File Ref.No.181386/GA - IV - E1/2016/Admn

UNIVERSITY OF CALICUT

Abstract

Faculty of Engineering-B.Arch programme- syllabus of Fifth and Sixth semester B.Arch Programme with effect from 2022 admission-Implemented subject to ratification by the Academic Council - Orders issued.

G & A - IV - E

U.O.No. 6351/2024/Admn Dated, Calicut University.P.O, 12.04.2024

Read:-1.U.O.No. 20254/2022/Admn dtd.27.10.2022

2.U.O.No.10476/2023/Admn dtd. 03.07.2023.

3. Minutes of the online meeting of the Board of Studies in Architecture held on 07.03.2024

4. Email dtd:11.04.2024 received from the Dean, Faculty of Engineering.

ORDER

1. The Regulation, Curriculum and syllabus for Combined First and Second semester B.Arch Programme was implemented with effect from 2022 admission vide paper read as (1) and Modified Curriculum and the Syllabus of Third and Fourth semester B.Arch Programme with effect from 2022 admission was implemented vide paper read as (2) above.
2. As per paper read as (3), the Board of Studies in Architecture approved the Syllabus of Fifth and Sixth semester B.Arch Programme with effect from 2022 admission.
3. The above resolution of the Board of Studies in Architecture was approved by the Dean, Faculty of Engineering vide paper read as (4).
4. Considering the urgency, sanction has been accorded by the Vice Chancellor on 12.04.2024 to implement the Syllabus of Fifth and Sixth semester B.Arch Programme with effect from 2022 admission subject to ratification by the Academic Council.
5. The Syllabus of Fifth and Sixth semester B.Arch Programme with effect from 2022 admission is, therefore, implemented, subject to ratification by the Academic Council.

Orders are issued accordingly. (Syllabus of Fifth and Sixth Semester B.Arch appended)

Ajayakumar T.K

Assistant Registrar

To

1. The Principals of affiliated Architecture Colleges.
2. The Controller of Examinations, Pareeksha Bhavan.
3. The Deputy Registrar, B.Tech Branch Pareeksha Bhavan.

Copy to:PS to VC/PA to PVC/PA to Registrar/PA to CE/DR,B.Tech/GA IF/Enquiry/SF/DF/FC

Forwarded / By Order

Section Officer

University of Calicut

Syllabus

of

Fifth & Sixth Semester

B.Arch. Degree Course

(With effect from 2022 admissions)

FIFTH SEMESTER												
Course Code	**Subject**	**Group**	**Category**	**Credits**	**Hours Per Week** **			**Duration of Exam**	**Marks**			
					L	**T**	**P/S**		**W**	**J**	**C.A.**	**Total**
AR 22-51	Architectural Design-III *	I	PC	10	0	1	9	0		200	300	500
AR 22-52	Landscape Design & Planning	III	PC	4	3	0	1	3	100		50	150
AR 22-53	Building Materials & Construction -IV	II	BS & AE	3	2	0	1	3	100		100	200
AR 22-54	Design Of Structures-I	III	BS & AE	3	2	1	0	3	100		50	150
AR 22-55	History of Architecture-IV	III	PC	3	3	0	0	3	100		50	150
AR 22-56	Building Services-III (HVAC & Mechanical Services)	III	BS & AE	3	2	0	1	3	100		50	150
AR 22-57	Specification & Cost Estimation	III	PC	3	1	2	0	3	100		50	150
TOTAL				**29**	13	4	12		600	200	650	1450

* Evaluation by the Jury as per the B. Arch Degree Manual, L - Lecture, T - Tutorial, P/S - Practical/Studio, W - Written University Examination, J - Jury, C.A. - Continuous Assessment.

** One hour per week allotted to Library

Note:

One Hour Practical time of Building Services to be earmarked for conducting experiments in building science laboratory.

Semester: Fifth

Course No.	Course Name	L-T-P/D	Credits	Year of Introduction
AR 22-51	Architectural Design-III	0-1-9	10	2022

Course objectives

The Architectural Design III course for students of architecture would help,

- To study the impact of site, context and climate on spatial design and formulate an apt concept for the design.
- To bring about optimum design solutions.
- To introduce site planning principles involving landscaping, circulation network and parking.
- To learn to analyse sloping sites and explore possible design options.
- To do user study and analysis in framing an optimum design circulation solution.
- To emphasize on the importance of understanding the essential building services like water supply, sanitation and electrification.

Course outcome

After the completion of this course, the students will be able to

- design structures that are climate responsive while reducing the building's reliance on artificial energy.
- learn and practice a logical method of drafting design area programs.
- do site analysis to formulate and propose site development as part of design process.
- Integrate building services systems, water supply & sanitation and lighting into the design of the building.

Reference books

- Kerala Municipal Building Rules
- National Building Code
- Sam F. Miller, "Design Process: A Primer for Architectural and Interior Design", Van Nostrand Reinhold, 1995
- Julius Panero, Martin Zelnik, "Human Dimension and Interior Space", Whitney Library of Design,
- Bansal, N.K., Hauser, G. and Minke, G., "Passive Building Design: A Handbook of Natural Climatic Control", Elsevier Science. 1994
- Wakita / Linde, The Professional practice of Architectural working drawing, John Wiley & sons, 1984.
- Andrew Alpern, 'Handbook of speciality Elements in Architecture', McGraw Hill Book CO., 1982.
- New Metric Handbook – Patricia Tutt and David Adler – The Architectural Press
- Arthur L. Guptill and Susan E. Meyer, 'Rendering in Pen and Ink', Watson- Guptill, 1997
- Joseph De Chiara, Michael J Crosbie, "Time Saver Standards for Building Types", McGraw Hill Professional 2001.

Projects: A minimum of two projects shall be completed during the semester.

Major project – Project shall have enough emphasis on site planning principles and climate responsiveness. These shall be medium sized buildings such as Resorts, Schools, medium sized office complexes or mid-rise apartments.

Minor project - The short project of conceptual design presentation with enough emphasis on site planning. These shall be design of club house, fitness centre or any similar facility used in conjunction with the major project.

Process and deliverables:

- Data collection from various reference books, building bye-laws and national building code.
- Study and presentation of similar designs (literature and live) to formulate a detailed design brief and architectural area programme.
- Analysis based on study, site, context, activities, users, services to draw inferences and evolve concept with emphasis on site and climatic analysis.
- Development of the design from the concept within the constraints of bye-laws and regulations.
- Deliverables shall be graphical representation of study, concept explanation and design evolution, computer aided presentation drawings of design, physical model in appropriate scale etc.

TOTAL HOURS: 160

CONTINUOUS INTERNAL EVALUATION PATTERN:

Design exercises, projects, tests, and internal reviews**:** 270 Marks

Attendance: 30 Marks

Semester: Fifth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-52	LANDSCAPE DESIGN AND PLANNING	3-0-1	4	2022

Course Objectives

- To introduce students about Site Planning & Landscape Design so as to integrate basic principles in architectural design
- To understand the importance of sustainable development and managing natural resources.
- To understand the scope of Landscape Architecture and Planning through various examples from past to present.

