University of Calicut

Syllabus

of

Third & Fourth Semester

B.Arch. Degree Course

(With effect from 2022 admissions)

THIRD SEMESTER												
Course Code	**Subject**	**Group**	**Category**	**Credits**	**Hours Per Week ****			**Duration of Exam**	**Marks**			
					L	**T**	**P/S**		**W**	**J**	**C.A.**	**Total**
AR 22-31	Architectural Design-I *	I	PC	10	0	1	9	0		200	300	500
AR 22-32	Building Climatology	III	PC	3	2	0	1	3	100		50	150
AR 22-33	Building Materials & Construction -II	II	BS & AE	4	2	0	2	3	100		100	200
AR 22-34	Theory Of Structures-II	III	BS & AE	3	2	1	0	3	100		50	150
AR 22-35	History of Architecture-II	III	PC	3	3	0	0	3	100		50	150
AR 22-36	Building Services-I (Water Supply & Sanitation)	III	BS & AE	3	2	1	0	3	100		50	150
AR 22-37	Computer Aided Visualization - I	IV	SE	3	0	0	3	0			100	100
TOTAL				**29**	11	3	15		500	200	700	1400

* 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 Climatology to be dedicated for conducting experiments in Building Science lab.

Semester: Third

Course No.	Course Name	L-T-P/D	Credits	Year of Introduction
AR 22-31	**ARCHITECTURAL DESIGN-I**	**0-1-9**	**10**	**2022**

Course Objectives

The Architectural Design I course for students of architecture would,
• Help them to understand space requirements related to human activities and study anthropometric data.
• Introduce concept to the process of design.
• Introduce students to standards and norms related to different functions.
• Introduce students to rules and regulations related to building design.
• Enable them to conceive 3 dimensional forms and establish relation to functional requirements which will result in optimal utilization of space.
• Help them to develop a basic understanding of building materials.

Course Outcome

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

- To develop a basic understanding of space, form, structure and the built environment
- Application of knowledge to initiate architectural design process by using space standards and environmental aspects to formulate concepts and design.
- Analysis and inference through data collection, case studies of projects related to the design project and developing skills so as to create a design programme.

Reference Books

• De Chiara and Callender, Time Saver Standard for building types, McGraw Hill Co.
• Neufert Architect's data, Bousmaha Baiche & Nicholas Walliman, Blackwell science ltd.
• KMBR • Simon Unwin, "Analyzing Architecture", Routledge 2003
• Francis D.K.Ching, "Architecture, Form, Space and Order"; III Edition, John Wiley, 2007
• Leland M.- Roth, "Understanding Architecture: Its Elements- History, and Meaning", Icon Editions, 1993
• Steen Eiler Rasmussen, "Experiencing Architecture", MIT Press 1964
• Peter von Meiss, "Elements of Architecture - From Form to Place", Span Press, 1992
• Bryan Lawson, "How Designers Think", Architectural Press Ltd" London, 1980.

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 small span, single space, single use spaces with simple movement, predominantly horizontal, as well as simple function public buildings of small scale 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, carryout 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.

TOTAL HOURS: 120

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

Semester: Third

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-32	**BUILDING CLIMATOLOGY**	**2-0-1**	**3**	**2022**

Course Objectives

The Building Climatology course for students of architecture would,

- Help students develop an understanding and appreciation of climate and its influence on built form and architecture of a region.
- Equip the students with the competence required to design climate responsive buildings, by providing an understanding of the various climatic zones and the climate responsive considerations in the design of spaces – built-up and open.

Course Outcome

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

- An understanding of the relation of climate to human comfort.
- Awareness about various types of climates and the corresponding design strategies for climate-responsive buildings and spaces.

Text books

- Koenisberger, O. H., Ingersoll, T.G., Mayhew, A. and Szokolay, S.V., Manual of Tropical Housing and Building – Climatic Design, Orient Longman Pvt Ltd, Chennai, 2003.
- Bureau of Indian Standards IS 3792 (1987), Hand book on Functional requirements of buildings other than industrial buildings, (Part I – IV), BIS, New Delhi, 1995.

Reference Books

- Krishnan, A., Szokolay et.al, Climate Responsive Architecture-A Design Handbook for Energy Efficient Buildings, Tata McGraw Hill, New Delhi, 2010.
- Evans, M., Housing Climate and Comfort – Architectural Press, London. (1980).
- Allan, K., Design Primer for hot Climates, The Architectural Press Ltd, London, 1980.
- Givoni, B., Passive and low energy cooling of Buildings, John Wiley and Sons, 1994.
- Markus, T.A. and Morris E. N., Buildings Climate and Energy, Pitman Pub., 1980.
- Fry. M and Drew. J, Tropical Architecture in the Dry and Humid Zones, Londres: Bestford, 1964.
- Giovoni, B., Man, Climate and Architecture, Van Nostrand Reinhold, 1981.
- Kukreja, C.P.,Tropical Architecture, Tata McGraw Hill Pub. Co. Ltd New Delhi, 1978.
- Olgyay, A. and Olgyay, V., Solar Control and Shading Devices, Princeton University Press, New Jersey, 1976.

MODULE I (10 hours)
UNDERSTANDING CLIMATE (12 Hours)
Climate and weather definitions- Elements. Measurement. representation of data- climatic zones – micro and macro climate — global climatic zones characteristics (temperature, humidity, wind, precipitation, etc). Weather Tools to Analyze Climate Data (Climate consultant , Ecotect Etc)

MODULE II (10 hours)
CLIMATE, BODY AND COMFORT
Human body heat balance – comfort in different climatic zones – ET/CET concept and application – comfort indices – bioclimatic chart.

MODULE III (16 hours)
NATURE OF CLIMATE
Heat transfer (concepts, terminology, units) - Hot air, solar gain, K- value, U value, Heat exchange – transmittance, thermal gradient, heat flow concepts, time lag & decrement. Geometry of solar movement – altitude, azimuth, sun path, solar chart, shadow – angles,

Ventilation and air movement – functions, stack effect, air movement through building, humidity. Transmittance of composite walls.

