q II -2 Questions of 15 marks from module I with choice to answer anyone.

Q III -2 Questions of 15 marks from module II with choice to answer anyone.

Q IV -2 Questions of 15 marks from module III with choice to answer anyone.

Q V -2 Questions of 15 marks from module IV with choice to answer anyone.
Teaching scheme
3 hrs per week

Credits: 3

Objectives: The objective of the course is to develop an understanding of appreciation of Islamic architecture and its influence in India’s local and regional history of architecture, its changes in social processes and lifestyle. Architecture is to be seen as an important and long-lasting by-product of development of civilization by understanding the role of technology, construction techniques, climate and materials with inherent visual aspects like spatial organisation, scale, compositional organisation, Architectural vocabulary and design grammar.

Module I (10 hrs)
A brief introduction into origin & characteristics of Islamic architecture: building types, elements, structural systems, construction techniques.

Islamic Architecture of
Syria and Egypt - Great Mosque of Damascus, Syria, Dome of the Rock, Jerusalem
The Mosque of Ahmad Ibn Tulun, Cairo
Persia - The Masjid-i Shah, Isfahan
Spain - The great mosque at Cordoba, The Alhambra
Morocco - King Hassan II Mosque, Casablanca

Module II (10 hrs)
Beginning of Islamic Architecture in India

Islamic Architecture in Delhi (Imperial Style)
Slave dynasty - Quwat-ul-Islam mosque, Qutb Minar, Mosque at Ajmer, Sultan Ghari, Tomb of Ilutmish, Tomb of Balban.
Khilji Dynasty - Alai Darwaza, Jamat Khana masjid
Tughlaq dynasty - Tomb of Ghias-Ud-din, City of Tughlaqabad, City of Firoz Shah Kotla, Khirki Masjid.

Module III (10 hrs)

Provincial styles:
Punjab - Tomb of Shah Rukhn-I- Alam.
Jaunpur - Atala Masjid, Jam Masjid
Bengal - Dakhil Darwaza, Firoze Minar, and Adina Masjid.
Gujarat  - Jami Masjid, Teen Darwaza, Well retreats of Ahmedabad.
Malwa  - Hindola mahal, Jami Masjid at Mandu, Jahaz Mahal, Hawa Mahal
Deccan  - Charminar at Hyderabad, Tomb of Golconda.
Bijapur  - Jami Masjid, Golgumbaz.

Module IV(10 hrs)

Evolution of Mughal style and the different eras of rule:

Early period  - Babar, Humayun, Shershab
Akbar  - Tomb of Humayun, Jahangir Mahal Agra,
         Fatehpur Sikri - city planning & the various structures inside
Jahangir  - Akbar's tomb.
Shah Jahan  - Red fort at Agra, Taj Mahal, City of Shahjahanabad (Delhi fort),
         Jami Masjid at Delhi.
Aurangzeb  - Tomb of Rabi Durrani at Aurangabad, Moti Masjid at Delhi fort.

Reference books

5. John Julius Norwitch : Great architecture of the world
6. Stephen Gardiner: Introduction to architecture

Sessional Requirements

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<th>Marks</th>
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University examination pattern

QI  - 8 short type questions of 5 marks, 2 from reach module.
QII - 2 questions A and B of 15 marks of module 1 with choice to answer any one.
QIII - 2 questions A and B of 15 marks of module 11 with choice to answer any one.
QIV - 2 questions A and B of 15 marks of module III with choice to answer any one.
QV - 2 questions A and B of 15 marks of module IV with choice to answer any one.
Objective: The objective of the course is to develop an understanding and appreciation of climate and its influence on built form and architecture of a region. The role of technology and locally available building materials in shaping of the local vernacular and traditional styles shall be studied and documented to understand the impact of climate on inherent visual aspects like spatial organization, Scale, Compositional organization, Vocabulary and Design grammar of architecture.

Module I (9 hrs)

*Elements of Climate and Climatic Factors:* Climate- Macro and micro climate-elements of climate-temperature, humidity, vapour pressure, precipitation, solar radiation and wind - Measurement, representation techniques of climatic data and implication of climatic elements in design – Global Climatic zones and architectural design considerations in different zone, Site climate-Influence of terrain features, vegetation and manmade objects in changing Site climate. Global wind pattern-Trade wind, westerly and polar winds, Reason for seasonal change - Tilt of earth, solar radiation quantity

Module II (9 hrs)

*Design Criteria for Comfort Environment:* Mechanism of comfort in human system in various climatic environments, comfort indices, concept of effective temperature, its correction and application- comfort scales, bio-climatic chart- solar charts- orientation of building, structural controls like design of openings, shading devices, glazing and louvers, Use of Mahoney's table in design.