Course Outcome

By the end of this course students will be able to

- Understand the scope of landscape architecture
- Apply effective grading and stormwater management for Architecture design Projects.
- Create landscape construction details for the projects.

Text books

- *Simonds. J. O.* (1961). *Landscape Architecture, The Shaping of Man's Natural Environment*. London: F.W. Dodge Cooperation.
- Jellicoe, *Geoffrey, and Susan Jellicoe*. (1975) *The Landscape of Man*: Shaping the Environment from Prehistory to the Present Day. London.

Reference Books

- *Laurie, Michael.* (1975). *An introduction to landscape architecture*. New York: American Elsevier Pub. Co.
- *Hackett, Brian*. (1979). *Planting design*. New York: McGraw-Hill
- *Tandy, Cliff*. (1972). *Handbook Of Urban Landscape*, The Architectural Press, London.
- *Motloch J. L.* 2000 *Introduction to landscape design* Second Edition, *John Wiley & Sons, USA*
- *Appleton*, J. (1975). The *experience of landscape*. London, England: Wiley.
- *Reid* GW. (1993). From *concept to form: In landscape design*. New York: John Wiley & Sons.
- *Dee, C.* (*2001*). *Form* and *Fabric* in *Landscape Architecture*: A *Visual Introduction* (1st ed.). *Taylor* & *Francis*.
- *McHarg*, I. L. (1969). *Design with nature*. [1st ed.]. Garden City, N.Y.,
- *Bose T.K. and Choudhary, K.* (1991) "*Tropical Garden Plants in Colour*" Horticulture and Allied Publishers

MODULE I (13 hrs)

Introduction to landscape architecture: Introduction to landscape architecture definitions, importance, need and scope; Role of landscape design in architecture.

Landscape planning: The concept of Landscape Planning: definitions and scope.
Contribution of Fredrick Law Olmsted, Example such as Central Park, New York & Emerald Necklace, Boston and its contribution to the city.

Elements and principles of landscape design

- Elements of Design (Line, Form, Texture, Color, Visual Weight)
- Principles of Design (Scale & Proportion, Balance, Rhythm, Unity, Emphasis)

The role of landscape components in modifying microclimate with respect to temperature, humidity, precipitation, air corridors, heat islands, wind speed etc., in cities.
Exercise: *Identifying elements and principles from selected landscape designed spaces*

MODULE II (12 hrs.)

Plant material: Plant materials, classification, characteristics, use and application in landscape design; Role of plants in landscape design, Native, Exotic and Invasive species
Hard & soft-scape in landscape, landscape lighting, street furniture.

Landscape resources: Understanding landscape resources, Threats to urban landscape resources
Watersheds and their characteristics, protection of natural water bodies: water retention structures, water harvesting techniques, swales, bioswales.
Urban open spaces, Urban Forest: It's ecological social and environmental dimensions. Its role in the urban landscape.

Exercise: *Preparing a chart with different plant materials used in landscape with common name, scientific name and images along with Site Visit.*

MODULE III (12 hrs.)

History of landscape architecture

Landscape and garden design in history -Italy, France, England, China, Japan, Persia. Study of notable examples.

Garden design in Indian History. Sacred groves. Mughal and Rajput Landscapes

Exercise: *Sketching the studied gardens in the history of Landscape*

MODULE IV (15 hrs.)

Landscape engineering

Introduction to grading, landform modifications, stormwater management and surface water drainage.

Basic grading principles, cut and fill process, retaining walls, surface drainage.

Preparation of grading and drainage plan

Landscape construction

Driveways, Pathways, Plazas, Walls, Steps, Ramps

Planting: Planters, Beds, Edges, Terraces

Water elements: Swimming Pool, Water bodies

Exercise:

Preparing a master plan marking hardscape and softscape, showing levels and incorporating strategies for storm water management.

Sketching details of pathways, steps, planters, and swimming pool used in landscape

(For the above exercise their fifth semester Architecture Design Project shall be considered.)

TOTAL HOURS-52

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 marks

UNIVERSITY EXAMINATION PATTERN

Q1 – 8 Short type questions of 5 marks, 2 from each module

Q2 – 2 Questions of 15 marks from Module 1 with a choice to answer any one of them.

Q3 – 2 Questions of 15 marks from Module 2 with a choice to answer any one of them.

Q4 – 2 Questions of 15 marks from Module 3 with a choice to answer any one of them.

Q5 – 2 Questions of 15 marks from Module 4 with a choice to answer any one of them.

Semester: Fifth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-53	**BUILDING MATERIALS AND CONSTRUCTION IV**	**2-0-1**	**3**	**2022**

Course Objectives

The Building materials and construction course for students of architecture would,

- Introduce students to the various building finishes and their application.
- Provide exposure to the various materials used as wall and floor finishes through relevant market studies and site visits.

Course Outcome

By the end of this course students will be able to:

- Understand the properties and application of various building materials used as building finishes, construction methods.
- Study the application of glass as an advanced construction material.
- Identify or assign finishes appropriate for different design projects.

Text books

- Arora S.P. and Bindra S.P.,"Text book of Building Construction", Dhanpat Rai & Sons, New Delhi, 2012.
- P C Varghese, Building Construction, Prentice Hall of India Pvt. Ltd, New Delhi,2010
- Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000.

Reference Books

- W.B. Mckay; Building construction, Vol 1,2, Longman UK 1981.
- Barry, The Construction of Buildings; Affiliated East West press put Ltd New Delhi 1999.
- Harry Parker, Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
- Relevant BIS codes.

MODULE I

WALL FINISHES (13 hrs)

Plaster: Introduction, types of plaster- Lime plaster and gypsum plaster, Fire resistant plaster, X-Ray shielding plaster and acoustic plaster. Process of plastering.

Paints and varnish: Characteristics of an ideal paint and varnish. Classification - various types of paints. Painting process. Defects in painting works. Process of varnishing.

Wall cladding- stone cladding, tile cladding, Wooden cladding and metal cladding. Stucco finish and other finishes.

Exercises: Study the specifications of wall finishes from relevant BIS codes,

Stone cladding details, Metal cladding details

Market study: Various wall finishes-plasters, paints, cladding materials etc.

MODULE II

FLOOR FINISHES (13 hrs)

Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, colored cement, mosaic, terrazzo, tiles, wood, parquet flooring, stone, brick etc.

Classification & properties of tiles used in flooring. Selection criteria and Methods of fixing various types of tiles.

Different type of resilient and vibration resistive floor like rubber, Linoleum and PVC flooring.

Exercises: Study the specifications from relevant BIS Codes.

Tile flooring details, wooden flooring details.