MODULE IV (16 hours)
CLIMATE AND BUILDINGS

Thermal characteristics of building materials and components, structural controls, heat absorptive materials. Vernacular techniques of climatic adaptation. Design for different climatic zones – passive design techniques in built and unbuilt environment.

Climatic design process:
Design of shading devices: Horizontal and vertical shadow angles, Use of shadow angle protractor
Design using wind tunnel, solar scope, heliodone and analysis of 3D analog & digital models using software.

TOTAL HOURS: 54

CONTINUOUS INTERNAL EVALUATION PATTERN:

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: Third

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-33	BUILDING MATERIALS AND CONSTRUCTION II	2-0-2	4	2022

Course Objectives

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

- Introduce the study of building materials (concrete, iron, steel & aluminium), their application and construction methods.
- Knowledge of construction techniques with sustainable building practices.

Course Outcome

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

- Demonstrate an understanding of the basic principles of building construction including the roles of structural systems, building components, and materials.
- Exposure to the common construction techniques used for constructing various components of a building.
- Develop architectural drafting skills for the representation of construction details.

Text books

- Arora S.P. and Bindra S.P., "Text book of Building Construction", DhanpatRai& Sons,New Delhi, 2012.
- P C Varghese, Building Materials, Prentice Hall of India Pvt. Ltd, New Delhi, 2010
- Shetty M.S, Concrete Technology
- Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000.
- Balagopal T.S. Prabhu, "Civil Engineering Drawing Hand book"

Reference Books

- Don A. Watson Construction Materials and Processes McGraw Hill 1972.
- WB Mckay Building construction, Vol 1,2, Longman UK 1981.
- Barry, The Construction of Buildings; Affiliated East West press put Ltd New Delhi1999.
- Neville A M and Brooks J J , Concrete Technology.

MODULE I

CONCRETE (12 hrs)

Ingredients of Concrete: Cement, Fine aggregate, Coarse aggregate, Water, Reinforcement, Various types of concrete and applications.

Process of concreting & concrete construction techniques: Formwork for concrete, Cutting, bending and placing of reinforcement, scaffolding, batching, mixing, placing, compacting, curing.

Properties of concrete: fresh concrete, workability, segregation and bleeding, factors affecting workability & strength, water -cement ratio.

Mix Design of concrete-Understanding concrete mix design, Grades of concrete, PCC & RCC.

Specifications for concreting : CPWD manual, Relevant BIS Codes

Exercise: Concrete - onsite experience – listing out observations and site report

MODULE II

DEEP FOUNDATION (16 hrs.)

Pile foundation: Need for deep foundations, Classification of piles according to function: End

bearing piles, friction piles, screw piles, sheet pile, tension/uplift pile, batter piles, fender piles, sheet piles.
Classification based on materials and composition: Concrete piles, Timber piles, Steel piles, Composite piles
Precast and cast in situ piles, Driven and Bored piles, Cased and uncased cast in situ concrete piles,pressure piles, Under reamed piles, Bored compaction piles. Sand piles, Pile Cap
Caissons: Box caissons, Open caissons & pneumatic caissons,
Timbering and trenching of foundations.
Exercise: Drawings of various types of Pile foundations-Concrete pile, steel pile .(Refer to IS codes)- Site visit & Observations

MODULE III

IRON, STEEL, ALUMINIUM (12 hrs.)
Iron: Forms of Iron used for building construction–Properties and applications in construction.
Steel: Properties , Uses, Anti corrosive measures, mechanical and heat treatment of steel.
Forms of steel used for building construction: steel for reinforcement-Hot rolled bars, Cold rolled steel, TMT bars, Welded wire fabrics. Structural Steel, Stainless steel, Steel alloys, advanced uses of steel.
Aluminium: Properties, applications in construction, available forms- Extrusion, casting, foil, powder & sheet -finishes - anodising, surface texture ,colour coating & painting.
Exercise : Market study - study of standard aluminium steel products and profiles used for building construction .
Refer to relevant BIS codes for the specifications.

MODULE IV

JOINERY, DOORS & WINDOWS (16 hrs.)
Joinery: Wooden joinery details, terms for various members, fasteners and fixtures used in joinery.
Door: Different types of doors and uses. Wooden doors, Steel doors , Aluminium doors PVC doors, glass doors,Solid doors, Flush doors, revolving doors, folding doors, sliding doors, swingingdoors, collapsible doors.
Windows: Aluminium, Steel & UPVC windows - French windows, bay windows, awning window ,and louvered windows - fixed, casement, sliding & pivoting windows.
Drawings: Battened door , slidingdoor details, folding door Aluminium , steel window , Joinery details.

TOTAL HOURS-56

CONTINUOUS INTERNAL EVALUATION PATTERN:

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: Third

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-34	**THEORY OF STRUCTURES**-II	**2-1-0**	**3**	**2022**

Course Objectives

The Theory of Structures II course for students of architecture would help

- To develop an overall understanding of structural behavior of structural elements under various loading conditions.
- To interpret shear force and bending moment diagrams for various types of beams and loading conditions.
- To study the internal stresses (bending and shear stresses) in beams and strength of sections.

Course Outcome

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

- Understand the various structural elements in a building and types of loads acting on it.
- Achieve fundamental knowledge of the sectional properties of various sections.
- Analyze different types of beams with different loading conditions.

