DEPARTMENT OF ARCHITECTURE

SYLLABUS

SEMESTER 1

23ARD101	BASIC DESIGN	L	T	P	S	C	Year of Introduction
		0	0	8	8	8	2023

Preamble:

The primary objective of this course is to familiarize students with their imaginative thinking and creativity and understand form, proportion, scale, etc. This also includes introduction to primary elements and basic principles of design, space articulation, and the use of drawing as a communication tool for design information.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Understand and gain a fundamental knowledge of design, its elements, and principles.
CO2	Judge proportion, scale, and spatial relationships, understand principles of visual composition through field observation, anthropometrics, and experiment with them.
CO3	Develop ability to assemble simple spatial elements in articulated constructs or design of an objector space and visually represent them through hand-made 2D drawings and 3D models.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
CO4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Review 1	Review 2	
Remember			
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze	✓	✓	✓
Evaluate	✓	✓	✓
Create	✓	✓	✓

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Studio [P]	Total Marks
		Assignments Or reviews	
	10	90	**100**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
200	100	100	**Jury**

End Semester Examination [ESE]: ESE will be the portfolio evaluation by a panel of jury.

SYLLABUS

MODULE I: Introduction to basic elements and principles of design

Elements and Principles of design and their application in the design of spaces and forms.
Exercises: 2D and 3D compositions demonstrating elements and principles of design.

MODULE II: Study of Forms

Solids and Voids, Planar, Fluid and Plastic Forms. Study of linear and Planar forms using simple material like Mount Board, metal foil, box boards, wire string, thermocol etc., Study of Solids and voids to evolves sculptural forms and spaces and explore the play of light and shade and application of color, Study of fluid andplasticformsusingeasilymoldablematerialslikeclay,plasterofparisetc.Studyoftextur eandschemesoftextureboth applied and stimulated and their application, Analytical appraisal of building form in terms of visual character, play of light and shade, solids and voids etc.

MODULE III: Parameters of design, anthropometrics, human activity, and the use of space

Parameters of design, anthropometrics, human activity and the use of space: Anthropometric studies – average measurements of human body in different postures, its proportion and graphic representation, application in design of simple household and street furniture. Basic human functions and their implications for space requirements.
Minimum and optimum areas for various functions.

MODULE IV: Abstraction to Product Design

Abstraction to Product Design: Studying/analyzing manmade and natural forms/objects and copying or abstracting patterns and using the same to generate design for a product like chair, lampshade, pen stand etc.
Representation of ideas through sketches, diagrams, and drawings with application of line quality, thickness and intensity as appropriate to the intent.

Text books

1. Edward D. Mills– Planning the Architects Hand Book – Bitterworth, London,1985.
2. Francis D.K. Ching – Architecture Form Space and Order Van Nostrand Reinhold Co.,(Canada),1979
3. Owen Cappleman & Michael Jack Kordan, Foundations in Architecture: An Annotated Anthology of beginning design projects, VanNostr and Reinhold, New York.
4. Paul Laseau, Graphic Thinking for Architects and Designers, John Wiley & Sons, New York, 2001.
5. Wucius Wong, 'Principles of Two-Dimensional Design', John Wiley and Sons Inc., NewYork,1972.

Evaluation methods

● Books, research papers, e-books, videos etc. to be provided to the students by the faculty and ensure that they read it, by initiating discussions.
● Students are required to develop presentation skills.
● Students are required to understand the elements and principles of Basic Design as the building blocks of creative design through exercises that will develop the originality, expression, skill and creative thinking. Involve students in a number of exercises to

understand the grammar of design and visual composition.
● Enable the understanding of 3D Composition by involving students in a number of exercises which will help generation of a form from a two dimensional / abstract idea.
● Students need to be equipped to understand the relationship between the grammar of design and architecture by involving the students in seminars/ workshops and simple exercises which will look at building form analytically.
● Each student should be encouraged to have a sketchbook with sketches of all the topics covered.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [104 hours]
	MODULE 1[24 hours]	
1.1	Introduction to basic elements and principles of design	4
1.2	Elements of Design: Point, Line, Shape, Plane, Volume, Forms etc.	4
1.3	Principles of design and their application to quality to spaces and forms	4
1.4	Unity, balance, symmetry, proportion, scale, hierarchy, rhythm, contrast, harmony, focus, figure and ground etc.	4
1.5	Exercises: 2D compositions demonstrating principles of design.	4
1.6	Exercises: 3D compositions demonstrating principles of design.	4
	MODULE II [24 hours]	
2.1	Study of Forms	2
2.2	Solids and Voids, Planar, Fluid and Plastic Forms. Study of Solids and voids to evolves sculptural forms and spaces and explore the play of light and shade and application of color,	4
2.3	Study of linear and Planar forms using simple material like Mount Board, metal foil, box boards, wire string, thermocol etc.,	3
2.4	Study of Solids and voids to evolves sculptural forms and spaces and explore the play of light and shade and application of color	4
2.5	Study of fluid and plastic forms using easily moldable materials like clay, plaster of paris etc.	4
2.6	Study of texture and schemes of texture both applied and stimulated and their application,	3
2.7	Analytical appraisal of building form in terms of visual character	2
2.8	Play of light and shade, solids and voids etc.	2

MODULE III [24 hours]		
3.1	Parameters of design, anthropometrics, human activity and the use of space	3
3.2	Parameters of design, anthropometrics, human activity and the use of space	3
3.3	Anthropometric studies – average measurements of human body in different postures	3
3.4	Anthropometric studies - its proportion and graphic representation	3
3.5	Application in design of simple household and street furniture	3
3.6	Basic human functions and their implications for space requirements	3
3.7	Minimum and optimum areas for various functions	6
MODULE IV [32 hours]		
4.1	Abstraction to Product Design	3
4.2	Studying/analyzing man-made and natural forms/ objects	3
4.3	Copying or abstracting patterns	3
4.4	Using the same to generate design for a product like chair, lampshade, pen stand etc.	6
4.5	Representation of ideas through sketches, diagrams, and drawings	3
4.6	Representation of ideas through sketches	4
4.7	Representation of ideas through diagrams, and drawings	4
4.8	Representation of ideas through sketches, diagrams, and drawings with application of Line quality, thickness and intensity as appropriate to the intent.	6

23ARS102	THEORY OF ARCHITECTURE–I	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

To enable the students to:

1. Comprehend foundation of architecture as a field of study
2. Develop an appropriate vocabulary for understanding and expressing architectural works.
3. Evaluate architectural work based on aesthetical and functional needs.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Define architecture from various perspectives
CO2	Identify and evaluate the basic elements of design and architecture
CO3	Analyze the various visual principles of composition
CO4	Evaluate the relationship of form and space in architecture
CO5	Appreciate the importance of circulation in architecture

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓	✓		✓							
CO3	✓	✓	✓		✓							
CO4	✓	✓	✓		✓							
CO5	✓	✓	✓		✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyze	✓	✓	✓	✓
Evaluate			✓	
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 questions with one question from each module, with 4 marks for each question. Answer all questions in Part A. Marks: (5x4 =20marks)	10 questions with 2 questions from each module, of which the student should answer any one from each module Each question carries 8 marks. One or two questions can have subdivisions. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I: Introduction

Origin of Architecture, Etymology of the Word 'Architecture', Definition of Architecture and Understanding Architecture as Identification of Place, Natural and Man-made form, Architecture and culture– aspects of culture that influence architecture

MODULE II: Elements of Design and Architecture

Basic elements of design - point, line, plane, volume and their architectural expressions. Basic elements of Architecture, Modifying elements of Architecture, Gestalt principles of visual perception

MODULE III: Principles of Composition

Proportion and scale in architecture, Proportioning systems, and their role in establishing visual relationship.
Ordering principles- Axis, symmetry, balance, hierarchy, datum, rhythm, repetition, pattern, transformation, harmony, contrast, unity, dominance, emphasis

MODULE IV: Form and Space

Evolution, Transformation and Articulation of form, Geometry in Architecture
Elements defining spaces- spatial relationships- spatial organization- centralized, linear, radial, clustered, grid-built from and open space relationships with architectural examples.

MODULE V: Circulation

Experiencing architecture through movement in space, Relationship between

architectural form and circulation- Types of circulation- Building approach and entrance, path configuration and form, path space relationship, orientation with architectural examples.

Text books

1. Francis D.K. Ching, 'Architecture Form, Space and Order', Van Nostrand Reinhold Company, NewYork,2007.
2. John Beverly Robinson, 'Principles of Architectural Composition', Wentworth Press,2016
3. Kurt Koffka, 'Principles of Gestalt Psychology, Mimesis International,2014
4. Pramar V.S., 'Design Fundamentals in Architecture', Somaiya Publications Private Ltd., NewDelhi,1973.
5. Simon Unwin, 'Analysing Architecture', Rouledge, London,2003.

Reference books

1. Bryan Lawson, 'The Language of Space', Architectural Press,2001.
2. James C. Snyder, 'Introduction toArchitecture', McGraw-Hill,1979
3. Leland MRoth; 'Understanding Architecture: Its Elements, History and Meaning', Craftsman House,1994.
4. Wucius Wong, 'Principles of Two-Dimensional Design', Wiley,2009
5. Yatin Pandya, 'Elements of Space making', Map in 2007.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1[6 hours]	
1.1	Origin of Architecture	1
1.2	Etymology of the Word 'Architecture'	1
1.3	Definition of Architecture, Natural and Man-made form	1
1.4	Understanding Architecture as Identification of Place	1
1.5	Architecture and culture – aspects of culture that influence architecture	2
	MODULE II [9 hours]	
2.1	Basic elements of design-point and their architectural expressions.	1
2.2	Basic elements of design-Line and their architectural expressions.	1
2.3	Basic elements of design-plane and their architectural expressions.	1
2.4	Basic elements of design-Volume and their architectural expressions.	1
2.5	Basic elements of Architecture	1

2.6	Modifying elements of Architecture	2
2.7	Gestalt principles of visual perception	2
MODULE III [9 hours]		
3.1	Proportion and scale in architecture	2
3.2	Proportioning systems	1
3.3	Their role in establishing visual relationship	2
3.4	Ordering principles -Axis, symmetry, balance, hierarchy, datum,	1
3.5	Rhythm, repetition, pattern	1
3.6	Transformation, harmony, contrast	1
3.7	Unity, dominance, emphasis	1
MODULE IV [9 hours]		
4.1	Form and Space-Evolution	1
4.2	Transformation and Articulation of form,	2
4.3	Geometry in Architecture	2
4.4	Elements defining spaces	1
4.5	Spatial relationships	1
4.6	Spatial organization- centralized, linear, radial, clustered, grid	1
4.7	Built form and open space relationships with architectural examples	1
MODULE V [6 hours]		
5.1	Circulation-Experiencing architecture through movement in space	1
5.2	Relationship between architectural form and circulation	1
5.3	Types of circulation	1
5.4	Building approach and entrance	1
5.5	Path configuration and form	1
5.6	Path space relationship, orientation with architectural examples.	1

23ARS103	GEOMETRICAL DRAWING	L	T	P	S	C	Year of Introduction
		0	0	3	3	3	2023

Preamble:

To introduce students to the fundamentals of technical drawings.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Summarize the basic principles of technical drawing. **Understanding**
CO2	Draw orthographic projections of simple solids. **Applying**
CO3	Develop surfaces of small objects. **Applying**

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓						✓		✓	✓
CO2	✓		✓		✓							✓
CO3		✓		✓					✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Test1	Test2	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze			
Evaluate			
Create			

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Drawing [P]			Total Marks
		Assignment	Test-1	Test-2	
	5	30	7.5	7.5	**50**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	ESE Marks
PATTERN 1	Contains six questions. Answer any five questions Module 1: 1 Question (10 Marks) Module 2: 1 Question (10 Marks) Module 3: 2 Questions (10 Marks) Module 4: 2 Questions (10 Marks)	50
	Total Marks: 50	

SYLLABUS

MODULE I: Scale

Introduction to scales. Graphical scale and plain scale.

Drawings:

Construction of scales

MODULE II: Introduction to projections

Projection, types of projections and classification of projections

Orthographic projections

Projections of points, lines, and planes.

True and apparent lengths and angles.

Traces

Drawings:

Projection of lines

MODULE III: Projection of solids

Projection of solids in simple position inclined to one of the planes and inclined to both planes. (Prisms, pyramids, cylinders and cones)

Drawings:

Projection of solids (prisms, pyramids, cylinders, and cones)

MODULE IV: Sections of solids

Introduction to sections and relevance of sections in drawings. Sections of solids (prisms, pyramids, cylinders, and cones) True shapes of sections.

Concept of auxiliary projection (for true shapes)

Development of surfaces

Development of simple solids. Relevance in architectural model making.

Development of a simple hipped roof.

Drawing

Sections of solids

Development of surfaces of solids and

Development of a simple hipped roof

Text books

1. Ching, Francis D. K., Architectural Graphics, Hoboken, New Jersey: John Wiley & Sons,2015

2. Ching, Francis D. K., Design Drawing, Hoboken, New Jersey: John Wiley &Sons, 2010
3. Norling. Earnest R., Perspective Made Easy, New York: Dover Publications, Inc.,1999

Reference books

1. Ching, Francis D. K., Architectural Graphics, Hoboken, New Jersey: John Wiley & Sons,2015
2. Ching, Francis D. K., Design Drawing, Hoboken, New Jersey: John Wiley &Sons, 2010

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE I [4 hours]	
1.1	**Scale** Introduction to scales.	1
1.2	Graphical scale and plain scale.	1
1.3	**Drawings:** Construction of scales	2
	MODULE II [8 hours]	
2.1	Introduction to projection	1
2.2	Projection	1
2.3	Types of projections	1
2.4	Classification of projections	1
2.5	**Orthographic projections** Projections of points, lines and planes.	1
2.6	True and apparent lengths and angles. Traces	1
2.7	**Drawings:** Projection of lines	2
	MODULE III [12 hours]	
3.1	Projection of solids in simple position inclined to one of the planes	2
3.2	Projection of solids inclined to both planes.	2
3.3	Prisms, pyramids,	2
3.4	Cylinders and cones	2
3.5	**Drawings:** Projection of solids (prisms, pyramids)	2

3.6	**Drawings:** Projection of solids (cylinders and cones)	2
MODULE IV [15 hours]		
4.1	**Sections of solids-** Introduction to sections and True shapes of sections.	2
4.2	Relevance of sections in drawings	1
4.3	Sections of solids- (prisms, pyramids, cylinders and cones)	1
4.4	Sections of solids -(cylinders and cones)	1
4.5	Concept of auxiliary projection (for true shapes)	2
4.6	**Drawing** Sections of solids	2
4.7	Development of surfaces - Developments of simple solids.	1
4.8	Relevance in architectural model making.	1
4.9	Development of a simple hipped roof.	1
4.10	**Drawing** Development of surfaces of solids and Development of a simple hipped roof	2
4.11	**Drawing** Development of a simple hipped roof	1

23ARS104	ARCHITECTURAL GRAPHICS AND VISUAL ARTS I	L	T	P	S	C	Year of Introduction
		1	0	3	4	4	2023

Preamble:

To introduce students to the fundamentals of technical drawings and to familiarize students with the grammar of art by involving them in a series of free hand exercises both indoor and outdoor to enhance their imaginative thinking and creativity and appreciate form, proportion, scale, etc.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Summarize the basic principles of visual presentation and architectural graphics.
CO2	Draw in various media and materials, to implement in design studio projects.
CO3	Draw shades and shadows and apply rendering techniques
CO4	Draw measured drawings of small objects.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓							✓	✓		✓
CO2	✓	✓	✓		✓				✓			✓
CO3	✓	✓		✓					✓			✓
CO4	✓	✓	✓		✓				✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Test1	Test2	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze			
Evaluate			
Create			

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory and drawing [L- P]			Total Marks
		Assignment	Test-1	Test-2 (Portfolio and viva)	
	5	30	7.5	7.5	**50**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	ESE Marks
PATTERN 1	There will be one question from Module 4 with sub divisions which will have applications from all the other three modules. (50 marks)	50
	Total Marks: 50	

SYLLABUS

MODULEI: Introduction to Architectural Graphics

Familiarizing architectural drawing equipment. Architectural lettering, Sheet layouts, Drawing and rendering materials: Pencils, colored pencils, markers, chalks, crayons, oil pastels, char coals, drawing pen, water color, ink, and brush etc

MODULEII: Visual presentation for Architecture

Indoor and outdoor sketching: An experience of live drawing in various contexts in pencil and pen/ink,

Free-hand perspective drawing and rendering of imagined objects, in pencil and pen/ink. Architectural rendering: rendering dots, lines, geometry, and forms using pencils, pens and brush and ink.

Exercises using different mediums.

Free hand line sketching and drawing of natural and manmade. Study of shades and shadows, Sketching of Historic or new built- up structures of Architectural importance using different mediums.

MODULE III: Color theory

Exploring color scheme based on principles of harmony and contrast and degree of chromatism, light and shade.

Exercises using different mediums.

Study of shades and shadows, coloring, rendering with various color materials.

MODULE IV: Measured Drawing

Orthographic projection of small furniture like stools, chairs and tables (plans, elevations, and sections), Drafting techniques, graphical symbols and annotations Dimensioning, labeling and representation of materials, Composing the drawing sheet.