MODULE III

WOOD SUBSTITUTES (15 hrs)

Industrial products as substitutes for natural hard wood- Characteristics, physical properties, areas of application, available forms and sizes of: Veneers and veneer ply woods, particle board, hard board, fiberboard, block board, lamina-boards, glulam, laminates, cement particle board, e-board, bamboo ply,etc.

Exercises: Study the specifications from relevant BIS Codes.

Case study :Site visit for studying and analyzing different wood substitutes, material selection criterias, specifications , application etc.

MODULE IV

GLASS AND GLAZING (15 hrs.)

Glass products : Types of glass - wired glass, fiber glass, laminated glass, glass building blocks, Heat strengthened glass- toughened glass, laminated glass Special purpose glasses- Low emissivity glass, Solar control glasses and variable transmission glass, Fire resistant glass, Self cleaning glass, their properties and uses in buildings

Glazing: Single, double and triple glazing -Glazed curtain walls & sky lights.

Exercises : Study the specifications from relevant BIS Codes, Structural glazing details.

Market study : Different types of glass and its application in construction.

TOTAL HOURS-56

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments / Viva based on assignments	- 60 marks
Two internal tests each of equal weightage	- 30 marks
Attendance	- 10 marks

UNIVERSITY EXAMINATION PATTERN

Q1 – 8 Short type questions of 5 marks, 2 from each module

Q2 – 2 Questions of 15 marks from Module 1 with a choice to answer any one of them.

Q3 – 2 Questions of 15 marks from Module 2 with a choice to answer any one of them.

Q4 – 2 Questions of 15 marks from Module 3 with a choice to answer any one of them.

Q5 – 2 Questions of 15 marks from Module 4 with a choice to answer any one of them

Semester: Fifth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-54	**DESIGN OF STRUCTURES-I**	**2-1-0**	**3**	**2022**

Course Objectives

The Design of Structures I course for students of architecture would,

- provide them with the knowledge of the behaviour of reinforced concrete structural elements and enable them to design such elements

Course Outcome

By the end of this course, students will be able to:

- Acquire awareness about the analysis and design of reinforced concrete structural elements.
- Get exposure to the relevant IS codes for structural analysis and design.

Text books

- Varghese P. C., Limit State Design of Reinforced Concrete, Prentice Hall of India
- Punmia B. C., Jain A. K. and Jain A. K., Limit State Design of Reinforced Concrete, Laxmi Publications (P) Ltd., 1st Edition, 2007.

Reference Books

- Pillai S. U. and Menon D., Reinforced Concrete Design, Tata McGraw Hill
- Sinha S. N., Reinforced Concrete Design, Tata McGraw Hill
- Park and Paulay, Reinforced Concrete
- Mallick S. K. and Gupta A. K., Reinforced Concrete, Oxford and IBH.
- Jain A. K., Reinforced Concrete- Limit State Design, Standard Book House.
- Jain and Jaikrishna, Plain and Reinforced Concrete Vol I, Nemchand
- Gambhir M. L., Design of Reinforced Concrete Structures, Prentice Hall of India

- IS 456:2000- Code of Practice for Plain and Reinforced Concrete

MODULE I (11 hours)

- Introduction-Plain concrete and Reinforced concrete, Types of loads, Design philosophies – Working stress method, Ultimate load method, Limit state method.
- Limit state method- Principles and assumptions, Types of limit state, Characteristic strength, Characteristic load, Partial safety factors.
- Singly reinforced beam- Design and analysis of beams subjected to flexure, shear and torsion. (Simply supported case only)

MODULE II (11 hours)

- Doubly reinforced beam- Design and analysis of beams subjected to flexure, shear and torsion. (Simply supported case only)**.**
- Flanged beams- Effective flange width of flanged beam section, Analysis of flanged sections (Simple problems only)
- Development length, Flexural and anchorage bond, IS recommendations regarding curtailment of reinforcement.

MODULE III (11 hours)

- Introduction- One way and two-way action of slabs, load distribution in a slab.
- Design of one-way slab and two-way slab
- Stairs – Types of stairs, general principles in design and detailing of various types of stairs.

MODULE IV (11 hours)

- Columns- Introduction- Classification, Effective length, Short columns and Long columns
- Design of Axially loaded short columns- Rectangular and Circular columns
- Foundations- Introduction-Classification and Design concepts of footings.

TOTAL HOURS: 44

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 marks

UNIVERSITY EXAMINATION PATTERN

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

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

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

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

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

Note: IS 456:2000- Code of Practice for Plain and Reinforced Concrete is permitted in the examination hall.

Semester: Fifth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-55	History of Architecture IV	3-0-0	3	2022

Course Objectives

To help students understand design principles that shape innovative architectural styles and forms.

Course Outcome

By the end of this course students will be able to comprehend various design philosophies of Modern and Post-Modern Architecture.

References

- Ching, Francis D. K., et al. A Global History of Architecture. John Wiley and Sons, 2010.
- Frampton, Kenneth. Modern Architecture: A Critical History (Fifth) (World of Art).

Thames and Hudson, 2020.

- Radford, Antony, and Amit Srivastava. The Elements of Modern Architecture: Understanding Contemporary Buildings. National Geographic Books, 2020.
- Curtis, W. J. (1996, June 27). Modern Architecture Since 1900. Phaidon.
- Sigfried Giedion, Space time and Architecture: The Growth of a new tradition, Harvard University Press.
- McCarter, R., & Pallasma, J. (2012, October 22). Understanding Architecture. Phaidon Press.

MODULE I (9 hrs)

BEFORE MODERNISM: THE BEGINNING

- European Architecture: An Introduction ; Neo classicism- works of Étienne-Louis Boullée -Bibliothèque Nationale , Cenotaph for Sir Isaac Newton ;
- Industrial revolution and its impact, new materials – steel, glass, concrete- Eiffel Tower, Sir Joseph Paxton's Crystal Palace, London ;
- Arts and crafts movement – William Morris ; Art Nouveau – works of Antoni Gaudí – Sagrada Femilia;
- Skyscrapers – Works of Louis Sullivan- Wainwright Building ;
- Adolf Loos -Ornament and crime, Raumplan-Moller House, Vienna;
- Deutsche Werkbund- Peter Behrens - AEG Turbine Factory, 1908-09, Berlin;
- Expressionism – Works of Mendelsohn-Einstein Tower ,
- Destijl movement- Schröder House, Netherlands ;
- Russian Constructivism - Tatlin's Tower
- Walter Gropius: The Bauhaus.

MODULE II (12 hrs)

MODERN ARCHITECTURE

Modernism. Ideas and works of architects:

- Philip Johnson – Glass house;Seagram Building, New York.

- Mies Vander Rohe - Barcelona Pavilion, Farnsworth House.
- F. L. Wright - Falling water, Pennsylvania; Guggenheim Museum, New York ,
- Richard Neutra - Kaufmann Desert House, California.
- Oscar Niemeyer - Cathedral of Brasília, Casa das Canoas.
- Alvar Alto - Säynätsalo Town Hall Finland , Villa Mairea.
- Le Corbusier – Sarabhai House ,Villa Savoye, France , Notre Dame Ronchamp, Paris,
- Louis Kahn - The National Assembly Building, Bangladesh, Salk Institute California.