Text books

- S.S Bhavikkatti, Strength of materials, New Age International Publishers
- R.S. Khurmi, Strength of materials, S. Chand & Company Ltd, New Delhi
- R. K. Banzal., Strength of Materials, Lakshmi Publications Pvt. Ltd., New Delhi
- S. Ramamrutham., Strength of Materials, Dhanpat Rai Publishing Company Pvt. Limited

Reference Books

- F.V. Warnock, Strength of Materials, Sir Isaac Pitman Sons Ltd.
- E.P. Popov, Mechanics of Materials, SI Version, Prentice Hall, India
- William. A. Nash, Strength of Materials, SI Version, Schaum's Out line Series
- S. S. Bhavikkatti, Structural Analysis Vol. I, Vikas Publishing House Pvt. Ltd.
- Ramamrutham S. and R. Narayan, Theory of Structures, Dhanpat Rai Publishing Co., 2012
- R. K Bansal., Strength of Materials, Lakshmi Publications Pvt. Ltd
- M. M. Ratwani & V.N. Vazirani, Analysis of Structures, Vol. 1, Khanna Publishers – Delhi, 1987.
- Timoshenko, S. P. and D. H. Young, Elements of Strength of Materials, Fifth edition, East West Press, 1993

MODULE I (12 hours)

- Beams - different types. Types of loading on beams.
- Concept of bending moment and shear force, Sign convention
- Shear force and bending moment diagrams of cantilever beams, simply supported beams and overhanging beams for different type of loads (Point load, uniformly distributed load, Moment). Point of contra flexure.
- Relationship between intensity of load, shear force and bending moment.

MODULE II (12 hours)

- Theory of simple bending, Derivation of equation, assumptions and limitations.
- Calculation of normal stress in beams, moment of resistance
- Variation of bending stress across the cross section, Maximum bending stress, section modulus, moment of resistance. Beams of uniform strength, bending of composite beams – simple problems

MODULE III (10 hours)

- Shear stress in beams – derivation of equation.
- Variation of shear stress across the cross section.
- (Derivation required for rectangular, circular and triangular sections only)
- Stress on inclined planes for axial and bi-axial stress fields, principal stresses, Mohr's circle of stress, principal stresses. (Concept only).

MODULE IV (14 hours)

- Differential equation of the elastic curve
- Slope and deflection of beams by method of successive integration,
- Slope and deflection of beams by Macaulay's method,
- Slope and deflection of beams by moment area method.
- Deflection of beams by strain energy method -application to simple beams. (Only concentrated load, uniformly distributed loads required)

TOTAL HOURS: 48

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

Semester: Third				
Course No.	**Course Name**	**L-T-P/S**	**Credits**	**Year of Introduction**
AR 17-35	**HISTORY OF ARCHITECTURE II**	**3-0-0**	**3**	**2022**

Course 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 organization, scale, compositional organization, Architectural vocabulary and design grammar.

Course Outcome

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

- Identify major typologies, characteristics and forms of Islamic architecture.
- Identify major succeeding dynastic periods together with principal monuments and their main stylistic features.

Reference Books

- Percy Brown , 'Indian Architecture (Islamic Period)' ,D.B. Taraporevala Sons & Co. Private Ltd., Bombay, 1997.
- Satish Grover , 'Islamic Architecture in India', CBS Pub, New Delhi, 2002
- Banister Fletcher, Dan Cruickshank Sir Banister Fletcher's a History of Architecture, Architectural Press, 1996
- Christopher Tadgell , 'The History of Architecture in India', Phaidon Press Ltd, 1994.
- John Julius Norwitch : Great architecture of the world
- Stephen Gardiner: Introduction to architecture
- Henri Sterlin : Encyclopedia of world Architecture

MODULE I - (12 Hours)

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 Palace.

Morocco -King Hassan II Mosque, Casablanca.

MODULE II - (10 Hours)

Beginning of Islamic Architecture in India; Islamic Architecture in Delhi (Imperial Style)

Mamluk Dynasty -Quwat-ul-Islam mosque, Qutb Minar, Sultan Ghari, Tomb of Iltumish, 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 Mazjid. **Sayyid and Lodi Dynasty**-Tomb of Mubarak Shah, Tomb of Mohamed Sayyid, Garden tomb of Sikander Lodi , Bara Khan ka Gumbad, Chota Khan ka Gumbad, Shish Gumbad, Bara Gumbad.

MODULE III - (10 Hours)

Provincial styles:

Punjab -Tomb of Shah Rukhn-I-Alam.

Jaunpur -Atala Masjid, Jami 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.
Deccan - Charminar at Hyderabad, Tomb of Golconda.
Bijapur - Jami Masjid, Golgumbaz.

MODULE I V- (10 Hours)
Evolution of Mughal style and the contributions during the different eras of rule:
Early period:
Babar- Jama Masjid, Sambhal; Humayun- City of Din Panah; **Sher Shah**- Qila Kunha Masjid, Sher Shah's Tomb
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).
Aurangazeb -Tomb of Rabi Durrani at Aurangabad, Moti Masjid at Delhi fort.

TOTAL HOURS: 42

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: Third

Course No.	Course Name	L-T-P/D	Credits	Year of Introduction
AR 22-36	BUILDING SERVICES-I (WATER SUPPLY AND SANITATION)	2-1-0	3	2022

Course Objectives

The objective of the course is to help students to develop an understanding of thefundamentals of water supply and sanitary engineering - students will learn aboutsources of water, water treatment, waste water treatment, solid waste management, etc.

Course Outcome

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

- Understand about demand, consumption, sources, treatment and distribution of water.
- Acquire knowledge about treatment and disposal of wastewater, and solid-waste management.

Text books

Modi, P. N., Sewage Treatment and Disposal and Wastewater Engineering, Standard BookHouse, New Delhi,2008.

Birdie, G. S., and Birdie, J. S., Water Supply and Sanitary Engineering, Dhanpat Rai andSons, New Delhi,2007.

Garg, S. K., Environmental Engineering, Vol. II, Khanna Publications, New Delhi, 2009. Duggal, K. N., Elements of Environmental Engineering, S Chand and Co. Ltd., New Delhi,2008.

Reference Books

Mark J. Hammer and Mark J. Hammer Jr., Water and Waste Water Technology, PrenticeHall of India Pvt. Ltd.New Delhi, 2009.

Ernest W. Steel and Terence J. Mc Ghee, Water Supply and Sewerage, McGraw Hill, NewYork, 1991.

Ehlers, V. M. and Steel, E. W., Municipal and Rural Sanitation, McGraw Hill, 2009.