Drawings:

Measured drawing of furniture

Text books

1. Cleaver, D. G., Artan Introduction
2. Mumford, L., Art & Techniques
3. Ching, Francis D.K., Architectural Graphics, Hoboken, New Jersey: John Wiley & Sons,2015
4. Bhatt, N.D., Engineering Drawing, Anand, CharotarPublishingHouse,2012

5. Webb, Frank, "The Artist Guide to Composition", David & Charles,U.K.,1994.
6. Drawing a Creative Process", Ching Francis,VanNostrandReinhold,NewYork,1990.
7. Gardener's Art through Ages by FredS.Kleiner,12th Edition,2005, Wadsworth, Inc.
8. Caldwell Peter, "Pen and Ink Sketching", B.T. Batsford Ltd., London,1995.
9. Charles Wallschlaeger & Synthia Busic Snyder, Basic Visual Concepts & Principles for artists, architects & designers, McGraw hill, USA,1992.
10. Edward D. Mills–Planning the Architects Hand Book Bitterworth, London,1985.
11. Francis D. K. Ching –Architecture Form Space and Order Nostrand Reinhold ((Canada),1979
12. Owen Cappleman &Michael Jack Kordan, Foundations in Architecture: An Annotated Anthology of beginning design projects, Van Nostrand Reinhold, New York.
13. Paul Laseau, Graphic Thinking for Architects and Designers, John Wiley & Sons, New York, 2001.
14. Wucius Wong, 'Principles of Two-Dimensional Design', John Wiley and SonsInc.,New York,1972.

Reference books

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36 hours]
MODULE 1 [4 hours]		
1.1	**Introduction to Architectural Graphics:** Familiarizing architectural drawing equipment.,	1
1.2	Architectural lettering, Sheet layouts	1
1.3	Drawing and rendering materials: Pencils, colored pencils, markers, chalks,	1
1.4	Drawing and rendering materials: crayons, oil pastels, charcoals, drawing pen, Watercolor, ink and brush etc.	1
MODULE II [24 hours]		
2.1	Visual presentation for architecture: **Indoor and outdoor sketching:** An experience of live drawing in various contexts in pencil and pen/ink,	2
2.2	Free-hand perspective drawing and rendering of imagined objects, in pencil and pen/ink.	2
2.3	Architectural rendering: rendering dots, lines, geometry	2

2.4	Architectural rendering: forms using pencils, pens and brush and ink.	2
2.5	Exercises using different mediums.	2
2.6	Free hand line sketching and drawing of natural and manmade	2
2.7	Study of shades and shadows,	2
2.8	Sketching of Historic or new built-up structures of Architectural importance using different mediums.	2
2.9	Exercises using different painting mediums.	2
2.10	Outdoor sketching	2
2.11	Outdoor sketching	2
2.13	Outdoor sketching	2
MODULE III [12 hours]		
3.1	Color theory	1
3.2	Exploring color schemes based on principles of harmony and contrast	1
3.3	Degree of chromatism	1
3.4	Light and shade	1
3.5	Exercises using different mediums	2
3.6	Study of shades and shadows	2
3.7	Coloring	2
3.8	Rendering with various color materials	2
MODULE IV [12 hours]		
4.1	Measured Drawing	1
4.2	Orthographic projection of small furniture like stools, chairs, and tables.	2

4.3	plans, elevations and sections	2
4.4	Drafting techniques,	2
4.5	Graphical symbols and annotations	1
4.6	Dimensioning, labeling and representation of materials.	1
4.7	Composing the drawing sheet	1
4.8	Drawings: Measured drawing of small furniture	2

23ARB105	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES-I	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

The goal of this course is to expose the students to elementary building materials and their applications. It aims students to contemporary as well as vernacular and traditional building materials. After this course, the students will be able to recognize materials in the market and use the min their design visualization.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Understand the properties, use and all general aspects of elementary building materials.
CO2	Understand and illustrate various construction techniques in building industry.
CO3	Discover the methods of construction through site visits, practical exercises and drawing preparation.
C04	Understand and illustrate various structural systems using bricks.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										✓
CO2	✓	✓			✓							✓
CO3	✓	✓	✓		✓					✓		✓
C04	✓	✓			✓							✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Test1	Test2	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze			
Evaluate			
Create			

Mark Distribution of CIA

Course Structure [L-T-P-J]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	Part C	ESE Marks
PATTERN 1	Contains 6 questions with at least one question from each module, having 2.5 marks for each question. Students should answer all the questions. Marks: (6x 2.5 =15 marks)	Contains 4 questions with 2 questions from each theory- based modules, of which the student should answer any one from each module. Each questioncarries7.5marks. Marks: (2x 7.5 =15 marks)	Contains two drawing questions (may have sub questions), from the two drawing-based modules, of which the student should answer any one. Marks: (1x 20=20 marks)	50
	Total Marks: 15	Total Marks: 15 marks	Total Marks: 20 marks	

SYLLABUS

MODULE I : Introduction to building materials and construction.

Introduction to building materials and construction

Building Structure and components-Sub structure, structure, frame, load bearing etc.

Properties, Types, Application, Specification and Standards of elementary building materials like Stone, Clay, Mud, Mortar, Brick, rubble, concrete, wood, metals, glass, plastics, tiles, paint etc.

Clay and mud as building material

Clay, availability, properties, processing, clay products, application etc

Mud, availability, properties, processing, products,
application, mud construction.

Exercise: *Site Visit with emphasis on clay and mud.*

Illustrations on mud construction techniques (Adobe, Wattle & Daub, Rammed Earth Construction).

MODULE II : Stone Masonry

Introduction to Building Stones & Stone masonry, General terminologies. Classification of building stones. Properties, Characteristic features& uses of Marble, Granite & Laterite
Stone Masonry and its classification.

Exercise: *Site Visit with emphasis on stone construction. Illustration of various types of stone masonry.*

MODULE III : Brick Masonry

Brick as a building material- properties, types and available sizes. General terminologies related to brick & Brick masonry.
Various types of brick bonds and its characteristic features.
Terracotta as a building material - properties and its use as flooring and roofing material.

Exercise: *Drawing of Brick Closers, Bats & various types of brick bonds.*
Site Visit with emphasis on Brick Masonry.

MODULE IV : Introduction to structural systems using bricks

Introduction to structural systems using bricks
Various structural members in brick work of Arches, Vaults, T junction &Cross walls.
Exercise: Drawings of semicircular, segmental arch& Brick footing.
Illustrations of vaults cross walls and T junctions.

Text books

1. P.C. Varghese, 'Building Materials', Prentice Hall of India Pvt Ltd, New Delhi,2005
2. S.S. Bhavikatti, Building Materials & Construction, Vikas Publishing House.
3. B.C.Punmia, Ashok Kr. Jain, Arun Kr. Jain, Building Construction, Laxmi Publications Pvt Limited,2008.
4. S.C. Rangwala·2009, Building Construction, Charotar Publishing House Pvt. Limited, 2009
5. Arora S.P., Bindra S.P., Building Construction, Dhanpat Rai and Sons ·1984

Reference books

1. H Leslie Simmons, 'Construction – Principles, Material &Methods', 7th edition, John Wiley &Sons Inc., New York, 2001.
2. Relevant BIS codes.
3. Rosen Harold J, Construction materials for Architecture, Krieger PubCo,1992
4. Doran, David; Cather, Bob; Doran, D.K; Cather,R– Construction materials reference book, Routledge,2013

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours[36 hours]
MODULE 1[9 hours]		
1.1	Building Structure and components-Substructure, structure, frame, load bearing etc.	1
1.2	Properties, Types, Application,	1
1.3	Specification and Standards of elementary building materials like Stone, Clay, Mud, Mortar, Brick, rubble, concrete, wood, metals, glass, plastics, tiles, paint etc.	1
1.4	Clay, availability, properties, processing, clay products, application etc	1
1.5	Mud, availability, properties, processing, products, application, mud construction.	1
1.6	Exercise: *Site Visit with emphasis on clay and mud.*	2
1.7	*Illustrations on mud construction techniques (Adobe, Wattle & Daub, Rammed Earth Construction).*	2
MODULE II[9 hours]		
2.1	Introduction to Building Stones & Stone masonry, General terminologies.	1
2.2	Classification of building stones.	1
2.3	Properties, Characteristic features& uses of Marble, Granite & Laterite	1
2.4	Stone Masonry and its classification.	2
2.5	Exercise: *Site Visit with emphasis on stone construction.*	2
2.6	*Illustration of various types of stone masonry.*	2

MODULEIII[12 hours]		
3.1	Brick as building material- properties, types and available sizes. General terminologies related to brick & Brick masonry.	1
3.2	Terracotta as a building material-properties and its use as flooring and roofing material.	1
3.3	Exercise: *Drawing of Brick Closers & Bats.*	1
3.4	Various types of brick bonds and Its characteristic features.	2
3.5	*Drawing of various types of brick bonds.*	2
3.6	*Site Visit with emphasis on Brick Masonry.*	5
MODULEIV[9 hours]		
4.1	Various structural members in brick work.	1
4.2	General aspects of Arches, Vaults, Footings, T junction& Cross walls.	2
4.3	Illustrations of vaults, cross walls and T junctions.	2
4.4	Drawings of semicircular, segmental arches	2
4.5	Drawings of Brick footing.	2

23ACC106	THEORY OF STRUCTURES I	L	T	P	S	C	Year of Introduction
		2	1	0	3	3	2023

Preamble:

The goal of this course is to expose the students to the fundamental concepts of mechanics and enhance their problem-solving skills. It introduces students the sectional properties and influence of applied force systems on stationary rigid bodies. After this course, the students will be able to recognize similar problems in real world situations and respond accordingly.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Identify the components of system of forces acting on rigid bodies
CO2	Calculate the sectional properties of simple and compound plane sections
CO3	Apply the conditions of equilibrium to find reactions in rigid bodies and axial forces in simple plane trusses
C04	Compute the resultant of different force systems using basic principles of mechanics

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2	✓	✓	✓	✓								
CO3	✓	✓	✓	✓								
C04	✓	✓	✓	✓								

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Test1	Test2	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze			
Evaluate			
Create			

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory with drawing [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE

			Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 questions with one question from each module, with 4 marks for each question. Answer all questions in Part A. Marks: (5x4 =20 marks)	10 questions with 2 questions from each module, of which the student should answer any one from each module. Each question carries 8 marks. One or two questions can have subdivisions. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 40 marks	Total Marks: 60 marks

SYLLABUS

MODULE I: Introduction to Engineering Mechanics

Introduction to Engineering Mechanics –Statics – Basic principles of statics – Parallelogram law, Law of action and reaction (Review) Concept of rigid body – Practical examples Force concepts Characteristics of a force Principle of transmissibility and super position Various force systems – Practical examples Resolution of forces – Resultant of co planar concurrent force system – Methods of projections – Numerical exercise Co planar concurrent force system – Principle of resolved parts– Numerical exercise Equilibrium of concurrent forces – Laws of equilibrium – Free body diagrams – Exercises for free body diagram preparation –Numerical exercise on analysis of single body Analysis of concurrent force systems – Numerical exercises on analysis of bodies in contact

MODULE II:

Moment of a force –Review Introduction to non-concurrent force systems, Parallel force system, couple, Varignon's theorem – Derivation not required, Resultant of parallel forces Resultant of non-concurrent force system –Numerical exercise Introduction to beams – types of beams – Support conditions – Load types – Point load, Uniformly distributed and Varying loads – Practical examples Computation of support reactions of cantilever and simply supported beams subjected to concentrated and distributed loads – Numerical exercise

MODULE III: Centroid

Centre of gravity – Centre of mass- Centroid – Concept and definition – Practical examples, Centroid of thin uniform wire bend in to semi-circular arc Centroid of simple plane areas – Integration method – Numerical exercise Centroid of composite

areas – Numerical exercise

MODULE IV: Inertia

Moment of inertia –Concept and practical significance, Parallel axis theorm, Moment of inertia of basic shapes- rectangle, triangle, circle, semi-circle, quadrant of a circle – Derivation Perpendicular axis theorem, Polar moment of inertia, Radius of gyration. Moment of inertia of composite areas – Numerical exercise

MODULE V: Truss

Concept of truss – Applications – properties– Different configurations, Conditions for a stable, determinate truss – Examples Assumptions in the analysis of truss – Different methods of truss analysis Analysis of cantilever and simply supported trusses – Graphical method and Method of joints

Text books

1. S. Timoshenko, D. H. Young, J. V. Rao, Sukumar Pati, Engineering mechanics, Mc Graw Hill Education
2. R.C. Hibbler, "Engineering Mechanics", Pearson Education, Asia Pvt. Ltd.
3. F. P. Beer & E. R. Johnston, "Vector Mechanics for Engineers", Tata McGraw Hill

Reference books

4. Henry J., Covan, Architectural structures: An introduction to structural mechanics, Pitman Publishing
5. Philip Garrison, Basic structures for engineers and architects, Wiley – Blackwell publishers
6. Francis D. K. Ching, Barry S. Onouye, Douglas Zuberbuhler, building structures illustrated, Wiley Publishers
7. Babu, J., Engineering Mechanics, Pearson Prentice Hall
8. Benjamin J., Engineering Mechanics, Pentex Book Publishers and Distributors
9. Bhavikkatti, S. S., Engineering Mechanics, New Age International Publishers
10. J.L. Meriam &L.G. Kraige, "Engineering Mechanics", John Wiley and Sons
11. Kumar, K. L., Engineering Mechanics, Tata McGraw Hill Publishing Company Limited
12. R.K Bansal., Engineering Mechanics, Lakshmi Publications Pvt Ltd
13. R.K Bansal., Strength of Materials, Lakshmi Publications Pvt Ltd
14. R. S. Khurmi&N. Khurmi, Principles of Engineering Mechanics, S. Chand Publishing
15. Rajasekaran S. and Sankarasubramanian, G., Engineering Mechanics, Vikas Publishing House Private Limited
16. S. Ramamrutham., Strength of Materials, Dhanpat Rai Publishing Company Pvt.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1[8 hours]		
1.1	Introduction to Engineering Mechanics –Statics – Basic principles of statics – Parallelogram law, Law of action and reaction (Review) Concept of rigid body – Practical examples Force concepts -	2

	Characteristics of a force	
1.2	Principle of transmissibility and super position Various force systems – Practical examples Resolution of forces – Resultant of co planar concurrent force system – Methods of projections – Numerical exercise	2
1.3	Co planar concurrent force system – Principle of resolved parts– Numerical exercise Equilibrium of concurrent forces – Laws of equilibrium – Free body diagrams	2
1.4	Exercises for free body diagram preparation –Numerical exercise on analysis of single body Analysis of concurrent force systems – Numerical exercises on analysis of bodies in contact	2
MODULE II [8 hours]		
2.1	Moment of a force –Review Introduction to non-concurrent force systems, Parallel force system, couple	1
2.2	Varignon's theorem–Derivation not required Resultant of parallel forces Resultant of non-concurrent force system– Numerical exercise	3
2.3	Introduction to beams –types of beams –Support conditions–Load types –Point load, uniformly distributed and Varying loads –Practical examples	2
2.4	Computation of support reactions of cantilever and simply supported beams subjected to concentrated and distributed loads–Numerical exercise	2
MODULE III [8 hours]		
3.1	Centre of gravity– Centre of mass-Centroid–Concept and definition– Practical examples Centroid of thin uniform wire bend into semi-circular arc	4
3.2	Centroid of simple plane areas – Integration method – Numerical exercise Centroid of composite areas–Numerical exercise	4
MODULE IV [8 hours]		
4.1	Moment of inertia –Concept and practical significance Parallel axis theorem	1
4.2	Moment of inertia of basic shapes- rectangle, triangle, circle, semi-circle, quadrant of a circle–Derivation	2
4.3	Perpendicular axis theorem, Polar moment of inertia, Radius of gyration	2
4.4	Moment of inertia of composite areas–Numerical exercise	3

MODULE V [7 hours]		
5.1	Concept of truss –Applications– properties–Different configurations	2
5.2	Conditions for a stable, determinate truss–Examples Assumptions in the analysis of truss– Different methods of truss analysis	2
5.3	Analysis of cantilever and simply supported trusses–Graphical method and Method of joints	3

23ABC107	MATHEMATICS FOR ARCHITECTURAL APPLICATIONS	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Preamble:

The course enables the students to understand basic concepts of Linear Algebra, probability distributions and statistical methods. Mathematics and its application are required as a fundamental basis for equipping Architecture students with analytical, logical and practical skills needed to excel in design. Data and mathematical analysis work as essential tools to make the right decision in many practical situations.

Prerequisite: Basics of probability and matrices.