MODULE III (12 hrs)

POST MODERN ARCHITECTURE

Post Modernism. Ideas and works of architects:

- Robert Venturi- Vanna Venturi House, Phiadelphia.
- Paul Rudolph – The Colonnade Condominiums, Singapore.
- I M. Pei - Grand Louvre, Paris.
- Kenzo Tange – Yoyogi National Gymnasium Tokyo.
- Richard Meier – Jubilee Church, Los Angeles; Barcelona Museum of Contemporary Art.
- Toyo Ito - Meiso no Mori Crematorium, Japan
- John Utzon - Sydney Opera House, Bagsvaerd Church Denmark
- James Stirling- Neue Staatsgaleria.

ALTERNATIVE PRACTICES AND IDEAS

Critical regionalism.

- Hassan Fathy-New Gourna Village.
- Geoffrey Bawa – Bawa's House Colombo; Bentota Beach Hotel.
- Louis Barragan- Chapel and Convent of the Capuchinas, Mexico; Casa Estudio,Mexico.
- Tadao Ando- Church on the water, Japan; Modern Art Museum of Fort Worth, USA
- Mario Botta- Theatre of the Architecture, Switzerland.
- Alvaro Siza- Mimesis Museum.
- Carlo Scarpa- Canova Museum, Castelvecchio Museum.

Modern And High-Tech Architecture

- Renzo Piano- Pompidou Centre, Paris.
- Richard Rogers- Lloyd's of London Office Building London.
- Norman Foster -HSBC Office Building, China.

Module IV (12 hrs)

21st CENTURY ARCHITECTURE

Deconstructivism.

- Zaha Hadid – Vitra Fire Station Germany; MAXXI Italy
- Daniel Libeskind – Jewish Museum, Berlin.
- Frank Gehry -Dancing Building, Prague; Guggenheim Museum Bilbao, Spain,
- Peter Eisenman – State Farm Stadium, Arizona.
- Santiago Calatrava – Quadracci Pavilion,USA;

Architecture as Experience

- Glenn Murcutt- Arthur and Yvonne Boyd Education Centre, Australia; Simpson-Lee House.
- Peter Zumthor- Brother Klaus Field Chapel; Thermal Baths Vals, Switzerland

TOTAL HOURS: 45

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 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.

Semester: Fifth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-56	**BUILDING SERVICES III (HVAC & MECHANICAL SERVICES)**	**2-0-1**	**3**	**2022**

Course Objective

To impart the knowledge and skills required for understanding the building services
of Heating, Ventilation and Air-conditioning and their integration with Architectural Design.

Course Outcome

By the end of this course students will be able to:

- Achieve an understanding of the fundamentals of HVAC & Mechanical services in buildings.
- Get knowledge about the ASHRAE standards.

Reference books

· Refrigeration & air conditioning- Ramesh Chandra Arora
· Refrigeration & Air conditioning-Manohar Prasad
· Refrigeration & air conditioning- Ahmadul Ameen
· Refrigeration & Air conditioning-C.P.Arora
· Refrigeration & Air conditioning-W.F.Stocker
· Refrigeration & Air conditioning-P.L.Balleny
· Refrigeration & Air conditioning-Dossat
· Heating ventilation and A/C by Fage C Mcquiston & Jarald D Parker - John Wiley &

Sons
· Refrigeration & air condition by Regiput
· ASHRAE data book

MODULE I (11 hrs)

Introduction - Role and Purpose of HVAC systems in everyday use. Need for architects to study the system.
The scope and impact of Mechanical systems- Impact of space planning - Impact on Architectural Design - Impact on High-rise Buildings - Impact on construction cost – Impact on the Global environment.
Engineering Fundamentals - Principles of Heat transfer – Conduction, convection, radiation, Thermodynamics.
Document any traditional context where passive system for thermal comfort is implemented.

MODULE II (11 hrs.)

Psychrometry - Psychrometric properties - Psychrometric chart – Psychrometric process - adiabatic mixing - Sensible heating and cooling - humidifying and dehumidifying - bypass factor - sensible heat factor - room sensible factor – RSHF and GSHF line - Thermal Comfort- Human comfort, comfort chart - Standard requirements of ventilation for different conditions of

living and work. Conditions for comfort - Control of quality, quantity, temperature, and Humidity of air. Indoor Air Quality, Techniques and Adaptations of different climatic conditions. Effective temperature – Factors governing effective temperature.

MODULE III (12 hrs.)

Principles of Refrigeration – Capacity - Coefficient of performance (COP)- Carnot refrigeration cycle - vapor compression systems - Theoretical and practical cycles - Thermodynamic analysis using PH diagram - Standard refrigerants including eco-friendly refrigerants and their properties - Study of refrigeration system components – Compressors – Condensers - Expansion devices – evaporators - cooling towers.

Exercise: *Site visits to study various air conditioning systems.*

MODULE IV (12 hrs.)

Air conditioning systems - Room air conditioning systems - window A/C, split packaged systems - central and unitary systems – summer – winter - year-round air conditioning systems - Cooling load calculation - various heat sources - Design of air conditioning systems - AHU, Duct design - air distribution systems - draft - throw - entrainment ratio – spread - location of air outlets - location of return air openings - general consideration in air duct design and layout - noise and noise control. Determination of duct size using equal friction (constant pressure loss) method.

Sustainable design approaches - Materials and systems for insulation, energy efficient techniques regarding HVAC systems.

Awareness of VRF system design, diversity factor in HVAC, district cooling system

Heating systems- modern sustainable solutions like heat pumps

Exercise: *Documentation and case studies of small scale and large-scale buildings, reading drawings, understanding notations, legends, symbols, and sizes.*

TOTAL HOURS-46

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 marks

UNIVERSITY EXAMINATION PATTERN

Q1 – 8 Short type questions of 5 marks, 2 from each module

Q2 – 2 Questions of 15 marks from Module 1 with a choice to answer any one of them.

Q3 – 2 Questions of 15 marks from Module 2 with a choice to answer any one of them.

Q4 – 2 Questions of 15 marks from Module 3 with a choice to answer any one of them.

Q5 – 2 Questions of 15 marks from Module 4 with a choice to answer any one of them.

Semester: Fifth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-57	SPECIFICATION AND COST ESTIMATION	1-2-0	3	2022

Course Objectives

- To enable the students to prepare detailed and approximate estimate and to have a clear picture of the project expenditure.
- To enable the students to have a thorough idea regarding the quality and quantity of materials required for the project.
- To equip the students with basic knowledge about property valuation.

Course Outcome

By the end of this course the students will be able to:

- Describe the concepts and methods of estimating project costs.
- Formulate the specification of various building materials.
- Perform the process of valuation.