Fair, Geyer and Okun, Water and Wastewater Engineering, John Wiley and sons, Inc., 2010Metcalf and Eddy, Wastewater Engineering Treatment, Disposal and Reuse, Tata McGraw Hill, 2007.

Kiely, G., Environmental Engineering, McGraw Hill, McGraw Hill, 2009.Relevant BIS Codes.

MODULE I (8 hours)

Water

Water Supply Engineering – Quantity of water, types of water demand, fluctuationin demand, factors affecting consumption

Forecasting population – design period.

Sources of water – surface water sources, intakes, ground water sources.

Quality of water – drinking water standards – physical, chemical and bacteriological analysis of water.

MODULE II (16 hours)

Water treatment

Treatment of water – aeration, coagulation, flocculation, sedimentation, filtration, disinfection.

Miscellaneous and advanced treatment methods:
removal of iron and manganese, fluoridation and de- fluoridation, water softening, arsenic removal, desalination, membrane filtration.

Transmission of water
Types - gravitational, pumping and combined schemes.
Lay out of distribution networks, intermittent and continuous systems of distribution

MODULE III (12 hours)

Wastewater
Systems of sanitation, types of sewerage systems, components of a sewerage systems, Wastewater characteristics

Wastewater treatment
Preliminary treatment of wastewater – screens, grit chamber, detritus tank, sedimentation tank.
Biological treatment - Activated sludge process, Trickling filter, Oxidation Pond.

Wastewater disposal
disposal into land, water bodies - stream, ocean -disposal by irrigation. Septic tank and soak pit.

MODULE IV (12 Hours)

Sewage collection from houses and building
General principles governing the design of a sanitary plumbing system
Functions and types of traps used in sanitary plumbing systems
systems of plumbing (4 types)
sanitary fittings and other accessories

Disposal of municipal solid waste
Solid waste management - collection, transportation and segregation of MSW, recycling.
Disposal of MSW - sanitary land fill, incineration, composting.

Understanding of service drawings. Site visit with documentation in the form of sketches/drawings and photos

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 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: Third

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-37	COMPUTER AIDED VISUALIZATION-I	0-0-3	3	2022

Course Objective

- Enable learning of CAD software by doing graded exercises
- Help them to understand various CAD Commands – creating two dimensional drawings and editing commands.
- Help in the preparation of hardcopy of drawings using normal architectural scales.
- Help them in creating 3D of buildings using Sketchup

Course Outcome

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

- Achieve an understanding of CAD software for preparing two-dimensional drawings.
- Create 3D architecture forms

Reference Books

Omura George, "Mastering AutoCAD, BPB Publications, New Delhi

- AutoDesk AutoCAD Manual
- Kolareric Branko, Architectural Rendering and Modelling with AutoCAD, John Wiley, New York, 1998.
- Synder James, Architectural Construction Drawings with AutoCAD, John Wiley, New York, 1998

MODULE 1 (35 hours)

All commands needed for the preparation of drawing Plan, Elevation and Section in Autocad

- Revision of basic commands
  (Commands- Units, Line, Polyline, Circle, Rectangle, Arc, Spline, Hatch, Extension line, Limits, LTscale, Measure, pan, zoom, Move, Copy, rotate, Stretch, Extend, Mirror, Offset, Array, Trim, Break, Linetype, Text, Mtext, Dist, Area, fillet, Redraw, Regen, Purge, Flatten)
- Creation and importing of blocks into AutoCAD
- Coordinate system-UCS, WCS
- Understanding layers and usage of CTB for doing drawings with proper gradation
- Dimensioning- Linear, Angular, Radial
- Model space & Paper space, To setup sheet in paper space, Incorporating title block and setting sheet layout
- Plotting

Exercises

1. Starting up - Drawing I- Measured drawing (plan and section) of a room.
2. Architectural Drawing II- Drawing Plans using layers, sections and elevations of Residence design project, setting the drawings in sheet using layout.

MODULE 2 (25 hours)

3D Modelling using Sketchup

- Importing 2D Plan from AutoCAD
- Setting up Scale and Units

- Basic commands- Push/Pull, Paint bucket, Move, Rotate, Scale, Measure, Introduction to basic tools-line, eraser, circle, rectangle, arc,
- Importing additional blocks, components etc. (window, doors, trees, furniture's)
- Application of materials
- V-ray/other Plugins for rendering

Exercises

1. Starting up – Basic 3d model of a house with application of materials, windows, doors, landscaping etc.
2. 3D Rendering using V-Ray - of the same project

Other Suggested Projects for the lab:

1) Graded exercises - measured drawing, site plan, Component details. Lettering, dimensioning & Layering standards.
2) Preparation of drawings in layers & layouts.
3) Municipal drawing preparation for a medium-sized residence.
4) Starting up- Preparing drawing with layer system, CTB & Creating hatch patterns, Importing /exporting files

TOTAL HOURS: 60

CONTINUOUS INTERNAL EVALUATION PATTERN:

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

FOURTH SEMESTER												
Course Code	**Subject**	**Group**	**Category**	**Credits**	**Hours Per Week ****			**Duration of Exam**	**Marks**			
					L	**T**	**P/S**		**W**	**J**	**C.A.**	**Total**
AR 22-41	Architectural Design-II *	I	PC	10	0	1	9	0		200	300	500
AR 22-42	Site Analysis & Planning	I	PC	3	2	1	0	3	100		50	150
AR 22-43	Building Materials & Construction - III	III	BS & AE	4	2	0	2	4	100		100	150
AR 22-44	Theory Of Structures-III	III	PC	3	2	1	0	3	100		50	150
AR 22-45	History of Architecture-III	III	BS & AE	3	3	0	0	3	100		50	150
AR 22-46	Building Services-II (Lighting & Electrical Services)	I	PC	3	2	1	0	3	100		50	150
AR 22-47	Computer Aided Visualization - II	IV	SE	3	0	0	3	0			100	100
TOTAL				**29**	11	4	14		500	200	700	1400

* 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.

** Two hours per week allotted to Library

Note:

One Hour Practical time of Site Analysis and Surveying to be earmarked for survey practical.