Course Outcomes: After the completion of the course the student will be able to

CO1	Use the Gauss elimination method to solve given systems of linear equations. [Apply level]
CO2	Apply concepts of measures of central tendency, dispersion to analyze data. [Apply level]
CO3	Apply the concepts of correlation coefficient, regression lines, and method of least squares in analyzing relationships between variables. [Apply level]
CO 4	Use the concept, properties, and important models of random variables to analyze suitable random phenomena. [Apply level]
CO 5	Apply important statistical tests of hypothesis to perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population. [Apply level]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										✓
CO2	✓	✓										✓
CO3	✓	✓										✓
CO 4	✓	✓										✓
CO 5	✓	✓										✓

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTools			EndSemesterExamination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA					
Course Structure [L-T-P-J]	**Attendance**	**Theory [L- T]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	10 Questions, each question carries 2 marks Marks: (2x10 =20 marks)	2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I: Linear Algebra

(Text1: Sections 7.3,7.4,7.5)

Systems of linear equations, Solution by Gauss elimination, row echelon form and rank of a matrix, fundamental theorem for linear systems (homogeneous and non-homogeneous, without proof)

MODULE II: Statistics

(Text 2: Sections 25.5, 25.6, 25.7, 25.8, 25.10, 25.11)

Measures of central tendency-Mean-median-mode, Measures of Dispersion-Mean deviation-standard deviation-variance. Definition of skewness and kurtosis.

MODULE III: Statistics

Text 2: Sections 25.13, 25.14, 24.4, 24.5)

Correlation coefficient – Regression Lines-Method of least squares-Fitting of straight line and parabola.

MODULE IV: Probability distributions

(Text2: Sections 26.7, 26.8, 26.9, 26.10, 26.14, 26.15, 26.16)

Probability distributions: Random variable-probability density function-probability distribution function-properties, Expectation of a random variable- Mean and variance. Probability distributions: Binomial-Poisson-Normal (without proof of mean and variance)

MODULE V: Testing of hypothesis

(Text 2 : Sections 27.1, 27.6, 27.9, 27.15)

Sampling distribution- Standard error- Testing a hypothesis- Type I and Type II errors- Level of significance. Large sample tests: Test of significance for a single mean- Test of significance for difference of means. Small sample tests: Student's t- distribution-Test of significance of a sample mean- Test of significance of difference between sample means.

Text books

1 Erwin Kreyszig, Advanced Engineering Mathematics, 10thEdition, JohnWiley&Sons,2016.

2 B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition,2017.

Reference books

1. Richard A Johnson, Probability and Statistics for Engineers (Miller and Freund's)-Prentice Hall of India ,8th Edition.
2. SC Gupta and VK Kapoor, Fundamentals of Mathematical Statistics, SC hand Publications.
3. Prof. Gilbert Strang, Linear Algebra [MITOPENCOURSEWARE] https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/(Relevant sections)
4. Prof. Somesh Kumar, Probability and Statistics [NPTEL] https://nptel.ac.in/courses/111105041(Relevant sections)

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1[7 hours]	
1.1	Systems of linear equations	1
1.2	Solution by Gauss elimination	1
1.3	Solution by Gauss elimination(continued)	1
1.4	Row echelon form	1
1.5	Rank of a matrix	1

1.6	Fundamental theorem for linear systems (homogeneous and non-homogeneous, without proof)	1
1.7	Fundamental theorem for linear systems(continued)	1
MODULE II [6 hours]		
2.1	Measures of central tendency-Mean	1
2.2	Median	1
2.3	Mode	1
2.4	Measures of Dispersion-Mean deviation	1
2.5	Standard deviation-variance	1
2.6	Definition of skewness and kurtosis.	1
MODULE III [6 hours]		
3.1	Correlation coefficient	1
3.2	Correlation coefficient(continued)	1
3.3	Regression lines	1
3.4	Regression lines(continued)	1
3.5	Method of least squares-Fitting of straight line and parabola.	1
3.6	Fitting of a parabola.	1
MODULE IV [8 hours]		
4.1	Random variable-probability density function	1
4.2	Probability distribution function- properties	1
4.3	Expectation of a random variable-Mean and variance.	1
4.4	Mean and variance(continued)	1
4.5	Binomial	1
4.6	Poisson distributions	1
4.7	Normal distribution	1
4.8	Normal distribution(continued)	1
MODULE V [9 hours]		
5.1	Sampling distribution- Standard error	1
5.2	Testing a hypothesis- Type I and Type II errors- Level of significance	1
5.3	Testing a hypothesis(continued)	1
5.4	Large sample tests: Test of significance for a single mean-	1
5.5	Test of significance for a single mean(continued)	1

5.6	Test of significance for difference of means	1
5.7	Small sample tests: Student's t- distribution-Test of significance of a sample mean	1
5.8	Test of significance of a sample mean(continued)	1
5.9	Test of significance of difference between sample means.	1

CO Assessment Questions

1

1. Find the rank of the matrix $\begin{bmatrix} 3 & 0 & 2 & 2 \\ -6 & 42 & 24 & 54 \\ -21 & 21 & 0 & -15 \end{bmatrix}$
2. Solve the following system of equations by Gauss elimination method: 2x+2y+4z=18, x+3y+2z=13, 3x+y+3z=14.
3. For what values of λ and μ the given system of equations x+y+z=1, x+2y+3z=10, x+2y+λz=μ has
   (i) No solution (ii) unique solution (iii) infinite number of solutions.

2

1. The mean of 200 items was 50. Later on, it was discovered that two items were misread as 92 and 8 instead of 192 and 88. Find out the correct mean.
2. Find the mode of the following data.

Marks	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
No. of candidates	7	10	16	32	24	18	10	5	1

3. Find the mean deviation from the median of the following frequency distribution.

Marks	0-10	10-20	20-30	30-40	40-50
No. of students	5	8	15	16	6

3

1. In a partially destroyed laboratory record of an analysis of a correlation data, the following results only are legible: Variance of x=9, Regression equations: 8x-10y+66=0, 40x-18y=214. What are (i) the mean values of x and y. (ii) the coefficient of correlation between x and y.
2. Obtain the equations of the lines of regression from the following data:

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

3. Fit a straight line to the following data.

X	1	2	3	4	5
Y	14	27	40	55	68

4

1. Suppose that X has Poisson distribution. If P(X=2) =2/3, P(X=1), find P(X=0) and P(X=3).

	2. In a test of 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and a standard deviation of 60 hours. Find the number of bulbs likely to burn (i) more than 2150 hours (ii) less than 1950 hours. 3. A discrete random variable X has the following probability function

x	1	2	3	4	5	6	7
F(x)	k	2k	2k	3k	K2	2k2	7k2+k

i Find k

ii Evaluate $P(X<3)$, $P(X\geq 6)$

5	1. A normal population has mean 6.8 and standard deviation of 1.5. A sample mean of 400 members gave a mean of 6.75. Is the difference significant? 2. In a random sample of size 500, the mean is found to be 20. In another independent sample of size 400, the mean is 1.5. Could the samples have been drawn from the same population with standard deviation 4. 3. A random sample of size 25 from a normal population gives a sample mean 15 and a standard deviation 8. Test the hypothesis that the population mean is 16 at 5% level of significance.

23ARK108	COMMUNICATION SKILLS ANDTECHNIQUES FOR ARCHITECTURE	L	T	P	S	C	Year of Introduction
		1	0	1	2	2	2023

Preamble:

- To develop the communication skills of students by helping them in the areas of English Language-Listening, Speaking, Reading and Writing.
- Help them to become confident speakers of English while dealing with their clients, suppliers, business partners and colleagues.
- Help to cultivate their analytical skills in writing especially writing resumes, letters, emails, proposals and reports.

Pre-requisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Understand new vocabulary and language skills in communication
CO2	Identify the listening patterns and apply listening techniques
CO3	Analyze and interpret reading skills
CO4	Develop writing skills
CO5	Develop speaking skills

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓									✓		✓
CO2	✓									✓		✓
CO3		✓			✓					✓		✓
CO4		✓	✓		✓					✓		✓
CO5	✓		✓		✓					✓		✓

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTools		Final test/ Viva (25)
	Presentation	Other tools for assessment	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze	✓	✓	✓
Evaluate		✓	
Create		✓	

Mark Distribution of CIA					
Course Structure [L-T-P-J]	**Attendance**	**Theory [L- P]**			**Total Marks**
		Presentation/ demonstration	**Marks for report**	**Final test/ Viva**	
	10	40	25	25	**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	100	-	-

SYLLABUS

MODULE I: Types of communication

Types of communication - objectives, verbal and non-verbal communication-effective communication and communication breakdown-significance of technical communication-technical vocabulary, vocabulary used in formal letters/e-mails/reports etc. Reduction of speech sounds in natural speech-Phonetics, intonation in natural speech, Basic Grammar. Technology based communications-Effective email messages,
Using software – Modern day research, and search, plagiarism piracy, patent.

MODULE II: Active and Passive listening

Active and Passive listening – listening for general content and listening for specific information-listening to technical talks, TED talks, news bulletins and interviews on TV channels.

MODULE III: Reading comprehension

Reading comprehension –reading styles and critical analysis, reading shorter and technical articles from journals, newspapers etc. related to architecture Skimming, scanning, intensive and extensive reading, Close reading, Comprehension - Note taking, Note making - interpretation- critical reading and analysis- speed reading Approaches to efficient reading. Tips for effective reading, Benefits of Effective reading.

MODULE IV: Technical writing, Differences between technical and literary style

Technical writing, Differences between technical and literary style - Letter writing formal and informal, Email writing job applications- Minute preparation, CV preparation-difference between BIO-DATA, CV and RESUME - Writing reports and Resumes- structure of a report, types of reports, references and bibliography

Creative writing exercises.

MODULE V: Participating in group discussions, debates-Oral Presentations

Participating in group discussions, debates-Oral Presentations - expression for starting a presentation, tips to improve slide presentations introducing a topic - visual presentation tools- listing supporting ideas- body language and audience analysis. Voice modulation-high pitch and low pitch public Differences between GD and debate-GD strategies activities to improve GD skills. interview etiquette, dress code, body language-online (Skype) interviews,

FAQs related to job interviews, soft skills and its relevance-Time management, Psychometrics and stress Management- manners and etiquette.

Reference books

1. Anderson, P.V, Technical Communication, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.
2. Evans, D, Decision maker, Cambridge University Press, 1997.
3. John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, 2004.
4. Prakash, P, Verbal and Non-Verbal Reasoning, Macmillan India Ltd., Second Edition, New Delhi, 2004.
5. Thorpe,E, and Thorpe,S, Objective English, Pearson Education, Second Edition, NewDelhi,2007.
6. Turton, N. Dand Heaton, J.B, Dictionary of Common Errors, Addision Wesley LongmanLtd.Indianreprint1998.
7. English for Engineers and Technologists (Combined edition,Vol. 1and2), OrientBlackswan2010.
8. Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice",2nd Edition, Oxford University Press, 2011

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [26 hours]
MODULE 1 [5 hours]		
1.1	Types of communication - objectives, verbal, and non-verbal communication-effective communication	1
1.2	Communication breakdown-significance of technical communication-technical vocabulary, vocabulary used in formal letters/e-mails/reports etc.	1
1.3	Reduction of speech sounds in natural speech-Phonetics, intonation in natural speech, Basic Grammar.	1
1.4	Technology based communications- Effective email messages, using software	1
1.5	Modern day research, and search, plagiarism piracy, patent.	1
MODULE II [5 hours]		

2.1	Active and Passive listening	1
2.2	Listening for general content	1
2.3	Listening for specific information	1
2.4	Listening to technical talks	1
2.5	TED talks, news bulletins and interviews on TV channels.	1
MODULE III [5 hours]		
3.1	Reading styles and critical analysis, reading shorter and technical articles from journals, newspapers etc. related to architecture Skimming, scanning, intensive and extensive reading.	1
3.2	Close reading, Comprehension - Note taking, Note making	1
3.3	Interpretation- critical reading and analysis-	1
3.4	Speed reading Approaches to efficient reading.	1
3.5	Tips for effective reading, Benefits of Effective reading.	1
MODULE IV [5 hours]		
4.1	Technical writing, Differences between technical and literary style -	1
4.2	Letter writing formal and informal, Email writing job applications- Minute preparation	1
4.3	CV preparation-difference between BIO-DATA, CV and Resume, Writing reports and Resumes	1
4.4	Structure of a report, types of reports, references, and bibliography	1
4.5	Creative writing exercises.	1
MODULE V [6 hours]		
5.1	Participating in group discussions, debates-Oral Presentations - expression for starting a presentation, tips to improve slide presentations introducing a topic	1
5.2	Visual presentation tools- listing supporting ideas- body language and audience analysis.	1
5.3	Voice modulation-high pitch and low pitch public	1
5.4	Differences between GD and debate-GD strategies activities to improve GD skills.	1
5.5	Interview etiquette, dress code, body language-online (Skype) interviews, FAQs related to job interviews, soft skills and its relevance – Time management,	1
5.6	Psychometrics and stress Management- manners and etiquette.	1

SEMESTER 2

23ARD201	ARCHITECTURAL DESIGN -I	L	T	P	S	C	Year of Introduction
		0	0	8	8	8	2023

Preamble:

To enable the students to develop a basic understanding of space, form, structure, and the built environment, to enable the conceptualization of form, space and structure through creative thinking and to initiate architectural design process deriving from first principles. To involve students in a design project(s) that will include simple space planning and the understanding of the functional aspects of a good design.

Prerequisite: Nil

Course Outcomes After the completion of the course the student will be able:

CO 1	To get a basic understanding of space, form, structure, and the built environment, to enable the conceptualization of form, space and structure through creative thinking. ((Understanding)
CO 2	To initiate architectural design process deriving from first principles, building case study by choosing appropriate examples and space standards to enable them to formulate and concretize their concepts and architectural program. ((Applying)
CO 3	To acquire skills of drawing and representation, built environment and its components, construction technology and structures to apply to architectural design. (Analyzing and evaluating)
CO 4	To involve students in a design project(s)that will involve simple space planning, understanding the functional aspects of good design, small scale building project(s) which will sensitize them to intelligent planning responsive to the environmental context. (Creating)

CO - PO MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Review 1	Review 2	Other tools	
Remember				
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze	✓	✓	✓	✓
Evaluate	✓	✓	✓	✓
Create	✓	✓	✓	✓

Other Assessment tools: Site study, analysis, sketching, video, presentation

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Studio [P]			Total Marks
		Assignment	Review-1	Review-2	
	10	90			**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
200	100	100	Jury

End Semester Examination [ESE]: ESE will be the portfolio evaluation by a panel of jury.

SYLLABUS

MODULE I: Study of simple structural systems and behavior under load:

Working model of structures (Like post and lintel, cantilever, trusses, arches, space frame, suspension etc.), Development of basic skill in design expression through visual analysis of structural forms, sculptural and spatial qualities of the structural system, three dimensional projects related to structural systems developed through models and sketches.

MODULE II: Integration of form and function in the Architectural design:

Design of a basic shelter: an architectural form with a specific function, stressing on concept generation and development of rich design process. Representation of ideas through sketches, diagrams, and architectural drawings with application of line quality, thickness and intensity as appropriate to the intent, isometric, axonometric, and oblique views, one and multi-point perspectives, sectional perspectives, light, shade, shadows and sciography. *Scale/Complexity:* Small scales impel function private/public buildings predominantly single floor.
Typology/Project: Shop, flower kiosk, Bake house, petrol bunk, fire station, weekend cottage etc.

Reference books

1. Arthur L. Guptill and Susan E. Meyer, 'Rendering in Pen and Ink',Watson- Guptill,1997
2. Francis D. K. Ching, 'Architectural Graphics', Wiley, 2009.
3. Francis D.K. Ching, ‘Architecture: Form, Space and Order’,John Wiley&Sons,2007.

4. GeoffreyBroadbent`DesigninArchitecture'JohnWileyandSons,1973.
5. Neuferts' Architect's Data
6. Simon Unwin, 'Analysing Architecture', Routledge, 2003.
7. Simon Unwin,'An Architecture Notebook Wall' Routledge,2000.
8. Simon Unwin, 'Doorway', Routledge, 2007.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [112 hours]
	MODULE 1 [40hours]	
1.1	**Study of simple structural systems and behavior under load:** Working model of structures- Like post and lintel, cantilever, trusses, arches, space frame, suspension etc.)	6
1.2	Working model of structures- cantilever, trusses, arches.	6
1.3	Working model of structures-space frame, suspension etc.	6
1.4	Development of basic skill in design expression through visual analysis of structural forms.	6
	Development of basic skill in design expression through visual analysis of sculptural and spatial qualities of the structural system.	6
	Three dimensional projects related to structural systems developed through models	6
1.5	Three dimensional projects related to structural systems developed through sketches.	4
	MODULE II [72 hours]	
2.1	**Integration of form and function in the Architectural design:** Design of a basic shelter: an architectural form with a specific function.	6
2.2	Design of a basic shelter: an architectural form with stressing on concept generation and development of rich design process.	6
2.3	Representation of ideas through sketches, diagrams.	6
2.4	Architectural drawings with application of line quality.	6
2.5	Representation of ideas through sketches, diagrams, and architectural drawings with intensity as appropriate to the intent, isometric, axonometric, and oblique views	6
	Representation of ideas through sketches, diagrams, and architectural drawings with intensity as appropriate to the intent, one and multi-point perspectives, sectional perspectives, light, shade, shadows and sciography.	6

2.4	*Scale/ Complexity:* Small scale simple function private/ public buildings predominantly single floor.	6
2.5	*Typology/ Project:* Shop, flower kiosk, Bake house, petrol bunk, fire station, weekend cottage etc.	6

23ARS202	HISTORY OFARCHITECTURE AND CULTURE-I	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

To enable the students to:

1. Identify and appreciate Architecture as an outcome of social and cultural processes of a geographical locality.
2. Improve visual literacy level and appreciate the aesthetic components of art and architecture.
3. Analyze architectural grammar, styles and practices in various cultural settings

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

- Build up the concepts of culture and civilization and identify impact on architectural products.
- Instill visual and formal analysis of architecture in them in of students to enhance the sketching, written and communication skills of students.