Module III (12 hrs)


Module IV (10 hrs)

*Lighting and Ventilation:* Function of ventilation, standard provision for ventilation - Wind effect and stack effect - cross ventilation and air movement - Orientation, external and internal features, position and size of openings, ventilation ducts. Precipitation, driving rain index,. Climate and lighting, Daylight factor concept, design variables - Day-lighting requirements, daylight protractors, different prediction techniques.

Reference books
2. V. Olgyay : Design with Climate
3. B. Givoni : Man, Climate and architecture
4. Martin Evans : Housing, Climate and Comfort
5. G Z Brown: Sun, Wind and Light
Sessional Requirements

Assignments = 15 marks
2 Tests 2 x 15 = 30 marks
Regularity = 5 marks
Total = 50 marks

University examination pattern

QI - 8 short type questions of 5 marks, 2 from each module.
QII - 2 questions A and B of 15 marks of module 1 with choice to answer any one.
QIII - 2 questions A and B of 15 marks of module 11 with choice to answer any one.
QIV - 2 questions A and B of 15 marks of module III with choice to answer any one.
QV - 2 questions A and B of 15 marks of module IV with choice to answer any one.
AR12 – 35 THEORY OF DESIGN –II

Teaching scheme
Credits: 3
2 hrs per week

Objective: To provide the student an understanding of the fundamentals of architecture and to learn philosophies of architectural design developed over the years in the history of architecture and structure.

Module I (15 hrs)
Architectural theory in historical perspective: Pragmatic design, Iconic Design, Analogical Design, Canonic Design

Module II (05 hrs)
Society and design: Role of designer in the society. Design for performance, Behavioural Aspects of Design

Module III (10 hrs)
Creativity and design: Concepts of creativity, Issues of creative design, Impact of computer applications on creativity and design

Module IV (10 hrs)
Contemporary movements in architecture: Organic architecture, Modern and Post modern movements in Architecture Deconstruction

Text books
1. Scott - Design fundamentals
2. G. Broadbent – Design in Architecture

References
1. Garry Stevens – The reasoning Architect
5. V.S. Pramar, Design Fundamentals in Architecture, Somaiya Publications, New Delhi, 1973
6. Y. Ashihara – Exterior design in Architecture
7. Diane Ghirardo – Architecture after Modernism

Sessional Requirements
Assignments = 15 marks
2 Tests 2 x 15 = 30 marks
Regularity = 5 marks
Total = 50 marks
University examination pattern

QI - 8 short type questions of 5 marks, 2 from reach module.
QII - 2 questions A and B of 15 marks of module 1 with choice to answer any one.
QIII - 2 questions A and B of 15 marks of module 11 with choice to answer any one.
QIV - 2 questions A and B of 15 marks of module III with choice to answer any one.
QV - 2 questions A and B of 15 marks of module IV with choice to answer any one.
Teaching scheme

2 hrs lecture and 1 hr tutorial per week

Objective: The objective of the course is to develop an understanding of fundamentals of stress, strain, force, compression, tension, loads etc. and their related mathematical applications and theorems applied in structural design.

Module I (15 hrs)

Tension, Compression and Shear: Types of external loads, self weight internal stresses, normal and shear stresses, strain, Hooke's law, Poisson's ratio, relationship between elastic constants, stress-strain diagrams, working stress, elongation of bars of constant and varying cross sections, thermal stresses.

Analysis of Stress and Strain: Stress on inclined planes for axial and bi-axial stress fields, principal stresses, Mohr's circle of stress, principal stresses.

Module II (14 hrs)

Bending Moments and Shearing Forces: Different types of beams, Shear forces and bending moment diagrams for simply supported, Cantilever and Over hanging beams, Relationships connecting intensity of loading, Shear force and bending moment.

Stresses in laterally Loaded Symmetrical Beams: Theory of simple bending, limitations, bending stresses in beams of different cross sections, moment of resistance, beams of uniform strength, beams of two materials, principal stresses in bending, strain energy due to bending, shearing stresses in bending

Module III (12 hrs)

Deflection of beams: Differential equation of the elastic curve, slope and deflection of beams by method of successive integration, Macaulay’s method, moment area method

Deflection of beams by strain energy method, virtual work, principle of virtual displacement, principle of virtual work for deformable bodies-application to simple beams

Module IV (10 hrs)

Torsion: Torsion of circular and hollow shafts, power transmission

Theory of columns: Axial loading of short strut, Long columns, Euler's formula, Rankine's formula, eccentric loading, direct and bending stresses

Reference books
1. F.V.Warnock : Strength of materials (Sir Isaac Pitman Sons Ltd.)
**Sessional Requirements**

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**University examination pattern**

- **QI** - 8 short type questions of 5 marks, 2 from each module.
- **QII** - 2 questions A and B of 15 marks of module 1 with choice to answer any one.
- **QIII** - 2 questions A and B of 15 marks of module 11 with choice to answer any one.
- **QIV** - 2 questions A and B of 15 marks of module III with choice to answer any one.
- **QV** - 2 questions A and B of 15 marks of module IV with choice to answer any one.
AR12-37 VERNACULAR ARCHITECTURE

Teaching scheme
2 hrs per week

Credits: 2

Objectives: To introduce the study of vernacular architecture as a process. To provide an overview of the various approaches and concepts to the study of vernacular architecture. To study the regional vernacular architecture forms.