One Hour Studio time of Building Services to be dedicated in teaching the application of Building Services in the previous year design problem.

Semester: Fourth

Course No.	Course Name	L-T-P/D	Credits	Year of Introduction
AR 22-41	**ARCHITECTURAL DESIGN-II**	**0-1-9**	**10**	**2022**

Course Objectives

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

- To create a holistic understanding of the socio-cultural, geographic and economic aspects that shapes the built environment
- To expose students to the methodology of conducting various surveys covering physical, visual characteristics and demographic aspects.
- To introduce concept to the process of design.
- To understand the climatic and topographic aspects related to the site and how they influence the design.
- To undertake a comprehensive study of a building/settlement/ or part of an urban area that is an example of design evolved organically over a period of time.
- To emphasis the importance of designing built form and open spaces that meet the aspirations of the community.

Course Outcome

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

- Achieve an understanding of design as a response to context and program and develops a holistic approach to design.
- Develop skills to create architectural solutions for simple problems with a thrust on evolution of concepts and response to site and climatic challenges.

Reference Books

- Julius Panero, Martin Zelnik, “Human Dimension and Interior Space”, Whitney Library of Design, 1975 Ramsey et al, “Architectural Graphic Standards”, Wiley, 2000 Kevin Lynch, “Site planning”, MIT Press, Cambridge, 1984 Sam F. Miller, “Design Process: A Primer for Architectural and Interior Design”, Van Nostrand Reinhold, 1995
- Francis D. K. Ching, 'Architectural Graphics', Wiley, 2009 Francis D. K. Ching, ‘Architecture: Form, Space and Order’, John Wiley & Sons, 2007
- Simon Unwin, ‘Experiencing Architecture’, Routledge, 2003
- Simon Unwin, ‘An Architecture Notebook’ Routledge, 2000 Geoffrey Broadbent, ‘Design in Architecture’ John Wiley and Sons, 1973
- Simon Unwin, ‘Doorway’, Routledge, 2007

Projects: Two projects - one minor and one major - shall be completed during this semester and these are to address context in terms of topography, site and built elements.

Major Project

A detail study of any rural settlements, or any vernacular settlements needs to be undertaken to understand basic aspects of human built environment. The study should include

- The interrelationship between built form and society will be studied, understood and established, starting from either end as required.

- Study of specific modes of rural/vernacular/traditional architecture including their morphology, local materials and construction techniques, details, meaning, etc., will be done

to give an insight into the particulars and universals of architecture.

- Appropriate tools and processes can be used to aid the understanding. These include different methods of historical and socio-cultural study, oral history, discussions, information collection, surveys, maps, perceptual sketches, documentation through drawings, demographic study, assimilation and analysis.

- Transformations across time need to be traced to understand constants and dynamics in human society. They will also be critically evaluated through discussions with experts. Rising from this, future changes can be projected/ envisaged and if found required, policy and physical interventions can be suggested/ explored.

Minor Project

- The physical interventions necessary which are found in the major project will be taken up as design situations. This could range from individual to community level and involve any aspect of the physical environment (including building projects) as the situation/viewpoint warrants.

- If the context does not warrant a building need, a small community oriented building design will be given as a separate project in addition to the major project. For building projects, the scale and complexity of planning and construction usually involved will be simple - small or medium span, ground plus two storeyed maximum, simple horizontal and vertical movement, simple/ local materials and construction, passive energy.

Process and deliverables:

Students should conduct data collection from various reference books, study the context, conduct relevant case studies; carry out detailed site analysis before attempting design. Formulation of a detailed design brief, evolution of concept shall be part of the architectural programming. Handmade sketches, manual drafting and scaled study models shall be made part of the design process. Deliverables shall be manually/digital drafted presentation drawings including free hand perspectives, graphical representation of concept, scaled models etc.

TOTAL HOURS: 160

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

Semester: Fourth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-42	SITE ANALYSIS & PLANNING	2-1-0	3	2022

Course Objectives

- To understand the importance of site in architectural design whereby the relationship between the built and the un-built environment and principles of site planning is established.
- To analyse ecological and geomorphological characteristics of a site which govern the siting of a building or group of buildings in a given site.
- To teach various techniques of site analysis through exercises and case studies.

Course Outcome

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

- Learn various terms involved in site planning and their relevance in design of buildings of varying scales
- Understand various parameters that need to be considered in site analysis and its implications on site
- Evaluate the consequences of interventions in a site at micro and macro scales
- Apply the principles of site planning learnt in real/ studio projects

Text books

- Kevin Lynch, 'Site Planning', MIT Press, Cambridge, MA. 1957.
- White T. Edward, 'Site Analysis: Diagramming Information for Architectural Design', Architectural Media Publisher, 1983
- James A La Gro, Site Analysis, Informing Context Sensitive and Sustainable Site Planning and Design, John Wiley and Sons, 2013

Reference Books

- John Ormsbee Simonds, 'Landscape Architecture: A manual of Site Planning and Design', McGraw Hill, 1961. • McHarg, lan, 'Design With Nature', Wiley Series in Sustainable Design,1995
- Joseph De Chiarra and Lee Coppleman, 'Planning Design Criteria', Van Nostrand Reinhold Co., New York, 1988.
- Thomas H. Russ, 'Site Planning and Design Hand Book', Pearson Education, 2002.
- Christopher Aalexander et.al., A Pattern Language: Towns, Buildings, Construction (Center for Environmental Structure Series),2015

MODULE I (10 hours)

Site Surveying

Introduction: Importance and principles of Surveying.

Chain surveying, Compass surveying, Theodolite surveying, Plane table surveying

Levelling: levelling instruments-temporary and permanent adjustment of dumpy and tilting level-Height of instrument method, Rise and fall method

Introduction to modern surveying equipment's:

UAV Drone, Total Station, GPS, Distomat, Digital Levels and Auto-Levels Electromagnetic distance measurement (EDM) - Principle of EDM ,Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey.