CO 1	To understand the beginnings of architecture, how prehistoric shelters and settings for rituals evolved Around the world in different cultures
CO 2	To develop an understanding of the physical experience of buildings in order to appreciate the complexity of the physical and meta physical influences bearing on architecture.
CO 3	To develop an understanding of architecture as an outcome of various social, political and economic, cultural and climate conditions.
CO 4	To understand the influence of culture and religion in forming architectural styles in India.
CO 5	To understand the progress of Architecture into a noble process with a governing theory and aesthetics, prominent architectural styles, religious and secular architecture, materials, construction technology, and theory of architecture during the First Millennium.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓		✓									✓
CO 2	✓					✓						✓
CO 3	✓		✓				✓					✓
CO 4	✓					✓						✓
CO 5	✓			✓								✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyse	✓	✓	✓	✓

Evaluate			✓	
Create				

Other Assessment tools: Site study, analysis, sketching, video, presentation

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 questions with one question from each module, with 4 marks for each question. Answer all questions in Part A Marks: (5x4=20 marks)	10 questions with 2 questions from each module, of which the student should answer any one from each module. Each questioncarries8marksEach question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I:

A brief over view of Paleolithic and Neolithic Culture– art forms and evolution of Shelter – megaliths – agricultural revolution and its impact on culture and civilization.

Pre-Historic Civilization: Primitive man - shelters, settlements, religious and burial systems E.g.: Oval hut, Nice, Dolmen tomb, gallery grave, passage grave, Gobekli Tepe Temple, Catal Huyuk, Jericho, Jomon culture Stone Henge.

MODULE II:

Introduction to River valley cultures: generic forces shaping settlements and habitats: River valley culture:

Indus Valley Civilization: Forces shaping settlements and habitats: Layout and Built forms of Mehrgarh, Early & Late Harappan & Mohenjodaro.

MODULE III:

River valley cultures: Mesopotamian civilization - Ziggurats at Warka, Ur and Chogha Zanbil, Palace of Sargon.

Nile Valley Civilization (Egyptian): Old kingdom, middle kingdom-Mastaba Tombs, Pyramid of Cheops, Temple of Khons, Karnak, Temple at Abu Simbel.

MODULE IV:

Greece - Pre-Classical Civilization Greek Language of Architecture – Palaces & Temples and their essential features. Geometry and Greek Architecture, Greek Capitals and Orders, Parthenon

Rome –Important Roman Cities, Typical Roman house, Form Development of Roman vocabulary of Architecture, Structural and Engineering Feats Typology of buildings-Colosseum, Forums, Palaces Pantheon, Basilica. A Comparative study of Greek & Roman Culture & Architecture.

MODULE V:

Pre-classical Aryan & Mauryan: Vedic and Epic Age Salient Features Vedic Village, Mauryan Empire–Architectural remains from Pataliputra, Asokan pillar at Vaishal, Lomas Risi Cave

Buddhism–Religion influencing Architecture–Buddhist Chaityas, Viharas, Stupa at Sanchi, Rock cut caves at Junnar, Chaitya Hall at Bhajja.

Text books

2. A Global History of Architecture / Francis. D.K.Ching, Mark Jarzombek, Vikramaditya Prakash. Published by John Wiley and sons,Third edition 2017
3. A History of Architecture: Settings and Rituals/Spiro Kost off. Revisions by Greg Castilo. Published by Oxford University Press, 1985, 1995
4. Sir Banister Fletcher, “A History of Architecture”, CBS Publications (Indian Edition),1999.
5. Percy Brown, “Indian Architecture: Buddhist and Hindu Periods”, D.B .Taraporevala, 1965
6. Satish Grover, “The Architecture of India: Buddhist and Hindu”, Vikas,1980

Reference books

- Leland M Roth; "Understanding Architecture: Its Elements, History and Meaning"; Craftsman House;1994
- Lloyd S. and Muller H.W., "History of World Architecture–Series", Faber and Faber
- Patrick Nuttgens, "The Story of Architecture FROMANTIQUITY TO THE PRESENT", H. F. Ullmann Pub:1983
- Pier Luigi Nervi, General Editor, "History of World Architecture–Series", Harry N. Abrams, Inc. Pub., New York, 1972.
- Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition), 1999.
- Spiro Kostof, "A History of Architecture: Setting and Rituals, Oxford University Press, London,1985.
- Vincent Scully, "Architecture–The Natural and the Manmade", Harper CollinsPub:1991.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. ofHours [39 hours]
	MODULE 1 [6 hours]	
1.1	**A brief overview of Paleolithic and Neolithic Culture-** Art forms and evolution of shelter–megaliths	2
1.2	Agricultural revolution and its impact on culture and civilization.	2
1.3	Pre-Historic Civilization: Primitive man - shelters, settlements, religious and burial systems.	1
1.4	E.g.: Ovalhut, Nice, Dolmen tomb, gallery grave, passage grave, Gobekli Tepe Temple, Catal Huyuk, Jericho, Jomon culture Stone Henge.	1
	MODULE II [6 hours]	
2.1	**Introduction to River valley cultures**: generic forces shaping settlements and habitats.	2
2.2	**Indus Valley Civilization**: Forces shaping settlements and habitats	2
2.3	Layout and Built forms of Mehrgarh, Early & Late Harappan & Mohen jo daro	2
	MODULE III [9 hours]	
3.1	**River valley cultures**: Mesopotamian civilization	2

3.2	Ziggurats at Warka, Palace of Sargon.	1
3.3	Urand Chogha Zanbil	1
3.4	Palace of Sargon.	1
3.5	**Nile Valley Civilization** (Egyptian): Old kingdom, middle	1
3.6	Mastaba Tombs, Pyramid of Cheops	1
3.7	Temple of Khons, Karnak	1
3.8	Temple at Abu Simbel	1
MODULE IV [9 hours]		
4.1	**Greece -** Pre-Classical Civilization Greek Language of Architecture	1
4.2	Palaces & Temples and their essential features	1
4.3	Geometry and Greek Architecture	1
4.4	Greek Capitals and Orders	1
4.5	Parthenon	1
4.6	**Rome** –Important Roman Cities Typical Roman house.	1
4.7	Form Development of Roman vocabulary of Architecture.	1
4.8	Structural and Engineering Feats Typology of buildings- Colosseum, Forums, Palaces Pantheon, Basilica.	1
4.9	A Comparative study of Greek & Roman Culture & Architecture	1
MODULE V [9 hours]		
5.1	**Pre-classical Aryan & Mauryan**: Vedic and Epic Age	2
5.2	Salient features of Vedic Village	1
5.3	Mauryan Empire –Architectural remains from Pataliputra,	1
5.3	Asokan pillar at Vaishal, Lomas Risi Cave	1
5.4	**Buddhism**–Religion influencing Architecture	1
5.5	Buddhist Chaityas, Viharas,	1
5.6	Stupa at Sanchi, Rock cut caves at Junnar	1
5.7	Chaitya hall at Bhajja	1

23ARS203	THEORY OFARCHITECTURE–II	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

To enable the students to:

1. Identify and appreciate Architecture as an outcome of social and cultural processes of a geographical locality.
2. Improve visual literacy level and appreciate the aesthetic components of art and architecture.
3. Analyze architectural grammar, styles and practices in various cultural settings.

Prerequisite: To define architecture from various perspectives

Course Outcomes After the completion of the course the student will be able:

CO1	To appreciate and evaluate architecture or built form with an understanding of the significance of different contexts in architecture
CO2	To critically approach a given architectural work with respect to the user behavior and design influences from allied fields
CO3	To appreciate the relevance of creativity and user behavior in architectural design
CO4	To analyze the various stages of the design process and their significance in architecture and explore the representation of ideas in visual language
CO5	To evaluate the development of architectural theories and philosophies from built examples

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓				✓		✓
CO2	✓	✓				✓				✓		✓
CO3	✓	✓				✓				✓		✓
CO4	✓	✓				✓				✓		✓
CO5	✓	✓				✓				✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyse	✓	✓	✓	✓

Evaluate			✓	
Create				

Other Assessment tools: Site study, analysis, sketching, video, presentation

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 questions with one question from each module, with 4 marks for each question. Answer all questions in Part A Marks: (5x4=20 marks)	10 questions with 2 questions from each module, of which the student should answer any one from each module. Each questioncarries8marks Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I :

Architecture, Society, and Culture- The impact of society and culture in built form Importance of Context –Climate as determinant, Structure and Building materials as determinants.
Socio-cultural determinants–Culture, temporal and regional influences as a determinant in architecture– Beliefs, Aspiration, values of the user

Casestudies of buildings in a local context-Kerala vernacular houses, Wattle, and daub construction of Assam,
Toda huts, Yurt tents, etc.

MODULE II :

Architecture and Human Behavior-

Need for studying the influence of architecture and human behavior- Appreciation of architecture from the user's perspective. Using the elements of architecture and principles of design to induce behavior and emotion.

Areas of application: Designing for social interaction, safety, privacy, etc.-Designing for children– school, home, and play. Designing for persons with physical challenges– visual, orthopaedic, etc.

MODULE III :

Creativity and Meaning in Design

Creativity in design–Function and Expression, Role of causes in the process of design, Understanding the concept of creativity, Theories on thinking-left / right brain, convergent and divergent thinking, lateral and
Vertical thinking, various techniques to generate creativity

MODULE IV :

Design Process

Need for integration of aesthetics and function in design, Formative Ideas, Concepts related to spatial organization and characteristics, and Importance of Massing in built form.

Application of design process through case studies

MODULE V :

Architectural inspirations, philosophies, and theories of architects

Aalvar Aalto, Charles Correa, Eero Saarinen, F L Wright, Geoffery Bawa, Laurie Baker, Le Corbusier, Louis Sullivan, Mies Van de Rohe, Walter Gropius

Text books

1. Amos Rapapport, House form and culture
2. Don Norman, The Design of Everyday Things
3. Emily Cole,'The Grammar of Architecture',MetroBooks,NewYork,2002
4. Francis D.K. Ching, A Visual Dictionary of Architecture
5. John Berger, Ways of Seeing
6. Juhani Pallasmaa, The Eyes of the Skin: Architecture and the Senses, John Wiley & Sons, 2012
7. James C. Snyder, Introduction to Architecture,McGraw-Hill,1979
8. Stephen Grabow, Kent Spreckelmeyer, The Architecture of Use: Aesthetics and Function in Architectural Design, Routledge,2014
9. William Lidwell, Kritina Holden and Jill Butle, Universal Principles of Design
10. Robert Gilliam Scott, 'Design Fundamentals', McGraw-HillInc., US,

Reference books

- Carmen Kagal, VISTARA,' The Architecture of India',1986
- Gabriele Leuthauser, 'Architecture in the 20th Century', Taschen GmbH,2005
- Gautum Bhatia, 'Laurie Baker', Penguin India,2000
- Geoffery Broad bent, 'Design in Architecture', Wiley–Blackwell,1973
- Garry Stevens, 'Reasoning Architect: Mathematics and Science in Design', McGraw Hill Education,1990
- Patrick Nuttgens, 'The Story of Architecture', Phaidon Press Limited,1983
- Helen Marie Evans and Carla David Dunneshil, "An invitation to design", Macmillan Publishing Co. Inc., New York, 1982.
- VS Parmar, Social history of Indian architecture

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [39 hours]
	MODULE 1 [10hours]	
1.1	Importance of context, climate, materials, society and culture in built form	2
1.2	Socio-cultural determinants and examples	1
1.3	Climate, structure and building material as determinant	2
1.4	Examples Kerala vernacular architecture, Wattle and daub construction of Assam,	2
1.5	Wattle and daub construction of Assam	2
1.6	Toda houses, Yurt houses	1
	MODULE II [7 hours]	
2.1	Architecture and Human Behavior.	2
2.2	Need for studying influence of architecture and human behavior.	2
2.3	Design to induce behavior and emotion.	1
2.4	Areas of application: Designing for social interaction, safety, privacy.	1
2.5	Designing for children – school, home, and play and designing for persons with physical challenges– visual, orthopedic, etc.	1
	MODULE III [6 hours]	
3.1	Creativity in design-Function and expression, its role in the process of design, and habitats.	1
3.2	Understanding the concept of creativity.	1
3.3	Theories on thinking of left and right brain, thinking	1

3.4	convergent and divergent thinking, lateral and vertical thinking,	1
3.5	Techniques to generate creativity	2
MODULE IV [6 hours]		
4.1	Design process-need for integration of aesthetics and function in design, formative ideas	1
4.2	Formative ideas	1
4.3	Concepts related to spatial organization and characteristics	1
4.4	The importance of massing in built form	1
4.5	Application of design process through case studies	2
MODULE V [10 hours]		
5.1	Architectural inspirations	1
5.2	Architectural philosophies	1
5.3	Theories of architects	1
5.3	Alvar Aalto	1
5.4	Charles Correa	1
5.5	Eero Saarinen	1
5.6	F L Wright	1
5.7	Geoffery Bawa	1
5.8	Laurie Baker, Le Corbusier,	1
5.9	Louis Sullivan, Mies Van de Rohe,	1
5.10	Walter Gropius	1

23ARS204	ARCHITECTURAL GRAPHICS AND VISUAL ARTS II	L	T	P	S	C	Year of Introduction
		1	0	3	4	4	2023

Preamble:

To equip students with the necessary skills required to prepare different types technical drawings to represent buildings

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Prepare technical drawings using pen and ink
CO 2	Draw pictorial projections of simple solids
CO 3	Prepare Architectural drawings of small buildings
CO 4	Prepare Rendered Presentation drawings
CO 1	Prepare technical drawings using pen and ink

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓											
CO 2	✓											
CO 3	✓	✓	✓						✓			
CO 4	✓		✓									

Assessment Pattern

Bloom's Category	Continuous Assessment Tests			End Semester Exam(50 Marks)
	Test1 (7.5Marks)	Test2 (7.5Marks)	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Other Assessment tools: Site study, analysis, sketching, video, presentation

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory and Drawing [L- P]			Total Marks
		Assignment	Test-1	Test-2 (Portfolio and Viva)	
	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	ESE Marks
PATTERN 1	One question, to evaluate the drawing skill and various presentation techniques acquired by the student during the semester. The drawing shall include plan / elevation / sections / views / sectional views etc. Depending upon the size of the drawing. All modules will be included as sub divisions in the question description. Marks: (50marks)	50
	Total Marks: 50	

SYLLABUS

MODULE I

Drafting with pen and ink:
Introduction to drafting with pen and ink.
Drawing plan, sections, and elevations of small buildings and building components.
Preparing site layouts

Drawings:

1. Plans for small buildings.
2. Technical drawings of building components
3. Typical sections of residential buildings.
4. Elevations of small buildings
5. Site layouts of small buildings

MODULE II

Axonometric Projection:
Types of axonometric projections.

Isometric projection of small buildings and structures.

Perspective projection:

One-point, two-point and three-point perspectives Projection of one-point and two-point perspectives (vanishing point method)

Application of Sciography in pictorial views: Drawing shadows on isometric and perspective views

Drawings:

1. Isometric projection of small buildings.
2. One-point and two-point perspectives of small buildings.

MODULE III

Measured drawing:

Measured drawing of a small building. Preparation of plans, elevations, sections and three-dimensional views, Interior perspectives & sectional perspectives

Drawings:

1. Plans, elevations and sections of the building
2. Isometric views of the building

MODULE IV :

Rendering Techniques:

Rendering of Architectural presentation drawings using different mediums (pen, graphite pencil, water color etc.)

Drawings:

1. Render- Perspective views of the building
2. Render-Interior perspectives of the building.

Textbooks

1. Ching, Francis D.K., Architectural Graphics, Hoboken, New Jersey:John Wiley & Sons,2015
2. Ching, Francis D.K., Design Drawing, Hoboken, New Jersey: John Wiley & Sons,2010
3. Norling. Earnest R., Perspective Made Easy, New York: Dover Publications, Inc.,1999
4. Guptill, Arthur L., Rendering in Pen and Ink: The Classic Book on Pen and Ink Techniques for Artists, Illustrators, Architects, and Designers. United States, Clarkson Potter/Ten Speed,2014.