Text books

- B.N. Dutta, Estimating and costing in Civil Engineering, USB publishers and distributers Ltd. New Delhi
- D.D. Kohli, RC Kohli, A textbook of Estimating and costing, S Chand Publishing, 2011
- Dr. S. Seetharaman, M. Chinnasamy, Estimation and Quantity Surveying, Anuradha Publications, Chennai

Reference Books

- BS Patil, Civil Engineering contracts and estimates, Universities press
- CPWD data book and schedule of rates
- V N Vazirani & S P Chandola, Civil engineering Estimating and Costing, Khanna Publishers.
- IS 1200 (1968), Methods of measurement of building and civil engineering works

MODULE I (12 hours)

- General Introduction- Quantity Surveying, Basic principles- Types of estimates - Detailed estimate, Revised estimate, Supplementary estimate, Maintenance estimate, Approximate estimate, Abstract of estimate. Explanation of terms- Contingencies, Work charged establishments, Provisional sum, Lump sum item.
- Specifications- Introduction, Purpose and basic principles. Types of specifications- General and Detailed specifications- Types of detailed specification.
- Detailed specification for building materials and execution of major items of work (Earthwork excavation for foundation, Masonry works, Concrete works, Finishing).

MODULE II (12 hours)

- Detailed estimate including measurements and calculation of quantities, abstract and preparation of various items of works for RCC single storied buildings using centre line method.
- Long wall-short wall method (Concept only). Bar-bending schedule (Concept only)

MODULE III (12 hours)

- Analysis of rates – Introduction to the use of CPWD data book and schedule of rates.
- Preparation of data and analysis of rates for various items of work connected with building construction (Earthwork excavation for foundation, Masonry works, Concrete works, Finishing)

MODULE IV (12 hours)

- Valuation - Explanation of terms, Types of values, Sinking fund, Years purchase, Obsolescence, Depreciation - Straight line method, Constant percentage method, Sinking fund method.
- Valuation of real properties- Rental method, Profit based method, Depreciation method.
- Valuation of landed properties – Belting method, Development method, Hypothecated building scheme method

TOTAL HOURS: 48

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 marks

UNIVERSITY EXAMINATION PATTERN

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

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

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

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

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

Note:- For analysis of rate and cost estimation, unit rate and labour requirement should be given along with the questions in the question paper. No other charts, tables, codes are permitted in the examination hall. If necessary, relevant data shall be given along with the question paper.

SIXTH SEMESTER												
Course Code	**Subject**	**Group**	**Category**	**Credits**	**Hours Per Week ****			**Duration of Exam**	**Marks**			
					L	**T**	**P/S**		**W**	**J**	**C.A.**	**Total**
AR 22-61	Architectural Design-IV *	I	PC	10	0	1	9	0		200	300	500
AR 22-62	Interior Design	II	EC	4	1	0	3	3	100		100	200
AR 22-63	Building Materials & Construction -V	II	BS & AE	3	2	0	1	3	100		100	200
AR 22-64	Design Of Structures-II	III	BS & AE	3	2	1	0	3	100		50	150
AR 22-65	History of Architecture-V	III	PC	3	3	0	0	3	100		50	150
AR 22-66	Building Services-IV (Acoustics & Fire Fighting)	III	BS & AE	3	2	0	1	3	100		50	150
AR 22-67	Working Drawing	IV	PC	3	0	0	3	3			100	100
TOTAL				**29**	10	2	17		500	200	750	1450

* Evaluation by the Jury as per the B. Arch Degree Manual, L - Lecture, T - Tutorial, P/S - Practical/Studio, W - Written University Examination, J - Jury, C.A. - Continuous Assessment.

** One hour per week allotted to Library

Note:

One Hour of Building Services to be dedicated to applying knowledge to a design problem.

Semester: Sixth

Course No.	Course Name	L-T-P/D	Credits	Year of Introduction
AR 22-61	Architectural Design-IV	0-1-9	10	2022

Course objectives

The Architectural Design IV course for students of architecture would help,

- To understand the design requirements of high-rise buildings with respect to services namely HVAC, STP, electrification, fire and safety aspects etc.
- To study vertical circulation systems and design considerations for high rise buildings.
- To incorporate structural grids in to design.
- To create an awareness of green building design and sustainable architecture.
- To understand LEED, IGBC and GRIHA rating systems
- To inculcate the importance of construction in spatial planning, services integration in the context of design of High-rise and service intensive buildings.

Course outcome

After the completion of this course, the students will be able to

- Incorporate green building rating systems in the design process.
- Gain knowledge on the integration of building services in the process of design.
- Explore advanced construction techniques and related structural details in design.
- Design and integration of varied functional spaces catering to multiple category of users in a single built space.

Reference Books

- Kerala Municipal Building Rules
- National Building Code
- Mili Majumdar, “Energy Efficient Buildings in India”
- S N Srinivas , “Implementing energy efficiency in buildings”
- Sam F. Miller, “Design Process: A Primer for Architectural and Interior Design”, Van Nostrand Reinhold, 1995
- Julius Panero, Martin Zelnik, “Human Dimension and Interior Space”, Whitney Library of Design,
- Wakita / Linde, The Professional practice of Architectural working drawing, John Wiley & sons, 1984.
- Andrew Alpern, ‘Handbook of speciality Elements in Architecture’, McGraw Hill Book CO., 1982.

- Joseph De Chiara, Michael J Crosbie, “Time Saver Standards for Building Types”, McGraw Hill Professional 2001.
- Joseph De Chiara, Julius Panero, Martin Zelnik, “Time Saver Standards for Interior Design and Space Planning”, McGraw Hill 2001.

Projects:

Projects may be public/semi-public, multi-storied commercial /mercantile, institutional, office/ business. A minimum of two projects may be given.

- Major -Projects shall have enough emphasis on advanced technology and the application of various building services, construction and circulation systems. These shall be hospital/ star rated hotel / large scale office building/ high rise apartment /shopping mall.

- Minor-The project can focus on aspects related to sustainable building planning and construction practices used in the Major project.

Process and deliverables:

- A detailed design program has to be formulated based on studies, site context and requirement of the project.
- Case studies of selected built forms to understand the details and application of green building concepts and advanced construction methods in design.
- Study of the various techniques of energy-efficient design and recycling technologies for water and wastes to be incorporated in the design proposals.
- Students have to incorporate detailing of various services, structural systems and vertical access systems such as elevators, escalators in design presentation.
- Students are expected to do the landscape layout in detail to develop appreciation of a holistic environmental design.
- Deliverable shall be computer assisted presentation drawings including graphical representation of concept explanation and design evolution, computer rendered perspectives, physical models etc.

TOTAL HOURS: 160

CONTINUOUS INTERNAL EVALUATION PATTERN:
Design exercises, projects, tests, and internal reviews: 270 Marks
Attendance: 30 Marks

Semester: Sixth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-62	**INTERIOR DESIGN**	**1-0-3**	**4**	**2022**

Course Objectives

- To introduce the principles and practices of interior design.
- To explore foundational concepts, historical perspectives, and practical applications through hands-on exercises and case studies.
- To provide a comprehensive understanding of spatial design principles, preparing students for the dynamic field of interior architecture.