Exercise 1: Computation of height, distance and area using Total Station

Exercise 2: Determination of elevation of points on ground by differential levelling

MODULE II (20 hours)

Site Analysis

Importance of site analysis - On site and off-site factors - Analysis of natural, cultural and aesthetic factors – topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available - sources of water supply and means of disposal system, visual aspects, visual analysis

Preparation of site analysis diagram. Study of contours: slope analysis - grading process - grading criteria - functional and aesthetic considerations.

Environmental consideration, Site Analysis tools and Techniques

Exercise: Preparation of Slope analysis, Relief map and drainage map for Contour Site

MODULE III (20 hours)

Site Planning

Definition of plot, site, land and region, units of measurements.

Objective of Site Planning, Site Planning Process, Design and management of site, Site Planning and Site Layout Principles

Site Context: Impact of proposed development on surrounding- aspects such as increase in traffic, noise and pollution to surroundings, Environment impact assessment, study through notable examples

MODULE IV (10 hours)

Site design guidelines for Pedestrians- Open space requirements- Playground design-seating.

Street and Parking design: Organization of vehicular and pedestrian circulation, types of roads, hierarchy of roads, networks, road widths and parking, regulations. Turning radii and street intersections

Site Grading- Balancing Cut and Fill- measures to minimize impact of site grading- grade changes- site stabilization techniques- slope stability- retaining walls- erosion and sediment control

Storm water management- swales- detention and retention basins-

Gray water systems- sanitary sewers- on site sewage disposal systems-sewage treatment plants

Exercise: Preparation of parking area plan in a master plan, making dimension, turning radius for various vehicles, marking detail levels and incorporating storm water drainage solutions.

TOTAL HOURS: 60

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: Fourth

Course No.	Course Name	L-T-P/S	Credits	Year of introduction
AR 22-43	BUILDING MATERIALS AND CONSTRUCTION III	2-0-1	3	2022

Course Objectives

The objectives of Building materials and construction III course for students of architecture include,

- Understanding the fundamental principles of architectural construction.
- Developing technical skills in the design and implementation of floor systems, roof systems, wall systems, and vertical transportation systems.
- Familiarizing oneself with the various types of materials and systems used in construction, such as concrete, steel, wood, glass, and masonry, and learning how to select and combine them effectively to achieve the desired performance and appearance.

Course Outcome

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

- Comprehend the application of various building components and their construction.
- Understand the principles of structural engineering and learn about the different materials and methods used in construction and how to analyze and design structural systems.
- Achieve proficiency in technical drawing and detailing.

Text books

- Arora S.P. and Bindra S.P., "Text book of Building Construction", Dhanpat Rai & Sons, NewDelhi, 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.
- Balagopal T.S. Prabhu, "Civil Engineering Drawing Hand book"

Reference Books

- Don A. Watson Construction Materials and Processes McGraw Hill 1972. WB Mckay Building construction, Vol 1,2, Longman UK 1981.
- Barry, The Construction of Buildings; Affiliated East West press put Ltd New Delhi 1999. RC Smith & TL Honkala, 'Principles and Practices of Light Construction', Prentice Hall,Englewood Cliff, 1986.
- Relevant BIS codes.

MODULE I

WALL SYSTEMS (15hrs)

Concrete System: Lintels and sunshades, concrete columns, concrete walls, concrete arches.

Masonry System: Masonry walls unreinforced and reinforced, solid walls and cavitywalls, masonry columns and pilasters.

Steel System: Structural steel framing, steel columns, light gauge steel studs, balloon framing.

Wooden System: Wood stud framing, stud wall sheathing, wood columns, woodpost and beam framing.

Partition wall systems.

Drawings: RCC lintel and sunshade with material specifications,
Cavity wall details.

MODULE II

FLOOR SYSTEMS (15 hrs.)

Concrete floor system: One-way slab, One way joist slab, Two-way slab, Two-way slab and Beam.

Steel floor system: One-way beam system, Two-way beam system, Triple beam system, Semi rigid connections, Open- web steel joists, Metal decking, Light-gauge steel joists.

Wood floor system: Wood joists, Wood joist framing, wood beams supports and connections,plank and beam framing.

Exercise : Site visits and field observations- concreting, steel structural framing
: Beam and slab details with material specifications - one way slab, two way slab
: RCC column detail

MODULE III

ROOF SYSTEMS (15hrs.)

Roof design -Basic roof types: Flat roof, Sloping roof and Curved roof, deciding the slope or curvature of roof , roofing materials -thatching, tile roofing, G.I & Aluminium sheets ,FRP and RMP sheets ,green roofing, roof drainage systems.

Roof framing and truss design -Wood trusses: Different types of trusses, King post truss, Queen post truss, Howe truss , Fink truss, Pratt truss, Bowstring truss, North light truss.

Short span structures, Medium span structures ,Large span structures-Introduction to Space frames, Composite roof Systems, shell structures, folded plates.

Drawings: Truss – King post truss, Queen post truss, Steel angular truss, roof covering and gutter details.

MODULE IV

VERTICAL TRANSPORTATION SYSTEMS (15 hrs)

Planning of vertical transportation systems – design parameters.

Ramps: Planning of ramps, slope, finishes, safety precautions.

Stairs: Planning staircases - Standards, rules and regulations. Components of stairs, Support conditions like inclined slab, cranked slab, cantilever. Stair plans-stairs with straight, circular and curved flights. Construction details of Wood stair, fire escape stairs, Concrete stair, Steel stair and Composite stair.

Elevators: Planning and grouping of elevators,Elevator design parameters. Different types of elevators – passenger elevators, observation elevators, hospital elevators and freight elevators. Construction details – lift shaft, lift pit, machine room etc.

Escalators: Planning and details of escalators and travelators.

Exercise: Analyis :Standards, rules & regulations of ramps, elevators, staircases, escalators from Kerala Building Rules and NBC.

Drawings : Wooden stair, RCC stair, Steel Stair, Composite stair..