Reference books

- Lohan, Frank., Pen& Ink Techniques, the University of Michigan, Contemporary Books,1978
- Alexander, Christopher. A Pattern Language: Towns, Buildings, Construction. United States, OxfordUniversityPress,2018.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [52 hours]
MODULE 1 [12 hours]		

1.1	**Drafting with pen and ink:** Introduction to drafting with pen and ink.	3
1.2	**Sciography:** Projection of shadows on plans and elevations of simple solids.	3
1.3	**Drawings:** 1.Simple drawings with technical pen on gateway sheets.	3
1.4	2. Projection of shadows on plans and elevations of solids prisms, pyramids, cylinder and cone.	3
MODULE II [14 hours]		
2.1	**Axonometric Projection**: Types of axonometric projections. Isometric projection of solids.	2
2.2	**Perspective projection:** One-point, two-point and three-point perspectives Projection of one-point and two-point perspectives (vanishing point method).	3
2.3	**Application of Sciography in pictorial views:** Drawing shadows on isometric and perspective views	3
2.4	**Drawings:** 1. Isometric projection of solids (prisms, pyramids, cylinder, cone and sphere)-projection of shadows	3
2.5	2. One-point and two-point perspectives of solids (prisms, pyramids, cylinder, cone and sphere)-projection of shadows	3
MODULE III [14 hours]		
3.1	**Measured drawing**: Measured drawing of a small building. Preparation of plans.	3
3.2	Elevations, sections and three-dimensional views.	3
3.3	Interior perspectives & sectional perspectives.	3
3.4	**Drawings:** Plans, elevations and sections of the building.	3
3.5	Isometric views of the building	2
MODULE IV [12 hours]		
4.1	**Rendering Techniques:** Rendering of Architectural presentation drawings using different mediums (pen, graphite pencil, water color etc.)	3
4.2	**Drawings:** 1. Render-Perspective views of the building	3
4.3	2. Render-Interior perspectives of the building	3

23ARB205	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES II	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

The goal of this course is to expose the students to elementary building materials and their applications. It aims to familiarize students to contemporary as well as vernacular and traditional building materials. After this course, the students will be able to recognize materials in the market and use them in their design processes.

Prerequisite: Skill & Knowledge of manual drafting.

Course Outcomes: After the completion of the course the student will be able:

CO 1	Describe qualitative aspects of various building materials including timber, bamboo & concrete.
CO 2	Explain various building materials including wood, bamboo and concrete their application for various construction needs.
CO 3	Identify various building materials and appropriately use them in the workshop and construction yard and understand their behavior.
CO4	Justify the use of various building materials in the design processes appropriately

CO - PO MAPPING

CO	PO 1	PO 2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO 1	✓	✓										
CO 2	✓	✓			✓							
CO 3	✓	✓			✓				✓	✓		
CO 4	✓	✓			✓		✓					✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze				
Evaluate				
Create				

Other Assessment tools: Site study, analysis, sketching, video, presentation

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L-P]			Total Marks
		Assignment	Test-1	Test-2 / Portfolio / Viva	
	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	PART C	ESE Marks
PATTERN 1	Will contain 6 questions with at least one question from each module, having 2.5 marks for each question. Answer all questions in Part A Marks: (6x2.5=15marks)	Contain 4 questions, with 2 questions from each theory- based module, of which the student should answer any one from each module. Each question carries 7.5 marks. Marks: (7.5x2 = 15 marks)	2 drawing questions (may have sub questions), from the two drawing-based modules, of which the student should answer anyone. Marks: (20x1 = 20 marks)	50
	Total Marks: 15	Total Marks:	Total Marks:	

		[7.5x2 = 15 marks]	20	

SYLLABUS

MODULE I

Timber and Working with Timber

Timber: Classification use of timber in construction, properties of timber- specification. Types of timber and its suitability for construction.

Seasoning of timber: need for seasoning and various methods of seasoning. Defects in timber – various types and its causes

Modern and traditional methods of treating timber. Treatment of samples of wood in construction yards, analysis and documentation of the same.

Documentation and presentation of wood samples of various species as part of the portfolio.

Working with Timber: Introduction to carpentry-General principles, Various steps involved- required sizes of members. Study of wood joints and its details indoors, windows etc.

Drawings: Wooden joinery for joining vertical, horizontal and inclined members- sketches.

Construction of wood joints in carpentry workshop, discussion on the same with analysis and properties of joints. Site Visit Toda huts, Yurt tents, etc.

MODULE II

Bamboo as a building material

Types, properties, application. Comparison of bamboo with wood. Strength and workability as criteria Various steps involved in working with bamboo, required sizes of members. Methods of joining bamboo for various applications.

Drawings- Joining details of bamboo for various Applications, Construction of bamboo joints in construction yard and documenting and presentation in portfolio.

Site Visit

MODULE III

Concrete

Introduction to concrete as a building material, relevant IS codes Concrete: Ingredients of plain cement concrete-grades, properties- applications and uses. Reinforced cement concrete, water- cement ratio, workability, curing Various types of concrete in construction such as Light weight concrete, Rapid setting concrete etc.

Safe on site experience- concrete – listing out observations, Documentation and presentation through seminar.

Site Visit

MODULE IV

Steel

Steel-physical properties-uses.

Types of steel employed in building construction- properties- uses. Hot rolled steel & cold rolled steel.

Structural steel- Bisteel- Stainless steel- Coated steel- Properties& Use.

Steel as reinforcement in RCC work: Types of reinforcement for concrete–standard forms-cutting, bending and placing of reinforcement.

Site visits to study the aspects of steel reinforcement.

Text books

- Arthur Lyons, 'Materials for Architects and Builders', Elsevier Butterworth-Heinemann, 2004.
- P.C. Varghese, 'Building Materials', Prentice hall of India Pvt Ltd, New Delhi, 2005
- Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada,1958.
- H Leslie Simmons, 'Construction–Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
- P C Varghese, 'Building Materials', Prentice Hall of India Pvt. Ltd, New Delhi, 2010.
- Rosen Harold J, Construction materials for Architecture, Krieger Pub Co,1992
- Doran, David; Cather, Bob; Doran, D.K; Cather, R-Construction materials reference book, Routledge,2013

Reference books

- Relevant BIS codes.
- Traditional architectural Forms of Malabar Coast, Ashalatha Thampuran.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [39 hours]
	MODULE 1 [9hours]	
1.1	**Timber and Working with Timber** Timber: Classification, use of timber in construction. Properties of timber-specification. Types of timber and its suitability for construction	1
1.2	Seasoning of timber: need for seasoning and various methods of seasoning. Defects in timber- various types and its causes	1
1.3	Modern and traditional methods of treating timber. Treatment of samples of wood in construction yards, analysis and documentation of the same	1
1.4	Documentation and presentation of wood samples of various species as part of the portfolio.	1
1.5	Working with Timber: Introduction to carpentry- General principles	1
1.6	Various steps involved- required sizes of members	1
1.7	Study of wood joints and its details in doors, windows etc.	1

1.8	Drawings: Wooden joinery for joining vertical, horizontal and inclined members- sketches.	1
1.9	Construction of wood joints in carpentry workshop, discussion on the same with analysis and properties of joints. *Site Visit.*	1
MODULE II [12 hours]		
2.1	**Bamboo as a building material:** Types, properties, application.	1
2.2	Comparison of bamboo with wood	1
2.3	Strength and workability as criteria Various steps involved in working with bamboo, required sizes of members.	1
2.4	Methods of joining bamboo for various applications.	1
2.5	Drawings-Joining details of bamboo for various Applications	3
2.6	Construction of bamboo joints in construction yard and documenting and presentation in portfolio.	3
2.7	Site Visit	2
MODULE III [12 hours]		
3.1	**Concrete** Introduction to concrete as a building material, relevant IScodes	1
3.2	Concrete: Ingredients of plain cement concrete : grades, properties-applications and uses	1
3.3	Reinforced cement concrete, water-cement ratio, workability, curing .Various types of concrete in construction such as Lightweight concrete, Rapid setting concrete etc.	1
3.4	Safe on site experience-concrete	3
3.5	Listing out observations, Documentation and presentation through seminar.	3
3.6	Site Visit	3
MODULE IV [6 hours]		
4.1	**Steel** Steel – physical properties -uses. Types of steel employed in building construction- properties-uses.	1
4.2	Hot rolled steel & cold rolled steel. Structural steel- Bi steel- Stainless steel- Coated steel- Properties& Use.	1
4.3	Steel as reinforcement in RCC work: Types of reinforcement for concrete – standard forms-cutting, bending and placing of	1

	reinforcement.	
4.4	*Site visits to study the aspects of steel reinforcement.*	3

23ARC206	THEORY OF STRUCTURES II	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Course Objectives

- To develop an overall understanding and interest in structural system
- To calculate the sectional properties (section modulus and radius of gyration) for various sections by working out problems.
- To study the stress – strain behaviors of steel and concrete due to axial loads and to determine the stresses and strains developed in solids due to external action.
- To study the internal stresses (bending and shear stresses) in beams and strength of sections.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies
CO2	Explain the behavior and response of various structural elements under various loading conditions.
CO3	Calculate internal stresses/ strains, stress resultant in structural elements subjected to axial/ transverse loads and bending/twisting moments and present the results graphically
CO 4	Calculate safe load carrying capacity of beams and columns

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓										
CO3	✓	✓										
CO 4	✓	✓										

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember				
Understand	✓			✓
Apply	✓	✓		✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A contains 5 questions with one question from each module, with 4 marks for each question. Answer all questions in Part A. Marks:(5x4=20marks)	Part B contains 10 questions with 2 questions from each module, of which the student should answer any one from each module. Each question carries 8 marks. One or two questions can have subdivisions Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 40 marks	

SYLLABUS

MODULE I : Review of statics and Concept of deformable

Strength, Stiffness, Stability- Bending and Buckling Concept of stress, Types of stresses. Concept of strain, Types of strains. Stress – Strain relation - Hooke's law Young's Modulus of Elasticity, Shear Modulus, Bulk Modulus, Relation between elastic constants (Derivation not required) - Numerical exercise Stress-strain (-)

diagram of mild steel – Proportionality limit, Yield point, Ultimate stress, True and Engineering Stress strain curve, Idealized Stress strain curves. Factor of safety, working stress - Numerical exercise Axially loaded bars with uniform cross section– Calculation of stress, strain and deformation – Numerical exercise Deformation of axially loaded bars with varying axial loads - Numerical exercises - Analysis of axially loaded composite bars (with maximum two materials)

MODULE II : Beams

Different types. - Types of loading on beams. Concept of bending moment and shear force. Practical examples Shear Force and Bending Moment diagrams. Practical significance - Numerical example Cantilever beams with point loads, UDL and moment - Numerical exercises Simply supported beams with point loads, UDL and moments –Numerical exercises Simply supported overhanging beams (one side and both sides) with point load, UDL and moment – Numerical exercises

MODULE III : Theory of simple bending

Assumptions and Limitations Variation of bending stress across the cross section - Maximum bending stress, section modulus, moment of resistance - Practical significance III Section modulus calculation of different cross sections (solid rectangle, hollow rectangle, solid circle, hollow circle, I section) - Numerical exercise CO –2 CO –3. Bending stresses in symmetrical and composite beams – Numerical exercise Calculation of allowable loads in beams based on bending stress criteria. - Proportioning of beam sections to carry given load without exceeding the allowable bending stress - Numerical exercises

MODULE IV : Shear stress in beams

Shear stress in beams (Derivation of equation not required) Variation of shear stress across various cross sections – rectangular, circular and triangular sections (Derivation required) Calculation of shear stress in symmetric cross sections - Numerical exercise Calculation of allowable loads in beams- based shear stress criteria – Numerical exercises

MODULE V : Concept of torsion

Torsion equation (Derivation not required), Assumptions, Torsional stresses in circular sections, Polar moment of inertia, Polar modulus - Practical significance Torsion of solid and hollow circular shafts, Variation of stress across the cross section - Numerical exercise Power transmitted by circular shafts and hollow circular shafts. - Proportioning the shafts to transmit a given power based on shear stress and angle of twist considerations Numerical exercise Definitions of Columns and Struts – Long, Medium, and Short columns – Effective Length – Slenderness Ratio Critical load – Safe load — Different end conditions — Euler's formula for critic al load for columns with different end conditions (derivations not required)— Assumptions and its limitations Effective length of columns with different end conditions - Numerical exercise Determination of the strength of columns – Proportioning of column sections - Numerical exercises

Text books

1 Gere and Timoshenko, Mechanics of Materials, CBS- Distributors and Publishers

2 Stephen Timoshenko, Strength of Materials, Part 1

3 Elementary Theory and Problems, CBS· Publishers and Distributors
4 Stephen Timoshenko, Strength of Materials, Part 2
5 Advanced Theory and Problems, CBS· Publishers and Distributors

Reference books

5. Henry J., Covan, Architectural structures: An introduction to structural mechanics, Pitman· Publishing Philip Garrison, Basic structures for engineers and architects, Wiley – Blackwell· publishers
6. Francis D. K. Ching, Barry S. Onouye, Douglas Zuberbuhler, Building structures· illustrated, Wiley publishers
7. R.K Bansal., Strength of Materials, Lakshmi Publications PvtLtd·
8. Benjamin J., Engineering Mechanics, Pentex Book Publishers and Distributors
9. S. Ramamrutham., Strength of Materials, Dhanpat Rai Publishing· Company Pvt
10. Junarkar S. B. and Shah S. J., Mechanics of Structures (Vol. I), 30/e, Charotar Publishing· House Pvt. Ltd., New Delhi, 2012
11. Punmia B. C., A. K. Jain and A. K. Jain, Strength of Materials· & Theory of Structures (Vol.I), Laxmi Publications, New Delhi, 2013.
12. Vaidyanathan R. and P. Perumal, Structural Analysis (Vol.I), Laxmi·Publications,2004 A. P. Dongre , Structural Engineering for Architecture, Scitech Publications Ltd.·

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1 [8 hours]	
1.1	Review of statics	1
1.2	Concept of deformable bodies–Strength, Stiffness, Stability-Bending and Buckling	1
1.3	Concept of stress, Types of stresses. Concept of strain, Types of strains. Stress–Strain relation- Hooke's law	1
1.4	Young's Modulus of Elasticity, Shear Modulus, Bulk Modulus, Relation between elastic constants (Derivation not required)-Numerical exercise	1
1.5	Stress-strain (-) diagram of mild steel–Proportionality limit, Yield point, Ultimate stress, True and Engineering Stress strain curve, Idealized Stress strain curves. Factor of safety, Working stress- Numerical exercise	1
1.6	Axially loaded bars with uniform cross section – Calculation of stress, strain and deformation– Numerical exercise	1
1.7	Deformation of axially loaded bars with varying axial loads-Numerical exercise	1

1.8	Analysis of axially loaded composite bars (with maximum two materials)- Numerical exercises	1
MODULE II [8 hours]		
2.1	Beams–Different types. -Types of loading on beams.	1
2.2	Concept of bending moment and shear force. Practical examples	1
2.3	Shear Force and Bending Moment diagrams.	1
2.4	Practical significance –Numerical examples Cantilever beams with point loads, UDL and moment - Numerical exercises Simply supported beams with point loads, UDL and moments –Numerical exercises Simply supported over hanging beams (one side and both sides) with point load, UDL and moment– Numerical exercises	5
MODULE III [7 hours]		
3.1	Theory of simple bending – Assumptions and Limitations	1
3.2	Variation of bending stress across the cross section-Maximum bending stress, section modulus, moment of resistance -Practical significance	1
3.3	Section modulus calculation of different cross sections (solid rectangle, hollow rectangle, solid circle, hollow circle, I section)-Numerical exercise	1
3.4	Bending stresses in symmetrical and composite beams–Numerical exercise	2
3.5	Calculation of allowable loads in beams based on bending stress criteria.- Proportioning of beam sections to carry given load without exceeding the allowable bending stress- Numerical exercises	2
MODULE IV [6 hours]		
4.1	Shear stress in beams (Derivation of equation not required)	1
4.2	Variation of shear stress across various cross sections–rectangular, circular and triangular sections(Derivation required)	1
4.3	Calculation of shear stress in symmetric cross sections-Numerical exercise	2
4.4	Calculation of allowable loads in beams- based shear stress criteria– Numerical exercises	2
MODULE V [7 hours]		
5.1	Concept of torsion- Torsion equation (Derivation not required), Assumptions, Torsional stresses in circular sections, Polar moment of inertia, Polar modulus- Practical significance	1
5.2	Torsion of solid and hollow circular shafts, Variation of stress across the cross section -Numerical exercise	1
5.3	Power transmitted by circular shafts and hollow circular shafts.- Proportioning the Shafts to transmit a given power based on shear stress and angle of twist considerations Numerical exercise	1

5.4	Definitions of Columns and Struts– Long, Medium, and Short columns– Effective Length– Slenderness Ratio	1
5.5	Critical load –Safe load—Different end conditions—Euler's formula for critical load for columns with different end conditions (derivations not required)— Assumptions and its limitations	1
5.6	Effective length of columns with different end conditions-Numerical exercise	1
5.7	Determination of the strength of columns–Proportioning of column sections- Numerical exercise	1

23ARK207	COMPUTER STUDIO AND DIGITAL ART	L	T	P	S	C	Year of Introduction
		0	0	2	2	2	2023

Preamble:

To enable the students to prepare documents, images, and drawings for presentation during various stages of design development.