Module I (9 hours)
Introduction, Approaches and Concepts
Definition and classification of Vernacular architecture – Vernacular architecture as a process - Cultural and contextual responsiveness of vernacular architecture: an overview
Different approaches and concepts to the study of vernacular architecture: an overview – Aesthetic, Architectural and anthropological studies in detail

Module II (9 hours)
Vernacular Architecture of Kerala – Residential
Study of factors that shape the architectural character of region - geographic, climatic, social, economic, political and religious aspects of the period with special reference to the region of Kerala
Evolution of early forms of Kerala architecture.
Typologies: ekasala, dwisala, trisala, chaturasala, etc – palatial complexes- Padmanabhapuram palace, Thuckalay, Krishnapuram palace Kayamkulam

Module III (12 hours)
Vernacular Architecture of Kerala – Religious
Evolution and morphology of religious architectural form - Early Hindu Temples, Churches, and Mosques.
Temple arts performance centres - Kalithattu, Koothambalam, etc

Module IV (12 hours)
Vernacular Architecture of India
Forms, spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the following:
Havelis of Rajasthan
Bohra Houses of Gujarat
Banglas (village huts) of Bishnupur, Bengal
Chettinad Houses of TamilNadu
References

10. The Bungalow in Twentieth Century India Desai et al, Ashgate Publishing Ltd, 2012

Sessional Requirements

Assignments = 15 marks
2 Tests 2 x 15 = 30 marks
Regularity = 5 marks
Total = 50 marks

University examination pattern

QI - 8 short type questions of 5 marks, 2 from reach module.
QII - 2 questions A and B of 15 marks of module 1 with choice to answer any one.
QIII - 2 questions A and B of 15 marks of module II with choice to answer any one.
QIV - 2 questions A and B of 15 marks of module III with choice to answer any one.
QV - 2 questions A and B of 15 marks of module IV with choice to answer any one.
Teaching scheme
2 hrs per week

Objectives
1) Learning of CAD software by doing graded exercises
2) Linking data and attribute management
3) Preparation of hardcopy of drawing in normal architectural scales.

Projects:

Suggested Projects for the lab:
1) Graded exercises - measured drawing, site plan, Component details, Lettering and Dimensioning, Layering standards.
2) Preparation of a Database and parametric cost estimating
3) Municipal drawing preparation for a medium size residence

Exercises:
1. Starting up- Drawing I- Drawing Measured drawing (plan and section) of a room.
2. Architectural Drawing II- Drawing Plans, section and elevation of Residence design project
3. Starting up- Preparing estimation of Residence design project
4. Architectural Drawing III- Preparing drawings for approval of Apartment Design Project

Reference Books:
1. AutoCAD manual
2. Lab Manual

Sessional Requirements:
Class work Exercises   = 60 marks
Lab Series test   = 2X15 = 30 marks
Attendance          = 10 marks
Total                  = 100 marks
Objective: The objective of the course is to develop an understanding of fundamentals of environmental engineering-water supply and sanitary engineering-students will learn about sources of water, water treatment, waste water treatment, solid waste management etc.

Module 1 (8 hrs)
Water Supply Engineering – Quantity of water, types of water demand, fluctuation in demand, factors affecting consumption, forecasting population – design period. Sources of water – surface water sources, intakes, ground water sources.

Module II (16 hrs)

Module III (12 hrs)
Wastewater characteristics – different types of oxygen demand. Preliminary treatment of wastewater – screens, grit chamber, detritus tank, sedimentation tank. Biological treatment - Activated sludge process, Trickling filter, Oxidation pond. Anaerobic treatment- Anaerobic digesters, Septic tank and soak pit.

Module IV (12 hrs)

Text books

Reference books

4. Fair, Geyer and Okun, Water and Wastewater Engineering, John Wiley and sons, Inc., 2010
7. Relevant BIS Codes.

Sessional Requirements

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University examination pattern

QI - 8 short questions of 5 mark each module
QII - 2 questions of 15 marks from module I with choice to answer any one.
QIII - 2 questions of 15 marks from module II with choice to answer any one.
QIV - 2 questions of 15 marks from module III with choice to answer any one.
QV - 2 questions of 15 marks from module IV with choice to answer any one.