Course Outcome

By the end of this course students will be able to

- Describe about the basics of Interior Design.
- Understand prevailing trends in materials and finishes.

Text books

- "Interior Design Illustrated" by Francis D. K. Ching and Corky Binggeli
- "The Fundamentals of Interior Design" by Simon Dodsworth

Reference Books

- Ching, Francis, “Form, Space and Order”, Van Nstrand Reinhold, London.
- Ching, Francis, "Interior Design illustrated", Van Nostrand Reinhold, London, 1987.
- Helsel, M.D., "Interior Designer's Drapery Sketch File", Watson Guptill Publishing Co., 1969.
- Scott, "Design Fundamentals".
- Panero Julious & Zclink Martin, "Human Dimensions and Interior Space".
- Alexander and Mercourt, “Design of interior environment”.
- Halse, “The use of colour in interiors”.
- Colin, Boyne and Lance Wright, "The best architects Working Details” Vol. 1 & 2.
- Shirish Vasat Bapat , “Living Areas - Internal Spaces”.
- Lan Grant, "Great Interiors”, Spring Books.

MODULE I (12 hrs)

Introduction to Interior Design

Definition and Scope of Interior Design: Clarify the boundaries and intersections between interior design and architecture.

Historical Evolution: Evolution of interior design styles through different historical periods- Influential designers and movements emphasizing their impact on contemporary practice.

Design Process: Detailed exploration of the stages involved in interior design projects, including research, concept development, design documentation, and implementation.

Exercise: *Analyze case studies of renowned interior design projects, highlighting the*

integration of design principles with practical considerations.

Views- One point, two points, Birds-eye and worms-eye of interiors.

MODULE II (13 hrs.)
Fundamentals of Interior Design

Client Engagement: Emphasize the importance of client collaboration, effective communication, and understanding client needs and preferences.

Space Analysis: Techniques for spatial analysis, including site evaluation, programmatic requirements, and circulation patterns.

Building Systems: Overview of building structures, materials, and systems, with a focus on their implications for interior design.

Technical Drawing: Introduction to technical drawing methods and conventions, with practical exercises in drafting plans, elevations, and sections.

Exercise: Spatial Transformation- Redesign a residential or commercial space to enhance spatial perception, incorporating design principles.

MODULE III (12 hrs.)
Spatial Organization and Human Factors
Space Planning: Principles of space organization, anthropometrics, and ergonomics, with an emphasis on creating functional and aesthetically pleasing interiors.
Human Interface: Selection and specification of materials, finishes, furnishings, and lighting to enhance user experience and accommodate diverse needs.
Interior Drawings: Designing flooring patterns, wall patterns, and ceiling patterns with detailed drawings and perspective views. Advanced techniques in interior drawing, including rendering, perspective drawing, and digital modelling.

Exercise: Preparation of interior drawing - design flooring pattern, wall pattern, ceiling pattern with its detailed drawings and perspective views.

MODULE IV (13 hrs.)
Design communication and Integration of MEP services in interior design.

Design Communication: Techniques for effective presentation and communication of design concepts, including digital rendering, 3D modelling, and multimedia presentations.
Integration of MEP services in interior design: Space planning based on services, aesthetic integration of MEP, layout preparation, sustainable MEP systems, technology integration.

Exercise: Prepare detailed drawings (Plans & Sections) of any space-Electrical, plumbing, HVAC

TOTAL HOURS-50

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments / Viva based on assignments - 60 marks

Two internal tests each of equal weightage - 30 marks

Attendance - 10 marks

UNIVERSITY EXAMINATION PATTERN

Q1 – 8 Short type questions of 5 marks, 2 from each module

Q2 – 2 Questions of 15 marks from Module 1 with a choice to answer any one of them.

Q3 – 2 Questions of 15 marks from Module 2 with a choice to answer any one of them.

Q4 – 2 Questions of 15 marks from Module 3 with a choice to answer any one of them.

Q5 – 2 Questions of 15 marks from Module 4 with a choice to answer any one of them.

Semester: Sixth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-63	BUILDING MATERIALS AND CONSTRUCTION V	2-0-1	3	2022

Course Objectives

- The building materials and construction course for students of architecture would,
- Introduce to the student the advanced structural concepts in Architecture.
- Help them understand the details and application of advanced construction methodologies.

Course Outcome

By the end of this course students will be able to

- Understand the properties of various building materials and their applications.
- Remember advanced construction techniques used for constructing various components of a building.

Text books

- Arora S.P. and Bindra S.P., “Text book of Building Construction”, Dhanpat Rai & Sons, New Delhi, 2012.
- P C Varghese, Building Construction, Prentice Hall of India Pvt. Ltd, New Delhi, 2010
- Francis D.K. Ching, Building Construction Illustrated John Wiley 6 Sons 2000.

Reference Books

- WB Mckay Building construction, Vol 1,2, Longman UK 1981.
- Barry, The Construction of Buildings; Affiliated East West press put Ltd New Delhi 1999.
- Relevant BIS codes.
- Harry Parker, ‘Materials and Methods of Architectural Construction’, John Wiley & Sons Canada, 1958.
- H Leslie Simmons, ‘Construction- Principles, Materials & Methods’, John Wiley & Sons Inc., New York, 2001.

MODULE I

STUDY OF ADVANCED CONCRETE (12 hrs)

Concrete types -Lightweight, high density, fiber reinforced, polymer concrete-Outline of manufacture, properties and uses of the above.

Admixtures - Water repellent, waterproofing compounds, accelerators, air entraining agents, hardeners, plasticizer - Their properties and uses.

Exercises: Study the specifications of concrete from relevant BIS codes.

Market study: Different admixtures and method of application.

MODULE II

ADVANCED STRUCTURAL CONCEPTS IN ARCHITECTURE (13 hrs)

Pre stressed concrete structures: Precast pre stressed construction. Two-way waffle slab, Two-way flat plate, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab.
Tensile structures: Concept of tensile structures, classification, uses, materials used. Application of cable structures in architecture.
Shell structures and domes: Construction methods
Plate structures: Definition, classification and application, folded plates, flat slab and coffered slab.
Special Structures: Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures, Portal frames: Definition, and Application.

Exercises: Study the specifications from relevant BIS codes.
Sketches : Folded pate, Post tensioned slab, Pre tensioned slab, Portal frame.
Case study : Studying different structure types and detailing.