TOTAL HOURS-60

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: Fourth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-44	THEORY OF STRUCTURES-III	2-1-0	3	2022

Course Objectives

The Theory of Structures III course for students of architecture would help them

- To understand torsion in shafts, structural behavior of columns and struts.
- To understand the concept of indeterminate structures and the various methods of analysis of such structures.

Course Outcome

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

- Describe shear force, bending moment in beams and frames.
- Achieve an understanding about various methods involved in analysis of indeterminate structures.
- Discuss the way in which stress and strain impacts beams and columns.

Text books

- S.S Bhavikkatti, Strength of materials, New Age International Publishers
- Rajasekharan S. and Sankarasubramanian G., EngineeringMechanics- Statics and Dynamics, Vikas Publications, NewDelhi
- R. K. Banzal., Engineering Mechanics, Lakshmi Publications Pvt. Ltd., NewDelhi
- R. K. Banzal., Strength of Materials, Lakshmi Publications Pvt. Ltd., New Delhi
- Bhavikkatti S. S., Engineering Mechanics, New Age International Publishers
- S. Ramamrutham., Strength of Materials, Dhanpat Rai Publishing Company Pvt Limited

Reference Books

- R Junarkar S. B. and Shah S. J., Mechanics of Structures (Vol. I), 30/e, Charotar Publishing House Pvt. Ltd., New Delhi, 2012
- Junnarkar S. B. and H. J. Shah, Mechanics of Structures, Vol – II, 23/e, Charotar Publishing House, 2013.
- Punmia B. C., A. K. Jain and A. K Jain, Theory of Structures (SMTS- II), Laxmi Publications Pvt. Ltd., 2004.
- Ramamrutham S. And R. Narayan, Theory of Structures, Dhanpat Rai Publishing Co., 2012
- M.M. Ratwani & V.N. Vazirani, Analysis of Structures, Vol. 1, Khanna Publishers – Delhi, 1987.
- Timoshenko, S.P. and D.H. Young, Elements of Strength of Materials, Fifth edition, East West Press, 1993.

MODULE I (12 hours)

- Torsion of circular and hollow shafts, power transmission.
- Axial loading of short strut, Long columns, Euler's formula, Rankine's formula,

MODULE II (12 hours)

- Determinate and Indeterminate beams.(Static Indeterminacy)
- Consistent deformation method – fixed and propped cantilever , Shear Force Diagram Bending Moment Diagram

MODULE III (14 hours)

- Analysis of continuous beams using Three moment theorem Shear Force Diagram – Bending Moment Diagram, Support settlement case. (derivation not required)
- Introduction to slope deflection method-simple beams only (settlement case not required.)

MODULE IV (10 hours)

- Moment distribution methods – shear force and bending moment diagrams of beams (Simple cases) , shear force and bending moment diagrams of frames (Non-sway only.)

TOTAL HOURS: 48

UNIVERSITY EXAMINATION PATTERN

Q I - 8 short type questions of 5 marks, 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.

Semester: Fourth

Course No.	Course Name	L-T-P/S	Credits	Year of Introduction
AR 22 - 45	HISTORY OF ARCHITECTURE – III	3-0-0	3	2023

Course Objectives

- To provide awareness about the development of architecture in the Ancient Western World and the cultural and contextual determinants that produced that architecture.
- To study the influences of events which have led to the outcome of styles such as Romanesque, Gothic & Renaissance and their architects in Italy, France and Britain comprehending the rich vocabulary of forms & shapes and structural systems.

Course Outcome

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

- Acquire knowledge to identify the common characteristics among the monuments of a particular style.
- Ability to recognize the role of technology and material in development of structure, ornament & detail, form & iconography in architecture across different contexts.

Reference Books

- Sir Banister Fletcher's –"A History of Architecture", Architectural Press, 1996.
- Louis Grodecki–"Gothic Architecture", Rizzoli,1991 History of World Architecture (Series),
- Vols. Titled "Ancient Architecture, Primitive Architecture, Greek Architecture, Roman Architecture and Byzantine Architecture", 1980.
- Kenneth Frampton : Modem Architecture -A Critical History "Builders of Ancient World", A National Geographic Society Publication, 1986.
- Raeburn Michael, "Architecture of the Western World", Popular Press, England, 1988.
- John Julius Norwich: Great Architecture of the World.
- Stephen Gardiner : Introduction to Architecture Monographs of Modem Architects.
- Henri Sterlin : Encyclopedias of World Architecture

MODULE I (8 hours)

Introduction to society and culture of 400 -1150 AD in Europe;

Early Christian Architecture: Evolution of Church form, surface treatment and materials of construction, Old St. Peters Basilica.

Byzantine Architecture: Greek cross and Latin cross plans, Technique adopted to construct domes, surface treatment and material of construction. Pendentive sand Squinch arch construction, e.g., Hagia Sophia, St.Marks Venice.

MODULE II (10 Hours)

Romanesque Architecture: Design evolution - Development of Romanesque architecture from Early Christian architecture, Planning principles and structural details of Romanesque architecture.

Types: Italian Romanesque architecture (Pisa Cathedral Complex), French Romanesque (Abbey-Aux-Hommes at Cane) British Romanesque (Durham's Cathedral).

Module III (12 hours)

Introduction to society and culture of 1150 –1350 AD in Europe.

Gothic Architecture: Evolution of structural systems in Gothic Architecture –pointed arches, ribbed vaults, flying buttress, pinnacles etc;

Types: French Gothic Architecture (Notre Dame (Reims Cathedral), Paris) British Gothic Architecture (West Minister Abbey, Salisbury Cathedral) Italian Gothic Architecture (Milan Cathedral)

Module IV (12 hours)

Renaissance Architecture: Introduction of different styles existed in renaissance period, to society and culture of 1400 -1800 AD. The Idea of rebirth and revival of Art, Architectural character during Renaissance period.

Division of Renaissance architecture into Early, Mature and Late periods. Structural contributions - Ribbed dome, Lantern dome.