Prerequisite: Nil

Course Outcomes After the completion of the course the student will be able:

CO 1	Create, edit, and print word documents, and slide presentations.
CO 2	Create, Edit, and print images and photos
CO 3	Create edit and print 2D CAD drawings
CO 4	Create, and Edit 3D drawings in Sketch up
CO 1	Create, edit, and print word documents, and slide presentations.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓				✓			✓		✓		
CO 2	✓				✓			✓		✓		
CO 3	✓				✓			✓		✓		
CO 4	✓				✓			✓		✓		
CO 1	✓				✓			✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Practical [P]			Total Marks
		Presentation	Report / Record	Viva	
	10	40	25	25	**100**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	100	-	-

SYLLABUS

MODULE I

Word processing: Creation, Editing and Formatting of MS Word documents. Text Style, Review, Reference Citation, Bibliography and Table of contents in MS Word.

Power Point: Slide design, layout, Smart art graphics, Insertion of drawings, audio/ video clips, charts, transitions, animations, slideshow, record the presentation, export slides as high- resolution images.

Exercise1: Present Basic Design –I Assignment sheet in POWER POINT and submit colour print out.

MODULE II

Image processing: basic image sourcing, editing and insertion for desktop publishing in Adobe Photoshop or similar software. Rendering of architectural drawings using photoshop, GIMP, Adobe Illustrator, or mobile applications.

Exercise2:Present Basic Design-I Assignment in Photoshop/ Gimp and submit colour print out.

MODULE III

Fundamentals of **CAD** software. Settings - Units, Scale, Limits, Commands, Toolbars, Line Type, Line Weight, Colours and Layers. Grid and Snap settings. Simple exercises in 2D CAD software (AutoCAD) specifically for proficiency of, drawing/editing objects.

Exercise3:Present BMCT-I Assignment in CAD

MODULE IV

CAD-Blocks, Text, Dimension. Use of templates, Viewport, Layout settings and Printing.

Exercise4: Submit black and white print out of BMCT-I Assignment with formatting, labels, and dimensions.

MODULE V

Sketch up – 2D and 3D.

Exercise5: Create 3D view of the Architectural Design-I project using Sketch up and submit print out of 3D image

Reference Books

- Foulkes, L.(2020). Learn Microsoft Office 2019: A Comprehensive Guide to Getting Started with Word, Power Point, Excel, Access, and Outlook. Packet Publishing Ltd.
- Evening, M.(2009). Adobe Photoshop CS4 for Photographers: Learn Photoshop the Martin Evening Way!. CRC Press.
- Jain ,S., & Geetha, M.(2018).Corel Draw training guide. BPB Publications.

- Lecarme, O.,& Delvare, K.(2013).The book of GIMP: A complete guide to nearly everything. No Starch Press.
- Omura, G., & Benton, B.C.(2013). Mastering AutoCAD 2014 and Auto CADLT 2014: Autodesk Official Press. John Wiley & Sons.
- Schreyer, A.C.(2012). Architectural Design with Sketch Up: Component-based Modeling, Plugins,
- Rendering, and Scripting. John Wiley & Sons.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [26 hours]
	MODULE 1 [4hours]	
1.1	**Word processing**: Creation, Editing and Formatting of MS Word documents.	1
1.2	Text Style, Review, Reference Citation, Bibliography and Table of contents in MS Word.	1
1.4	**Power Point**: Slide design, layout, Smart art graphics, Insertion of drawings, audio/video clips, charts, transitions, animations, slide show, record the presentation, export slides as high- resolution images.	1
1.5	**Exercise 1**: Present Basic Design- I Assignment sheet in POWERPOINT and submit colour print out.	1
	MODULE II [5 hours]	
2.1	**Image processing**: basic image sourcing, editing and insertion for desktop publishing in Adobe Photoshop or similar software.	2
2.2	**Rendering** of architectural drawings using photoshop, GIMP, Adobe Illustrator, or mobile applications.	2
2.3	**Exercise2**:Present Basic Design-I Assignment in Photoshop/Gimp and submit colour print out	1
	MODULE III [6 hours]	
3.1	Fundamentals of **Computer Aided Design (CAD)** software. Settings- Units, Scale, Limits, Line Type, Line Weight, Colours and Layers.	2
3.2	Grid and Snap settings.	1
3.3	Simple exercises of 2D drafting in CAD software (AutoCAD)- drawing/editing objects.	2

3.4	**Exercise3**: Present BMCT-I Assignment in CAD	1
MODULE IV [6 hours]		
4.1	2D drafting in **CAD**– Creation and editing of Blocks, Adding, and editing of Text and Dimension	2
4.2	Use of templates, Viewports, Layout settings and Printing.	2
4.3	**Exercise 4**: Submit black and white printout of BMCT -I Assignment with formatting labels, and dimensions.	2
MODULE V [5 hours]		
5.1	Introduction to **Sketch up** interface and tools, Drawing and modifying 2D shapes and objects, applying materials, colors, textures, and styles,	2
5.2	Creating, and editing 3D models from 2D drawings.	1
5.3	Using layers, groups, components, and scenes, adding dimensions, annotations and labels, Exporting and printing 2D and 3D drawings	1
5.3	**Exercise 5**: Create 3 D view of the Architectural Design-I project using Sketchup and take print out of 3D image	1

23ARS208	CARPENTRY AND MODELMAKING WORKSHOP	L	T	P	S	C	Year of Introduction
		0	0	2	2	2	2023

Preamble:

To improve the students' overall capability in model making that help them to translate their architectural ideas.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to Understand and use different materials, tools, and machinery for making models. Ability to make true scale models of architectural designs, manually and mechanically and familiarity with carpentry, joinery, smithy and molding with different materials and techniques

CO1	Students will be able to understand the importance of Model making and different types of material, tools and Techniques in model making.
CO2	Students will be able to create geometric and free form models which convey innovative thoughts.
CO3	Students will be able to understand the workshop practice and explore modern manufacturing methods
CO 4	Students will be able to demonstrate different wooden joineries and its applications.
CO5	Students will be able to relate to scaled models to know the geometry of simple and complex built forms.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12
CO1	✓				✓							✓
CO2	✓											✓
CO3	✓									✓		✓
CO 4	✓		✓							✓		✓
CO 5	✓				✓							✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember			✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓

Evaluate			✓	✓
Create	✓	✓	✓	✓

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	Practical [P]			Total Marks
		Presentation	**Report / Record**	**Viva**	
	10	40	25	25	**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	100	----	----

SYLLABUS
MODULE I : Introduction to Model Making
Introduction to various materials for model making like paper, thermocol, clay, ceramic, plastic sheet, sheet metal, wood etc. Selection of material for model making. Introduction to various tools for model making Application of tools, suitability, and safety precautions.
MODULE II : Geometric and Free form
Exercises related to Geometric and free form using various materials such as paper, thermocol, clay, plastic sheet, sheet metal, wood etc.
MODULE III: Workshop
General: Introduction to workshop practice, Safety precautions, Shop, floor ethics, Basic First Aid knowledge. Study of mechanical tools, components, and their applications: Tools, screw drivers, spanners, Allen keys, cutting pliers ate and accessories (b) bearings, Seals, O-rings, circlips, keys etc. **Demonstration on welding practice, Smithy and Sheet metal.** **Introduction to Modern manufacturing methods:** Power tools, CNC machine tools, 3D printing, Glass cutting.
MODULE IV: Carpentry
Understanding of carpentry tools Minimum any Two model- 1. T-Lap joint 2. Cross lap joint 3. Dovetail joint 4. Mortise joints
MODULE V: Architectural models for study and presentation
Models should preferably be coordinated with other subjects like Design/Building technology/Theory of Structure/ History of Architecture etc.

Text books

1. Model Building for Architects and Engineers by John Taylor.
2. Architectural Models by Rolf Janke.
3. Color on Metal by Tim Mc Creight & Nicole Bsullak .
4. The complete book of drawing techniques, by Eugene Felder & Emmett Elvin.
5. Architectural Model making by Nick Dunn.
6. Paper Scissor Glue by Catherine Norman, Ryland Peters & Small

Reference books

1. An Architectural model by Will Strange.
2. Folding Techniques for Designers: From Sheet to Form by Paul Jackson.
   Construction and Design Manual: Architectural Models by Pyo Mi Young

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [26 hours]
	MODULE 1 [2 hours]	
1.1	Introduction to Model Making: Introduction to various materials for model making like paper, thermocol, clay, plastic sheet, sheet metal, wood etc. Selection of material for model making. Introduction to various tools for model making Application of tools, suitability, and safety precautions.	2
	MODULE II [6 hours]	
2.1	Geometric form: Exercises related to Geometric form using various materials such as paper, thermocol, clay, plastic sheet, sheet metal, wood etc.	3
2.2	Free form: Exercises related to Free form using various materials such as paper, thermocol, clay, plastic sheet, sheet metal, wood etc.	3
	MODULE III [6 hours]	
3.1	General: Introduction to workshop practice, Safety precautions, Shop, floor ethics, Basic First Aid knowledge.	2
3.2	Study of mechanical tools, components and their applications: Tools, screw drivers, spanners, Allen keys, cutting pliers ate and accessories (b) bearings, Seals, O-rings, circlips, keys etc.	2
3.3	Demonstration on welding practice, Smithy and Sheet metal.	1
3.4	Introduction to Modern manufacturing methods: Power tools, CNC machine tools, 3D printing, Glass cutting.	1
	MODULE IV [6 hours]	
4.1	Carpentry: Understanding of carpentry tools and joinery T-Lap joint	2
4.2	Cross lap joint, Dovetail joint	2
4.3	Mortise joints.	2
	MODULE V [6 hours]	
5.1	Architectural models for study and presentation: Models coordinated with other subjects like Design/Building	3

	technology/Theory of Structure/ History of Architecture	
5.2	Model making	3

SEMESTER 3

23ARD301	ARCHITECTURAL DESIGN- II	L	T	P	S	C	Year of Introduction
		0	0	8	8	8	2023

Preamble:

The course is designed so that students can examine the relationships between form and space in the built environment. It also seeks to comprehend the processes involved in a location's transformation into a functional space. Student participation in the design methodology is anticipated through analysis of user needs, regulations, context, site, and environmental factors.

Prerequisite: Architectural Design I

Course Outcomes: After the completion of the course the student will be able to

CO 1	Summarize technical data regarding site, building byelaws, space standards and other architectural design criteria and analyze them for designing multi-unit spaces [Apply].
CO 2	Analyze architectural design cases for designing multi-unit spaces based on different parameters to prepare well defined inferences [Analyze].
CO 3	Apply the knowledge acquired through live and literature data (site, data collection, and case studies) in devising complex space planning solutions [Evaluate].
CO 4	Design a multi-unit space, and prepare presentation drawings with necessary architectural details [Create].

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓				✓	✓	✓		✓		
CO 2	✓	✓		✓		✓	✓	✓	✓	✓		
CO 3	✓	✓	✓	✓				✓				
CO 4	✓	✓	✓	✓	✓	✓	✓	✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Review 1	Review 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate	✓	✓	✓	✓
Create	✓	✓	✓	✓

Assessment tools: Reviews of Data collected, Site study and analysis, user group study and analysis, Concept development and design evolution, drawing preparation and design presentations and models

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Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Studio [P]		Total Marks
		Project-1	Project-2	
	10	90		**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**Jury (Marks)**	**ESE Duration**
200	100	100	Jury

End Semester Examination [ESE]:

ESE will be the portfolio evaluation by a panel of jury members.

SYLLABUS

MODULE I: Minor Project

Literature and Live Case Studies (Group Work) - for single use, multi-unit spaces emphasizing on form, space generation, social, environment and design philosophy.
Typology/Project: Nursery school, health club, restaurant, library, bank, clinic, post office.
Literature Case Studies emphasizing on: Understanding Form and Space Generation - Influence of function on form, Relationship between mass and void; Social Considerations in Design - User behavior and space interaction, Inclusivity and accessibility; Environmental Considerations - Climate-responsive architecture, Use of passive design strategies, Sustainable material choices; Design philosophy of the architect.
Live Case Studies emphasizing on: Site visits, photography, and measured drawings, User behavior and space interaction, Functionality and circulation flow, Climate analysis and environmental impact - Orientation, natural lighting, and ventilation.

MODULE II: Major Project

Design of a public building and outdoor space based on the consideration of the context. Introduction to site planning. Interpretation of site information as a decision-making aid and to design the buildings suitable to climatic conditions. Understanding usage of locally available materials and appropriate construction techniques, in addition to thermal comfort, circulation pattern, furniture arrangement, texture, color etc. in the built environment. Multi use, multifunctional spaces with horizontal development and interconnection between spaces.
Typology/Project: Nursery school, health club, restaurant, library, bank, clinic, post office.

Reference books

1. Time-saver Standards for Building Types. (1980). United Kingdom: McGraw-Hill.
2. Neufert, E., Jones, V. (1988). Architects' Data. United Kingdom: Wiley.
3. Guptill, A. L. (1997). Rendering in Pen and Ink: The Classic Book on Pen and Ink Techniques for Artists, Illustrators, Architects, and Designers. United States: Clarkson Potter/Ten Speed.
4. Ching, F. D. K. (2012). Architecture: Form, Space, and Order. Germany: Wiley.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [104 hours]
MODULE 1 [30 hours]		
1.1	Minor Project : Literature case study and Analysis. Understanding Form and Space Generation - Influence of function on form, Relationship between mass and void; Social Considerations in Design - User behavior and space interaction, Inclusivity and accessibility; Environmental Considerations - Climate-responsive architecture, Use of passive design strategies, Sustainable material choices; Design philosophy of the architect.	15
1.2	Minor Project: Live Case study and analysis Site visits, photography, and measured drawings, User behavior and space interaction, Functionality and circulation flow, Climate analysis and environmental impact - Orientation, natural lighting, and ventilation.	15
MODULE II [74 hours]		
2.1	Major Project: Introduction.	1
2.2	Major Project: Preliminary studies – collecting data from secondary sources. Performing data analysis.	7
2.3	Major Project: Site study and analysis.	8
2.4a	Major Project: Design development - discussion	8
2.4b	Major Project: Design development - Review	10
2.5a	Major Project: Preparation of design drawings- Preliminary	10
2.5b	Major Project: Preparation of design drawings- Final draft	10
2.6a	Major Project: Preparation of finalized design drawings and presentations – virtual and physical models.	10
2.6b	Major Project: finalized design drawings and presentations – virtual and physical models.	10

CO Assessment Sample Questions	
1	Design multi-unit space for Project I and Project II, prepare sheets or reports containing technical data regarding the site, building bylaws, space standards, and other architectural design requirements, along with an analysis of these data. Present the same to a panel for review.
2	Prepare sheets or reports for the analysis of the case related to the projects for designing multi-unit spaces based on various parameters and prepare clearly stated inferences to design multi-unit spaces for Project I and Project II. Present the same to a panel for review.
3	Create intricate space planning solutions for Project I and Project II, by utilizing the knowledge gained from studying and analyzing sites, collecting data, and case studies. Technical drawings should be prepared and presented to a panel for evaluation.
4	Prepare presentation drawings, technical drawings, and virtual and or physical models with necessary architectural details for Project I and Project II. Present the same to a panel for review.

23ARS302	HISTORY OF ARCHITECTURE AND CULTURE- II	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

The course will help the student to develop an understanding of the physical experience of buildings, in order to appreciate the complexity of the physical and metaphysical influences bearing on architecture. The student will develop an understanding of architecture as an outcome of various social, political, and economic influences and as a response to the cultural and climate conditions. The course aims to instill visual and formal analysis of architecture in the minds of students. It will enhance the sketching, written and communication skills of students.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Summarize the principles of Hindu Temple Planning. (Understand)
CO 2	Distinguish Chalukya, Rashtrakuta, Hoysala architecture and identify social, political, and economic influences on architecture. (Understand)
CO 3	Identify characteristics of Dravidian architecture (Understand)
CO 4	Identify characteristics of Indo-Aryan architecture and demonstrate a comparative analysis of Dravidian and Indo-Aryan Architecture. Analyse)
CO 5	Identify characteristics of Kerala architecture and analyse the climatic and geographic influence on architecture.(Analyse)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓								✓	✓		
CO 2	✓								✓	✓		

CO 3	✓								✓	✓		
CO 4	✓								✓	✓		
CO 5	✓						✓		✓	✓		

Assessment Pattern

Bloom's Category	**Continuous Assessment Tools**			**End Semester Examination**
	Test 1	**Test 2**	**Other tools**	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyse			✓	✓
Evaluate				
Create				

Assessment tools: Sketches, interpretation of styles, analysis of buildings, presentations

Mark Distribution of CIA

Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	5 questions with one question from each module, and 4 marks for each question. Answer all questions. Marks: (5x4 = 20 marks)	10 questions with 2 questions from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I

A brief overview of Hindu Architecture- Hindu Temple planning, essential features, philosophy and ritual creating specific architectural vocabulary – Early shrines of the Gupta and Chalukyan periods – Tigawa Temple, Ladh Khan and Durga Temple, Aihole, and Virupaksha Temples, Pattadakal.

MODULE II

Vesara (mixture of the nagara and the dravida styles) Architecture – evolution, Chalukyas of Badami (500-753AD), Rashtrakutas of Manyakheta (750-983AD) in Ellora, and Hoysala empire (1000-1330 AD). The Hoysala temples at Belur, Halebidu and Somnathpura, Virupaksha Temple at Hampi in northern Karnataka.