MODULE III

PRE-FABRICATION & MODULAR CO-ORDINATION (10 hrs)

Modular co-ordination: Introduction to concepts of Modular Coordination. Definition of Basic Module. Modular controlling dimensions, Planning Modules.
Prefabrication: Introduction to concepts of prefabrication, Advantages and disadvantages of onsite & off-site prefabrication, Methods of prefabrication, Process of prefabrication,Various issues related to prefabrication industry , Examples of prefabrication concepts.
***Exercise: Literature study of the projects with prefabrication or modules*.**

MODULE IV

DAMP PROOFING, CONSTRUCTION JOINTS (10 hrs)

Damp proofing: Damp proofing materials, Causes and methods of damp proofing of foundation, walls, floors, roofs. DPC of bathrooms, swimming pools, roof gardens, water tanks.
Construction Joints and Expansion joints: Definition, Methods of construction, filling of joints and waterproofing.
Exercises: Study the specifications from relevant BIS codes.
Sketches: construction joints, expansion joints,
DPC for foundation, walls, roofs.

TOTAL HOURS-45

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments / Viva based on assignments - 60 marks

Two internal tests each of equal weightage - 30 marks

Attendance - 10 marks

UNIVERSITY EXAMINATION PATTERN

Q1 – 8 Short type questions of 5 marks, 2 from each module

Q2 – 2 Questions of 15 marks from Module 1 with a choice to answer any one of them.

Q3 – 2 Questions of 15 marks from Module 2 with a choice to answer any one of them.

Q4 – 2 Questions of 15 marks from Module 3 with a choice to answer any one of them.

Q5 – 2 Questions of 15 marks from Module 4 with a choice to answer any one of them.

Semester: Sixth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-64	**DESIGN OF STRUCTURES-II**	**2-1-0**	**3**	**2022**

Course Objectives

The Design of Structures II course for students of architecture would,

- Familiarize them to the fundamental aspects of structural behaviour and design of steel structures and also expose them to the concept of design of timber structures.

Course Outcome

By the end of this course students will be able to

- Perform the analysis and design of steel structural elements.
- Apply relevant IS codes for structural analysis and design

Text books

- Varghese P. C., Limit State Design of Reinforced Concrete, Prentice Hall of India
- Punmia B. C., Jain A. K. and Jain A. K., Limit State Design of Reinforced Concrete, Laxmi Publications (P) Ltd., 1st Edition, 2007.

Reference Books

- A.S. Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971
- Dayaratnam P., Design of Steel Structures, Oxford and IBH Publishing Co.
- IS 883:1994 – Code of Practice for Design of Structural Timber in Buildings
- IS 800:2007 – Code of Practice for use of Structural Steel in General Building Construction
- L.S. Negi, Design of Steel Structures – Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997
- S. Ramachandra, Design of Steel Structures - Standard Book House, Delhi, 1984
- N. Subramanian, Design of Steel Structures
- S.K. Duggal, Limit State Design of Steel Structures

MODULE I (12 hours)

- Steel: Introduction, Properties of structural steel,
- Design of bolted and welded connections. (Moment connections not required)

MODULE II (12 hours)

- Design of tension member – plate, single angled member
- Design of laterally restrained beam

MODULE III (12 hours)

- Compression Member- Design of Strut-normal sections, single angled sections.
- Solid and Built-up Columns for axial load-
- Battens and lacing (Theory only).

MODULE IV (12 hours)

- Introduction to design of timber beams, types of timber – classification, allowable stresses.
- Design of beams-flexure, shear, bearing and deflection considerations,
- Design of struts and ties and columns

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 marks

UNIVERSITY EXAMINATION PATTERN

Note: The following codes are permitted in the examination hall.

- IS 883:1994 – Code of Practice for Design of Structural Timber in Buildings
- IS 800:2007 – Code of Practice for use of Structural Steel in General Building Construction

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

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

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

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

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

Semester: Sixth

Course No:	Course Name	L-T-P/S	Credits	Year of Introduction
AR22-65	History of Architecture V	3-0-0	3	2022

Course Objectives

To help students understand design principles that shape innovative architectural styles and forms.

Course Outcome

By the end of this course students will be able to Interpret various design philosophies of Colonial, Post-independence and Contemporary architecture in India.

References

- Lang, J. T., Desai, M., & Desai, M. (1997, January 1). Architecture and Independence. Oxford University Press, USA.
- Metcalf, T. R. (2002, January 1). An Imperial Vision.
- Bahga, S., & Bahga, Y. (1993, January 1). *Modern Architecture in India*.
- Tadgell, C. (1990, January 1). *The History of Architecture in India*.
- Kagal, C. (1986, January 1). *Vistāra The Architecture of India*.

MODULE I (10 Hours)

ARCHITECTURE IN COLONIAL INDIA

Indo-Saracenic Architecture.

Colonial architecture in the cities of:

- Kolkata : St.Pauls Cathedral, Victoria Memorial;
- Chennai: University of Madras Senate House, Ripon Building, MGR Central railway station Chennai;
- Mumbai: Chhatrapati Shivaji Maharaj Terminus, Eros Cinema.
- New Delhi : Contribution of Edwin Lutyens and Herbert Baker to the lay-out and Architecture of New Delhi - Rashtrapathi Bhavan and Parliament House.

MODULE II (10 Hours)

POST-INDEPENDENCE MODERNIST ARCHITECTURE

Criticisms on the modern movement in India, countering the stigma of colonialism, the community architectural movement, the Neo-Vernacular- integrating the new and the old and Postmodernism.

MODERNIST ARCHITECTURE OF THE NEHRU ERA

- Le Corbusier’ works in India – Chandigarh and the Ahmedabad buildings - their influence on the modern rationalists;

- Louis Kahn's works in India - their influence on the empiricists.

Modernism, Utilitarian modernism, Brutalism and Neo-modernism.

MODULE III (10 Hours)

MODERNISM AFTER CORBUSIER AND KHAN

- Joseph Allen Stein-India Habitat Center, Delhi; Triveni Kala Sangham, Delhi.
- Laurie Baker -Loyola Chapel Trivandrum; CDS Trivandrum.
- Charles Correa - Gandhi Smarak Sangrahalaya; Ahmedabad, Kanchanjunga Apartments, Mumbai.
- Achuyut Kanvinde – IIT Kanpur; Nehru science center, Mumbai.
- Anant Raje - Bhopal Development Authority Headquarters, Institute for Forest Management, Bhopal.
- B.V.Doshi – Sangath Office, Ahmedabad; IIM Bangalore.
- Raj Rewal – Pragati Maidan New Delhi; Asian Games Village, New Delhi.
- Uttam C Jain - University of Jodhpur, Jodhpur.
- Hasmukh C Patel- Newman Hall, Ahmedabad.