Italian renaissance -St.Peters Rome, Florence Cathedral; Works of Brunelleschi, Alberti, Bramante and Michael Angelo;Palaces and Villas; Palladio's contribution – Villa Rotunda.

French renaissance: Palace of Louvres, Paris de Versailles.

British renaissance: St. Paul's Cathedral, London; White Hall Palace, London; Contributions of Inigo Jones and Christopher Wren.

TOTAL HOURS: 42

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: Fourth

Course No.	Course Name	L-T-P/D	Credits	Year of Introduction
AR 22-46	BUILDING SERVICES-II (LIGHTING & ELECTRICAL SERVICES)	2-1-0	3	2022

Course Objectives

To introduce students to electrical services and illumination and to sensitize them with respect to their integration into Architectural Design.

Course Outcome

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

- Understand about the fundamentals of electrical services in buildings.
- Acquire Knowledge about the Indian Electricity Rules.
- Know about the present trends in lighting practices.

Textbooks

- Electrical Technology – H. Cotton
- Electrical wiring, Estimating and Costing - L .Uppal
- Electrical Wiring, Design and Estimation – Raina & Bhattacharya
- Electrical systems for Architects - Aly. S. Dadras
- Simplified design of building lighting - Marc Schiler
- National Electrical Code
- Lighting Manual

MODULE I (12 hours)

Introduction to electrical services, commonly used terminology. Supply and distribution of electricity to buildings – familiarization with Substations and components like High Tension and Low Tension Panels and switchgear, transformers, captive power plants – electrical system in multi storied commercial and industrial buildings, apartments, hospitals etc.

MODULE II (16 hours)

Distribution systems, underground and overhead - Cabling systems, surface and concealed wiring systems, PVC and metal conduits, casing and capping system. Panel boards, switches, distribution boards. Earthing systems and protective devices such as fuses, MCB's, MCCB's, ELCB's etc. –lightning protection - safety standards and IS codes. Introduction to Indian Electricity Rules.

Exercise: Understanding of service drawings. Site visits with documentation in the form of sketches/ drawings/ photos. Design of electrical layout for buildings of small scale through drawings.

MODULE III (16 hours)

Commonly used terminology in illumination – laws of illumination – measurement of luminous flux and lux meter. Ambient, task and accent lighting – direct and indirect luminary systems. Natural lighting – use of daylight – concept of day light factor. Atrium lighting – methods and uses. Energy efficient lighting system.

MODULE IV (16 Hours)

Sources of illumination – point source – row lighting, area illumination – evaluation of total flux – colouring

aspects of lamps – linear and surface sources of illumination – common luminaries – incandescent, fluorescent/CFL, HID's, MV, SV lamps etc. Criteria and standards for different purpose/activity illumination - flood lighting, functional buildings like hospitals, sports stadia, swimming pools and underwater luminaries – street lighting, commercial display lighting. Lighting simulation and performance analysis using software.

Exercise: Design exercise involving lighting design for appropriate projects of simple scale through choice, calculations, layout, drawings, simulations, physical models.

Total Hours: 60

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: Fourth

Course No.	Course Name	L-T-S-P/D	Credits	Year of introduction
AR 22-47	COMPUTER AIDED VISUALIZATION-II	0-0-3	3	2022

Course Objective

To equip the students to acquire enough skills in Autodesk Revit and to gain confidence in them for using digital media for preparation of drawings and 3D views.

Course Outcome

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

- Prepare all necessary drawings for a project using software along with 3D views.

Reference Books

- Revit Manual
- Autodesk Revit for Architecture Certified User Exam Preparation (Revit 2024 Edition)

MODULE 1

- Introduction to Autodesk Revit Architecture
- Starting an Architectural Project
- Navigation Tools, Configuring Global Settings, Creating Walls, Creating Architectural Walls
- Using Basic Building Components-I-Adding Doors, Adding Windows and Wall Openings
- Using the Editing Tools, Working with Selection Sets
- Editing Tools - Grouping Elements, Retrieving Information About Elements
- Working with Datum Planes and Creating Standard Views, Working with Levels, Working with Grids, Working with Reference Planes and Work Planes, Controlling the Display of Elements, Working with Project Views
- Using Basic Building Components-II - Creating Floors, Creating Roofs, Shape Editing Tools, Creating Ceilings, Adding Rooms
- Using Basic Building Components-III -Working with Components, Adding Stairs, Adding Railings and Ramps, Creating Curtain Walls
- Adding Site Features- Working with Site Features, Property Lines and Building Pads, Adding Site Components
- Using Massing Tools- Understanding Massing Concepts, Creating Massing Geometry in the Family Editor, Editing Massing Geometry in the Family Editor, Massing in the Conceptual Design Environment, Creating Massing Geometry in a Project, Creating Building Elements from Massing Geometry, Creating Families
- Adding Annotations and Dimensions -Adding Tags, Room Tags, Keynotes, Adding Symbols and Dimensions, Dimensioning Terminology and Dimensioning Tools, Adding Alternate Dimension Units and Spot Dimensions
- Creating Project Details and Schedules- Project Detailing in Autodesk Revit Architecture, Crop Regions, Fills Patterns, and Detail Components, Adding Text Notes, Creating Drafting Views, Revision Clouds, Working with Schedules

- Creating Drawing Sheets, and Plotting, Creating Drawing Sheets, Creating Duplicate Dependent Views, Printing in Revit Architecture
- Creating 3D Views- Three Dimensional (3D) Views, Dynamically Viewing Models with Navigation Tools, orienting a 3D View, Generating Perspective Views, Using a Section Box
- Rendering Views and Creating Walkthroughs- Rendering in Revit Architecture, Working with Materials, Lights, Decals and Entourage, Rendering Settings o Creating a Walkthrough, Autodesk 360 | Rendering

PROJECTS

- To make all the drawing for a chosen building type (apartment, commercial building etc.) which has minimum 4 floors.
- Preparing complete set of drawing for a building including all floor plans, sections, sectional views, details, 3D views, and walkthrough

TOTAL HOURS: 60

CONTINUOUS INTERNAL EVALUATION PATTERN:

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