MODULE III

Dravidian Architecture: Dravidian culture and its relation to Architecture, Rock cut creations under Pallavas, Shore Temple, Mahabalipuram. Dravidian Order seen in Brihadehswara Temple, Tanjore, Meenakshi Temple, Madurai.

MODULE IV

Indo Aryan - Salient features of Indo Aryan Temples. Examples - Lingaraja Temple, Bhuvaneswar; Sun temple, Konarak; Khandarya Mahadev temple, Khajuraho temple complex

MODULE V

Architecture of Kerala

Climatic, Geographical, Geological, Cultural and religious factors that influenced Kerala Architecture – Salient features of domestic and religious Architecture of Kerala. Domestic Architecture – Palaces (Padmanabhapuram palace, Krishnapuram palace) Religious Architecture – Salient features of a Temple- Kaviyoor rock cut temple, Vadakkunathan temple, Sree Padmanabhaswamy temple, Cultural Architecture-temple theatres, Koothambalams

Reference books

1. "A Global History of Architecture", Francis D K ching, Mark M. Jarzombek, Vikramaditya Prakash, Wiley Pub: 2010
2. An Architectural survey of Temples of Kerala, Published by ASI, 1978
3. A. Volwahsen, Living Architecture – India (Buddhist and Hindu), Oxford and IBM, London, 1969
4. Brown Percy, Indian Architecture (Hindu Period) - Taraporevala and Sons, Bombay, 1983.
5. Christopher Tadgell, The History of Architecture in India, Longman Group, U.K. Ltd., London, 1990
6. Gateway to Indian Architecture, Guruswamy Vaidyanathan, Edifice Publication, 2003
7. George Mitchell, Monuments of India, Vol I, Buddhist, Jain, Hindu; Penguin books, 1990
   Marian Moffett, Michael Fazio & Lawrence Wodehouse, A World History of Architecture, McGraw-Hill,2004.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36]
MODULE 1 [8 hours]		
1.1	A brief overview of Hindu Architecture - Hindu Temple planning	1
1.2	Essential features, philosophy and ritual creating specific architectural vocabulary	1
1.3	Early shrines of the Gupta and Chalukyan periods – Tigawa Temple, Ladh Khan and Durga Temple	2
1.4	Aihole, and Virupaksha Temples, Pattadakal.	2
1.5	Features and Sketches	2
MODULE II [8 hours]		
2.1	Vesara (mixture of the Nagara and the Dravida styles) Architecture – evolution	2
2.2	Chalukyas of Badami (500-753AD),	1
2.3	Rashtrakutas of Manyakheta (750-983AD) in Ellora	1
2.4	Hoysala empire (1000-1330 AD), The Hoysala temples at Belur, Halebidu and Somnathpura,	2
2.5	Virupaksha Temple at Hampi in northern Karnataka.	2
MODULE III [6 hours]		
3.1	Dravidian Architecture: Dravidian culture and its relation to Architecture	2
3.2	Rock cut creations under Pallavas, Shore Temple, Mahabalipuram.	1
3.3	Dravidian Order seen in Brihadehswara Temple, Tanjore,	2
3.4	Meenakshi Temple, Madurai.	1
MODULE IV [8 hours]		
4.1	Indo Aryan - Salient features of Indo Aryan Temples.	2
4.2	Examples - Lingaraja Temple, Bhuvaneswar	2
4.3	Sun temple, Konarak	1
4.4	Khandarya Mahadev temple, Khajuraho temple complex	2
4.5	Comparison of Dravidian and Indo Aryan Architecture	1
MODULE V [6 hours]		
5.1	Climatic, Geographical, Geological, Cultural and religious factors that influenced Kerala Architecture	1

5.2	Salient features of domestic and religious Architecture of Kerala.	1
5.3	Domestic Architecture – Palaces (Padmanabhapuram palace, Krishnapuram palace)	1
5.4	Religious Architecture – Salient features of a Temple- Kaviyoor rock cut temple, Vadakkunathan temple,	1
5.5	Sree Padmanabhaswamy temple	1
5.6	Cultural Architecture-temple theatres, Koothambalams	1

CO Assessment Sample Questions	
CO1	Discuss the features of Hindu temple planning. Explain with sketches the characteristic features of Pattadakal temples.
CO2	Discuss the architectural style in the period of Chalukyas, Rashtrakutas and Hoysalas with relevant examples and sketches.
CO3	Discuss Dravidian architecture with relevant examples.
CO4	What are the salient features of Indo Aryan temples? Explain with examples.
CO5	Compare and contrast the domestic and religious architecture of Kerala. Give relevant examples with sketches.

23ARB303	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES -III	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

The course enables students to understand various building materials, their applications and construction methods.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Discuss the properties, types, uses and construction aspects of Iron, Aluminum, Copper, Alloys and glass products in the building industry.
CO 2	Illustrate the different types of shallow foundations.
CO 3	Illustrate the construction details of different types of doors and windows.
CO 4	Examine the relevance of ferrous & nonferrous metals, glass products, shallow foundations, aluminum & steel doors, and windows in the building industry through site visits, case studies, practical exercises, and drawing preparation

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										
CO 2	✓	✓			✓					✓		
CO 3	✓	✓			✓					✓		
CO 4	✓	✓	✓		✓					✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2/ Viva	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test -2/ Portfolio/ Viva	
	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**

100	50	50	3 Hours

End Semester Examination [ESE]: Pattern

There will be three parts; Part A, B and C. Part A (15 marks) will contain 6 questions with at least one question from each module, having 2.5 marks for each question. Students should answer all the questions.

Part B (15 marks) will contain 4 questions with 2 questions from each theory- based modules, of which the student should answer any one from each module. Each question carries 7.5 marks.

Part C (20 marks) will have two drawing questions (may have sub questions), from the two drawing-based modules, of which the student should answer any one. The question carries 20 marks.

PATTERN	PART A	PART B	PART C	ESE
PATTERN 1	6 Questions and at least one from each module Each question carries 2.5 marks. Marks: (6x2.5 =15 marks)	Total 4 Questions; 2 Questions from each theory-based module, and answer any one from each module. Each carry 7 .5 marks. Marks: (2x7.5 =15 marks)	Total 2 Questions; 1 Question from each drawing-based module, and answer any one. It carries 20 marks. Marks: (1x20 = 20 marks)	50
	Total Marks: 15	Total Marks: 15	Total Marks: 20	

SYLLABUS

MODULE I

Nonferrous metals

Forms of iron employed in building construction-wrought iron, cast iron

Aluminum in building construction- properties- advantages - available forms - casting, extrusion, foil, powder & sheet - uses- finishes - anodizing, surface texture, color coating & painting. Applications in buildings.

Copper; Alloys, Other metals- Stainless steels etc.

Exercise: Study of available steel and aluminum products and profiles in building construction, in the market.

MODULE II

Soils and shallow foundations

Load bearing properties of different soils -Bearing Capacity, Safe bearing capacity and methods for improving it.

Site protection: Slope protection- Edge protection- Retaining walls- Materials & Methods.
Shallow foundations: Spread footings – strip footing, stepped footings, isolated footing.
Continuous footing - Strap footing, Combined footing. Mat/ Raft foundation. Foundation walls – concrete foundation walls, concrete masonry foundation walls. Pole foundation and footing for wooden post and steel column.
Exercise: Preparation of center line plan and site visit to study a building set out.
Drawings: Strip footing, stepped footings, isolated footing.
Continuous footing - Strap footing,
Combined footing, Mat/ Raft foundation, RCC footing for wooden post and steel column.

MODULE III

Doors and window systems
Doors - Door types: Metal doors, metal framed doors, plastic doors & glass doors.
Door frames: Rabbet frame, wrap around installation, butt frame installation.
Door operation: Swinging, folding, sliding, revolving doors & coiling doors.
Door designs: Hollow core & solid core, framed & frameless
Special purpose doors: Fire doors
Windows - Window types: Aluminum, Steel and plastic
Window operation: Fixed, casement, awning & hopper, sliding, and pivoting.

Discussion: Comparative study of metal and plastic doors and window systems. Advantages, disadvantages, durability and cost factor.
Exercise: Market surveys of door / window hardware – hinges, locks, latches, handles, door closers, etc. Site visits to see door/ window construction.

Drawings: Construction detail of swinging, folding and sliding doors. Construction details of aluminum and steel windows.

MODULE IV

Glass and glazing
Glass products: Non-sheet products -Glass fibers, Cast glass, Cellular or foamed glass.
Sheet products- Float glass, traditional blown & drawn glass, clear glass, patterned glass, wired glass. 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
Glazing: Single, double and triple glazing Glazed curtain walls & skylights.

Discussion: Use of Glass in different contexts, energy conservation and environmental impact.
Exercise: Market surveys of glass products – sizes and cost. Collection of samples Glazing accessories.

Text books

1. Arthur Lyons, 'Materials for Architects and Builders', Elsevier Butterworth Heinemann, 2004.
2. Francis DK Ching, 'Building Construction Illustrated' (4th edition), Wiley- India, New Delhi, 2012.
3. Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
4. H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
5. P C Varghese, 'Building Materials', Prentice Hall of India Pvt. Ltd, NewDelhi, 2010.

Reference books

1. R Barry, 'The Construction of Buildings (Vol. I-II)', 6th edition, Affiliated East-West Press Pvt. Ltd., New Delhi, 1996.
2. RC Smith & TL Honkala, 'Principles and Practices of Light Construction', Prentice Hall, Englewood Cliff, NJ 07632, 1986.
3. Relevant BIS codes.
4. Rosen Harold J, Construction Materials for Architecture, Krieger Pub Co, 1992.
5. W B McKay, 'Building Construction', Orient Longman 21, London, 1938-44.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1 [6 hours]	
1.1	Forms of iron employed in building construction-wrought iron, cast iron	1
1.2	Aluminum in building construction- properties- advantages - available forms -casting, extrusion, foil, powder & sheet - uses- finishes - anodizing, surface texture, color coating & painting. Applications in buildings.	1
1.3	Copper; Alloys, Other metals- Stainless steels etc.	1
1.4	Exercise: Study of available steel and aluminum products and profiles in building construction in the market.	3
	MODULE II [12 hours]	
2.1	Load bearing properties of different soils -Bearing Capacity, Safe bearing capacity and methods for improving it. Site protection: Slope protection- Edge protection- Retaining walls- Materials & Methods.	1
2.2	Shallow foundations: Spread footings – strip footing, stepped footings, isolated footing. Continuous footing - Strap footing, Combined footing. Mat/ Raft foundation.	1

2.3	Foundation walls – concrete foundation walls, concrete masonry foundation walls. Pole foundation and footing for wooden post and steel column.	1
2.4	Exercise: Preparation of center line plan and site visit to study a building set out.	3
2.5	Drawings: Strip footing, stepped footings, isolated footing. Continuous footing - Strap footing,	3
2.6	Drawings: Combined footing, Mat/ Raft foundation, RCC footing for wooden post and steel column.	3
MODULE III [12 hours]		
3.1	Doors - Door types: Metal doors, metal framed doors, plastic doors & glass doors. Door frames: Rabbet frame, wrap around installation, butt frame installation.	1
3.2	Door operation: Swinging, folding, sliding, revolving doors & coiling doors. Door designs: Hollow core & solid core, framed & frameless Special purpose doors: Fire doors	1
3.3	Windows - Window types: Aluminum, Steel and plastic Window operation: Fixed, casement, awning & hopper, sliding, and pivoting.	1
3.4	Exercise: Market surveys of door / window hardware – hinges, locks, latches, handles, door closers, etc. Site visits to see door/ window construction. Discussion: Comparative study of metal and plastic doors and window systems. Advantages, disadvantages, durability and cost factor.	3
3.5	**Drawings:** Construction detail of swinging, folding and sliding doors.	3
3.6	**Drawings:** Construction details of aluminum and steel windows.	3
MODULE IV [6 hours]		
4.1	**Glass products:** Non-sheet products -Glass fibers, Cast glass, Cellular or foamed glass. Sheet products- Float glass, traditional blown & drawn glass, clear glass, patterned glass, wired glass. 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	1
4.2	**Glazing:** Single, double and triple glazing Glazed curtain walls & skylights.	1

4.3	Discussion: Use of Glass in different contexts, energy conservation and environmental impact. **Exercise:** Market surveys of glass products – sizes and cost. Collection of samples Glazing accessories.	4

CO Assessment Sample Questions	
1	Discuss the properties, types, uses and construction aspects of Iron, Aluminum, Copper, Alloys and glass products in the building industry. Give examples.
2	Compare the different types of shallow foundations. Draw sketches to explain.
3	Draw the door and window details of the following: sliding door, steel window, folding door
4	What are the different glass products used in the building industry? Discuss with relevant examples and details.

23ARB304	CLIMATE AND BUILT FORM – I	L	T	P	S	C	Year of Introduction
		2	0	2	4	4	2023

Preamble:

The course introduces the students to natural and the built environment, ecology, ecosystem, climate and various environmental aspects that need to be considered when designing buildings in the environment. It will enable students to understand environmental challenges and apply responsive design strategies in the design of built environment.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Explain the need for sustainability in architecture
CO 2	Interpret the global and local climates for designing built environment
CO 3	Examine the thermal comfort of a space
CO 4	Apply climate responsive design strategies in the design of shelters for tropical climates

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓		✓				✓					
CO 2	✓		✓		✓							
CO 3	✓	✓										
CO 4	✓				✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	
Evaluate			✓	
Create			✓	

Assessment tools: Site visits for real life situations and observation of ecosystems, lab experiments

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L- T]**			
		Assignment	**Test-1**	**Test-2**	**Total Marks**
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 questions with one question from each module, and 4 marks for each question. Answer all questions. Marks: (5x4 = 20 marks)	10 questions with 2 questions from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 5 X 8 = 40 marks	

SYLLABUS

MODULE I: Environment

Environment
Ecosystems, biomes, food chain and food web, energy cycle. Ecology.
Environmental cycles (water cycle, rock cycle, nitrogen cycle etc.)
Earth as a system.
Human activities affecting earth's balance – resource depletion, pollution
Effects of human activities – species extinction, global warming, climate change, floods, landslides etc.
Need for sustainability – how architecture affects the environment.
(The purpose of the module is to give basic awareness. Not to be taught in detail.)

MODULE II: Introduction to climate

Definitions – climate and weather
Climate and architecture
Need of study – comfort, sustainability
Active and passive systems

Global climatic factors
Climate classifications - global classification (Koppen)
Indian climate classification (SP 41)
Tropical climates and its classification

MODULE III: Climate in site study

Elements of climate
Macro and microclimate
Site climate – factors affecting site climate and their influence on different elements of climate
Urban climate

Exercises (Lab):
1. Measurement of temperature
2. Measurement of humidity
3. Measurement of mean radiant temperature

MODULE IV: Thermal comfort

Thermal balance of the human body – regulatory mechanisms and subjective variables
Thermal comfort – factors affecting thermal comfort
Introduction to thermal comfort indices – effective temperature, corrected effective temperature, bioclimatic chart.
Fanger's model of thermal comfort

Exercises (Lab):
1. Calculation of ET and CET

MODULE V: Climate responsive design for tropical climates

Design considerations for warm humid, hot dry and composite climates.

Text books

1. Koenisberger O. H., Ingersoll T. G., Mayhew A., Szokolay S. V., Manual of Tropical Housing and Building, Orient Blackswan, 1975.

Reference books

1. Givoni B., Man, Climate and Architecture, Elsevier Publishing Company Limited, 1969.
2. Olgyay V., Design with Climate, Princeton University Press, 2015.
3. Krishan A., et al., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw-Hill Education, 2001.
4. Baker N., Steemers K. Daylight Design of Buildings: A Handbook for Architects and Engineers, Routledge, 2014.

5. Miller T.G Jr., Environmental Sciences,
6. SC Sharma & MP Poonia, Environmental Studies
7. OP Gupta, Elements of Environmental Pollution Control
8. SC Sharma, Disaster Management
9. Cunningham, W.P. Cooper, T.H. Gorhani, E &Hepworth, Environmental Encyclopedia
10. E.P. Odum, Ecology
11. Keshav Kant & Rajni Kant, Air Pollution and Control

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [48 hours]
MODULE 1 [10 hours]		
1.1	Environment, Ecosystems.	1
1.2	Biomes, food chain and food web, energy cycle. Ecology.	2
1.3	Environmental cycles (water cycle, rock cycle, nitrogen cycle etc.)	1
1.4	Earth as a system.	1
1.5	Human activities affecting earth's balance – resource depletion, pollution.	2
1.6	Effects of human activities – species extinction, global warming, climate change, floods, landslides etc.	2
1.7	Need for sustainability – how architecture affects the environment. (The purpose of the module is to give basic awareness. Not to be taught in detail.)	1
MODULE II [14 hours]		
2.1	Definitions – climate and weather	1
2.2	Climate and architecture	2
2.3	Need of study – comfort, sustainability	2
2.4	Active and passive systems	2
2.5	Global climatic factors	2
2.6	Climate classifications - global classification (Koppen)	2
2.7	Indian climate classification (SP 41)	1
2.8	Tropical climates and its classification	2

MODULE III [10 hours]		
3.1	Elements of climate	2
3.2	Macro and Micro climate	2
3.3	Site climate – factors affecting site climate and their influence on different elements of climate	2
3.4	Urban climate	1
3.5	Exercises (Lab): 1. Measurement of temperature	1
3.6	Exercises (Lab): 2. Measurement of humidity	1
3.7	Exercises (Lab): 3. Measurement of mean radiant temperature	1
MODULE IV [8 hours]		
4.1	Thermal balance of the human body – regulatory mechanisms and subjective variables	1
4.2	Thermal comfort – factors affecting thermal comfort	1
4.3	Introduction to thermal comfort indices – effective temperature, corrected effective temperature, bioclimatic chart.	2
4.4	Fanger's model of thermal comfort	2
4.5	Exercises (Lab): 1. Calculation of ET and CET	2
MODULE V [6 hours]		
5.1	Design considerations for warm humid climate.	3
5.2	Design considerations for hot dry climate.	2
5.3	Design considerations for composite climate.	1
CO Assessment Sample Questions		
1	Write short notes on Environment, Ecosystem and Biomes. What are Environmental Cycles? Explain any 3 in detail.	
2	Differentiate between Climate and Weather. Define tropical climates and explain various classifications.	
3	Differentiate between macro and micro climate. What are the elements of climate to be examined during the site analysis phase of an architectural design project.	