MODULE IV (14 Hours)

WORKS OF CONTEMPORARY ARCHITECTS

Architects and their ideologies

- Poppo Pingel- Afsanah Guest House.
- Karl Damchen-The Brunton Boatyard Hotel, Kochi.
- Neelkanth Chhaya- Centre for Environmental Education, Ahmedabad.
- Christopher Benninger- Centre for Developmental Studies and Activities, Pune.
- Saprem Mani- The Vikas Community, Auroville.
- CNT – MindTree East Campus, Banglore.
- Vir.Mueller Architects- Institute of Engineering and Technology, Ahmedabad University.
- Sanjay Mohe –Titan Integrity Campus, Bangalore.
- Shirish Beri – Laboratory for the Conservation of Endangered Species, Hyderabad.
- Bijoy Jain-Ganka Maki Textile Studio.
- Bijoy Ramchandran-Bangalore International Centre.
- Chitra Vishwanath –The Atelier, Bangalore.
- Anupama Kundoo-Wall House, Auroville.

TOTAL HOURS: 44

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 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.

Semester: Sixth				
Course No	**Course Name**	**L-T/P-T**	**Credits**	**Year of Introduction**
AR 22-66	**BUILDINGSERVICES - IV (ACOUSTICS & FIRE FIGHTING SERVICES)**	**2-1-0**	**3**	**2022**

Course Objectives

The Building services – IV (Acoustics & Fire-fighting services) course for students of architecture would help

- To understand the importance of acoustics in buildings.
- To get familiarized with various acoustical materials, their properties and their construction details.
- To integrate architectural design with acoustic considerations.
- To learn the basics of fire fighting.

Course Outcome

After the completion of this course, the students will be able to

- remember the fundamentals of acoustics.
- understand about Fire and Life safety.

Reference Books

- Kinsler, L. E., & Frey, A. R. (1962). Fundamentals of acoustics. New York: Wiley.
- Templeton, Duncan (Ed.) (1993). Acoustics in the Built Environment. Oxford: Butterworth Architecture.
- Knudsen, V. O., & Harris, C. M. (1988). Acoustical designing in architecture.
- Woodbury: Acoustical Society of America. Cavanaugh, W. J., Tocci, G. C., & Wilkes, J. A. (2010).
- Architectural acoustics: Principles and practice. Hoboken, NJ: John Wiley & Sons
- Barendra Mohan Sen – Fire Fighting . (2021).
- N Sesha Prakash . Manual Of Fire Safety (2017).
- National Building Code 2011 – Part 4 – Fire and Life Safety (Fire prevention).

Module 1 (10 hrs)

Introduction to Acoustics & Acoustical Physics: Nature of Sounds- Propagation of Sound- Velocity, Frequency, Octave and wavelength of sound-sound intensity-sound pressure-loudness-Decibel- Human ear and hearing characteristics.

Module 2 (12 hrs)

Sound in Enclosed Space, Acoustical Construction: Room acoustics- behavior of sound in enclosed spaces-sound reflection, diffusion, and diffraction -room resonance- sound

absorption coefficient- sound absorptive materials and applications - porous absorbers, membrane absorbers- cavity resonators-space absorbers variable absorbers-measurement of sound absorption. Acoustic property of various materials. Technical details/drawings.

Module 3 (12 hrs)

Reverberation: Reverberation-Calculation of reverberation time- sabine's formula- acoustical defects in the enclosed spaces. Topography and sound propagation. Terminologies related to Acoustics (STC, NRC, Speech Privacy, Privacy Index, Articulation Index, Attenuation etc.). Acoustic Design of Various Buildings – Auditorium, Theatre, Lecture Hall, Office, Hospital. Effect of noise in human being- air borne and structure borne noise- noise criteria- transmission loss.

Module 4 (12 hrs)

Fire and life safety provisions in various buildings. Fire resistance of building elements, fire rating and assessment. Building bye-laws relating the fire and life safety provisions in the buildings. (NBC – *Fire prevention* and Kerala Building Rules - *Fire safety provisions for high rise buildings*). Active and passive firefighting systems. Firefighting equipment - automatic sprinklers, fire alarms, smoke detectors etc. Case study on firefighting systems in High Rise Buildings.

Activities

Seminar by Acoustic Consultants on Acoustic construction methods.
Seminar by Fire Consultants on Fire Fighting systems.

TOTAL: 46 hrs.

CONTINUOUS INTERNAL EVALUATION PATTERN:

Tutorials / Assignments (minimum 2)	- 20 marks
Two internal tests each of equal weightage	- 25 marks
Attendance	- 5 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.

Semester: Sixth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-67	**ARCHITECTURAL DETAILING AND WORKING DRAWING**	**0-0-3**	**3**	**2022**

Course Objectives

- To be conversant with project delivery methods of architectural design including digital methods.
- To understand the need of integrating structural design, construction and service requirements in architectural planning and design.
- To enable the development of architectural design drawings to make it the basis for structural and service drawings.
- To prepare architectural details and working drawing for a project.

Course Outcome

By the end of this course students will be able to

- Create working drawings required for construction of a building project.
- Integrate technical aspects of construction in architectural design.

Reference Books

- Ralph W Liebing, Architectural working drawings
- Edward J Muller, James G Faussett, Philip A Grau. Architectural drawing and Light construction
- Jefferis, A. and Madsen, D.A. (2005). Architectural Drafting and Design. 5th Ed. New York: Thomson Delmar Learning.
- Osamu, A. W., Linde, R. M. and Bakhoum, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken: John Wiley & Sons.
- IS 1200(1968), Methods of measurement of building and civil engineering works
- Styles, Keith; Bichard, Andrew; Working Drawings Handbook, RIBA

MODULE I (10 hours)

- Study of Architectural standards to be followed in the preparation of working drawing &detailing.
- Case study of sample detailed drawings and working drawings from general to specific details- Site plan, centre line drawings, building plans, enlarged detailed

plans, sections, staircase details, toilet details, joinery, water supply/plumbing, fire protection, mechanical, electrical drawings and HVAC details.

Students may be divided into groups for study and seminars on various topics

MODULE II (15 hours)

- Developing the design of a medium complexity building done by the student in the previous semester up to the stage for the preparation of working drawing or for a new design project for preparation of working drawing.

- **Preparation of working drawing for the design project including**
  a. Developing site plan, floor plans, Detailed Part plans, Roof Plan /Terrace Plan, schedules etc.
  b. Excavation drawings, Foundation drawings, Centre -line drawings, Floor Plans, Sections, Elevations.
  c. Basic internal electrical and plumbing lay outs.
  d. Enlarged plans for areas like toilet, kitchen, staircase etc.

MODULE III (12 hours)

- Details of joinery, finishing materials, built-in furniture, components like doors, windows, ventilators, wardrobe, storage cabinets, counters, fittings and fixtures etc. (done using different materials like Wood, steel, Aluminum, WPC…etc.)

- Details of septic tank, STP, Rain water harvesting etc.

MODULE IV (8 hours)

- Documentation of construction details for various types of staircase, lifts, dumb waiters, escalators etc. through case study.

- Students may be divided into groups for study and seminars on various topics.

TOTAL HOURS: 45

CONTINUOUS INTERNAL EVALUATION PATTERN:

Demonstrations / Presentations / Drawings (Course work)	- 50%
Records / Portfolio	- 20%
Final test / Viva	- 20%
Attendance	- 10%