4	What is a comfort zone? Calculate the ET and CET of a given space by collecting the necessary real time data. (Lab Experiment)
5	Explain how the plan and form of a building is to be designed for a hot and dry climate. Explain the design considerations while designing a residential building in a warm humid equatorial climate.

23ACC305	THEORY OF STRUCTURES - III	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Preamble:

The goal of this course is to assess the structural response of simple structures subjected to different types of loads. Students are introduced to the concept of determinate beams and indeterminate beams as well as to force and displacement methods of analysis. Special cases of structural response analysis of arches and cables are also introduced in this course. The course will help the students to enhance their problem-solving skills. After this course, the students will be able to perform the analysis of similar problems in real world situations and respond accordingly.

Prerequisite:

Course Outcomes: After the completion of the course the student will be able to

CO 1	Compute the slope and deflection of determinate beams using appropriate methods. (Apply)
CO 2	Explain the concept of static and kinematic indeterminacy and calculate the static and kinematic indeterminacy of structures. (Understanding)
CO 3	Explain the fundamentals of force and displacement methods of analysis (Understanding)
CO 4	Apply specific methods to analyze the structural response of beams and frames without sway subjected to different types of loading. (Apply)
CO 5	Apply suitable methods to analyze the structural response of cables and arches. (Apply)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓										
CO3	✓	✓										
CO4	✓	✓										
CO5	✓	✓										

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	**60**
	Total Marks: 20	Total Marks: 40	

SYLLABUS

MODULE I

Determinate beams – Slope and Deflection of determinate beams only – Conjugate beam method; Moment area method (subjected to concentrated load and full uniformly distributed load only)

MODULE II

Indeterminate beams- Static and kinematic Indeterminacy – Force and displacement methods of analysis Force methods -Consistent deformation method – Analysis of fixed and propped cantilever (subjected to single concentrated load and full uniformly distributed load only)
Analysis of continuous beams using Three moment theorem - Discussion on Support settlement case (Derivation not required)

MODULE III

Displacement method – Slope deflection method- Analysis of beams and frames without sway (subjected to single concentrated load and full uniformly distributed load only) -
Settlement case not required.

MODULE IV

Displacement method – Moment distribution method- Analysis of beams and frames without sway (subjected to single concentrated load and full uniformly distributed load
only) - Settlement case not required.

MODULE V

Arches - Analysis of three hinged arches – Parabolic and segmental arches with supports at same level only
Cables – General cable theorem – Cables under concentrated load and uniformly distributed load – Anchor cables

Text books

1. Junnarkar S. B. and H. J. Shah, Mechanics of Structures, Vol – II, Charotar Publishing House Pvt. Ltd., 2017.
2. Punmia B. C., A. K. Jain and A. K Jain, Theory of Structures (SMTS- II), Laxmi Publications Pvt. Ltd., 2017.
3. Ramamrutham S. and R. Narayan, Theory of Structures, Dhanpat Rai Publishing Company Ltd., 2020
4. H. J. Shah, and Junnarkar S. B., Mechanics of Structures (Vol. I), 30/e, Charotar Publishing House Pvt. Ltd., New Delhi, 2017
5. M.M. Ratwani, S. K. Duggal & V.N. Vazirani, Analysis of Structures, Vol. 1, Khanna Publishers – Delhi, 1987

Reference books

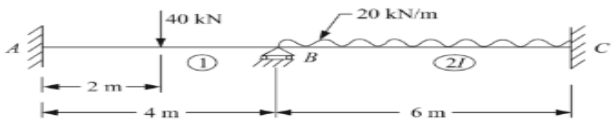
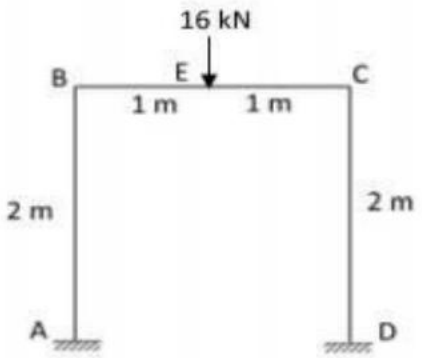
1.Devdas Menon, Structural analysis, Alpha Science International Ltd
2. Timoshenko, S.P. and D.H. Young, Elements of Strength of Materials, Fifth edition, East West Press, 1993.
3. A.R. Jain and B.K.Jain, Theory and analysis of structures, Vol. 1, Nemchand andBros, Roorkee, 1987.
4.R.K. Rajput "Strength of Materials", S.Chand& Company Ltd., New Delhi 1996.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1 (8 Hours)	
1.1	Introduction – slope and deflection in beams, Moment Area Theorems	1
1.2	Moment Area Method-cantilever beams with concentrated load and UDL	1
1.3	Moment Area method –Simply supported beam with Concentrated load and UDL.	2
1.4	Conjugate Beam Method-Introduction, cantilever beam with concentrated load and UDL	2
1.5	Problems on conjugate beam method for simply supported beams	2

MODULE II (7 Hours)		
2.1	Introduction to indeterminate beams, force and displacement method of Analysis	1
2.2	Introduction to Consistent deformation method, Analysis of propped cantilever beams.	2
2.3	Analysis of fixed beams using consistent deformation method	2
2.4	Analysis of continuous beam by three moment equation.	2
MODULE III (7 Hours)		
3.1	Introduction to slope deflection method	1
3.2	Analysis of beams subjected to single concentrated load and full uniformly distributed load only	3
3.3	Analysis of Frames subjected to single concentrated load and full uniformly distributed load only (without sway) settlement case not required	3
MODULE IV (7 Hours)		
4.1	Moment distribution method-Introduction	1
4.2	Analysis of beams subjected to single concentrated load and full uniformly distributed load only	3
4.3	Analysis of Frames subjected to single concentrated load and full uniformly distributed load only (without sway) settlement case not required	3
MODULE V (7 Hours)		
5.1	Introduction to Arches	1
5.2	Analysis of Three hinged arches	2
5.3	Cables –Introduction, General cable Theorems	1
5.4	Analysis of cables under concentrated load	1
5.5	Analysis of cables under udl	1
5.6	Anchor cables	1

CO Assessment Sample Questions	
CO1	1. Explain Moment Area Theorems. 2. Cantilever with a point load at the free end. 3. Simply supported beam subjected to UDL throughout using conjugate beam method.
CO2	1. Distinguish between static indeterminacy and kinematic indeterminacy. 2. Determine the reaction components of propped cantilever subjected to UDL throughout.

CO3	1. Explain force and displacement methods with examples. 2. Explain the steps of consistent deformation method 3. Explain the steps of slope defection method
CO4	1. Analyse the 2 span continuous beam shown in figure using slope deflection  2. Analyse the frame shown in fig by moment distribution method and draw the SFD and BMD. 
CO5	1. A three hinged circular arch hinged at the springing and crown points has a span of 40m and central rise of 8m. It carries a udl of 20kN/m over the left half of the span together with a concentrated load of 100kN at the right quarter span point. Find the reactions at the supports, normal thrust and shear at a section 10m from left support. 2. A bridge cable is suspended from towers 80m apart and carries a load of 30kN/m on the entire span. If the maximum sag is 8m calculate the maximum tension in the cable. If the cable is supported by saddles which are stayed by wires inclined at 30° to the horizontal, determine the forces acting on the towers. If the same inclination of back stay passes over the pulley determine the forces on the pulley.

23ACC306	BUILDING SERVICES-I (PLUMBING AND SANITATION)	L	T	P	S	C	Year of Introduction
		2	0	1	0	3	2023

Preamble:
This course intends to impart knowledge on plumbing and sanitation systems in buildings. The course introduces the fundamental concepts of public water supply and sewerage systems, water supply and wastewater collection and conveyance systems in buildings, decentralized treatment systems and principles of solid waste management.

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Estimate the quantity of water for a locality and explain the quality characteristics. (Apply)
CO 2	Illustrate the public and domestic water supply systems. (Apply)
CO 3	Discuss the wastewater collection and conveyance systems and quantify the wastewater generated. (Understand)
CO 4	Explain the wastewater characteristics and the treatment methods. (Understand, Apply)
CO 5	Describe the classification of solid waste and their management strategies. (Understand)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										
CO 2	✓					✓						
CO 3	✓					✓						
CO 4	✓		✓			✓						
CO 5	✓											

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
2-0-1	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60 Time: 3 hours
	Total Marks: 20	Total Marks: 40	Total Marks: 60

SYLLABUS

MODULE I: Quantity and quality of water

Quantity of water: Sources of water / hydrological cycle – Per capita demand –Types of water demand and factors affecting demand and consumption – design period - population forecasting
Quality of water: Physical and chemical characteristics of water– Drinking water standards – IS10500:2012. Flowchart of a centralized water treatment system (brief description only)
Drawings: Flowchart of a centralized water treatment system

MODULE II: Water Supply Systems

Public supply: Systems of supply - Gravitational, pumping, combined - Water distribution networks
Supply in buildings: House/service connection, capacity of overhead tanks and calculation of water consumption. Domestic water piping systems: Cold and hot water distribution within the building. Plumbing fittings - valves, taps and other fittings for water supply and conveyance
Drawings: Water distribution networks, House/service connection, Cold and hot water distribution within the building, Plumbing fittings

MODULE III: Waste water collection and conveyance

Sanitation in buildings: Preliminary data for design in individual buildings - Sanitary fittings – wash basin, bathtub, water closets etc. –Traps – functions and types - Plumbing systems in buildings.
Quantity of sewage – calculation –sewerage systems - Sewers – types and appurtenances
Drawings: Sanitary fittings, Traps, Plumbing systems in buildings, Sewer appurtenances

MODULE IV: Wastewater Treatment

Wastewater characteristics, Effluent discharge standards, Conventional sewage treatment plant – layout (brief description only), decentralized sewage treatment systems (overview only) - Natural wastewater treatment systems-Oxidation Ponds and Aerated Lagoons-Wetlands and Root- zone systems (Concepts only) – Low cost sanitation - Septic tanks –working and design of septic tank and water absorption systems.
Drawings: Layout of conventional sewage treatment plant, Septic tank and soil absorption system

MODULE V: Solid waste management

Source based classification of solid waste – factors affecting generation – 3R concept – Characteristics of Solid waste - Decentralized solid waste management systems - Composting, Vermicomposting, Bio gas systems

Text books

- B.C Punmia, “Water Supply Engineering”, Laxmi Publications Pvt. Ltd., 2016
- B.C Punmia, “Waste Water Engineering”, Laxmi Publications Pvt. Ltd, 2012
- S.K.Garg, “Water Supply Engineering”, Khanna Publishers. 2010
- S.K. Garg, Environmental Engineering, Vol. II, Khanna Publications, New Delhi, 2009.
- P.N. Modi, Sewage Treatment and Disposal and Wastewater Engineering, Standard Book House, New Delhi, 2008
- George Tchobanoglous, Frank Kreith et al “Handbook of solid waste management.” Mc Graw hill publications –New York

Reference books

- Metcalf and Eddy, Wastewater Engineering Treatment, Disposal and Reuse, Tata McGraw Hill, 2007.
- G. Kiely., Environmental Engineering, McGraw Hill, McGraw Hill, 2009.
- Mark J. Hammer and Mark J. Hammer Jr., Water and Waste Water Technology, Prentice Hall of India Pvt. Ltd. New Delhi, 2009.
- IS 10500:2012, Indian Standard – Drinking Water Specification, Bureau of Indian Standards, New Delhi
- Manual of Sewerage and Sewage Treatment - Central Public Health and

Environmental Engineering Organization, Ministry of Urban Development New Delhi, 2012 • National Building Code of India 2005 – Group 5 – Plumbing Services, Bureau of Indian Standards, New Delhi		
COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36]
MODULE 1 (8 hours)		
1.1	Introduction to building services	1
1.2	Sources of water, Hydrological cycle	1
1.3	Per capita demand	1
1.4	Population forecasting	1
1.5	Population forecasting	1
1.6	Physical and Chemical characteristics of water	1
1.7	Drinking water standards	1
1.8	Flowchart of a centralized water treatment system (Studio)	1
MODULE II (6 hours)		
2.1	Systems of supply of public system	1
2.2	Water distribution networks (Studio)	1
2.3	House/service connection (Studio)	1
2.4	Capacity of overhead tanks	1
2.5	Cold and hot water distribution within the building (Studio)	1
2.6	Plumbing fittings (Studio)	1
MODULE III (8 hours)		
3.1	Introduction to Sanitation in buildings	1
3.2	Preliminary data for design in individual buildings	1
3.3	Sanitary fittings (Studio)	1
3.4	Traps – functions and types (Studio)	1
3.5	Plumbing systems in buildings (Studio)	1
3.6	Quantity of sewage	1
3.7	Sewerage systems	1

3.8	Sewers – types and appurtenances (Studio)	1
MODULE IV (7 hours)		
4.1	Wastewater characteristics	1
4.2	Conventional sewage treatment plant – layout (Studio)	1
4.3	Decentralized sewage treatment systems	1
4.4	Oxidation Ponds and Aerated Lagoons	1
4.5	Wetlands and Root- zone systems	1
4.6	Septic tanks and soil absorption system (Studio)	1
4.7	Design of septic tank and water absorption systems	1
MODULE V (7 hours)		
5.1	Introduction to solid waste management	1
5.2	Source based classification of solid waste	1
5.3	Factors affecting generation	1
5.4	3R concept	1
5.5	Composting	1
5.6	Vermicomposting	1
5.7	Bio gas systems	1

CO Assessment Sample Questions	
CO1	1. Forecast the population of Bankura city to 2041 using (i) Arithmetic increase method; (ii) Geometric increase method; (iii) Incremental increase method for the following census data: Year 1971 1981 1991 2001 2011 Population 18,10,163 21,75,525 24,07,566 2,585,208 26,35,375
	2. Discuss any three chemical characteristics of water.
CO2	3. Explain the various methods of water distribution in a public water supply system.
	4. Describe any five pipe fittings used for water supply in buildings

CO3	5. What are the design considerations for the design of sanitary plumbing systems?
	6. Illustrate the various plumbing systems for collection of wastewater in buildings.
CO4	7. Design a septic tank for a community of population 300 with a sewage flow of 90 lpcd. Assume a soil percolation rate of 105 L/m^2/day. Also, make a neat sketch of the plan and longitudinal section. Assume necessary data.
	8. Explain in detail the characteristics of wastewater.
CO5	9. Classify and categorize solid waste.
	10. Describe composting and biogas systems for the treatment of solid waste.

23ACC307	SURVEYING AND LEVELING	L	T	P	S	C	Year of Introduction
		1	0	1	2	2	2023

Preamble: The course enables students to understand the importance, objectives, principles, and classifications of surveying. The course introduces methods for measurement of distance, calculation of area, computation of angles and determination of elevation of points in surveying. Furthermore, students are introduced to surveying with the help of modern equipment.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Describe the importance, objectives and principles of surveying and determination of area using chain/tape. [Apply]
CO2	Discuss the fundamental aspects of theodolite and compass survey and apply various triangulation techniques in surveying. [Apply]
CO3	Apply the principles of levelling to find the level difference between points in the field. [Apply]
CO4	Use Total station in surveying and area calculations. [Apply]
CO5	Explain the different geospatial data acquisition techniques [Understand]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓								✓	✓		
CO2	✓								✓	✓		
CO3	✓								✓	✓		
CO4	✓								✓	✓		✓
CO5	✓											✓

Assessment Pattern for Theory component

Bloom's Category	Continuous Assessment Tools	
	Presentation/ demonstration (Course work)	Final test & Viva Voce
Remember	✓	✓
Understand	✓	✓
Apply	✓	✓
Analyse		
Evaluate		
Create		

Assessment Pattern for Lab component

Bloom's Category	Continuous Assessment Tools
	Report/Record
Remember	✓
Understand	✓
Apply	✓
Analyse	
Evaluate	
Create	

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]** **Presentation/ demonstration (Course work)**	**Practical [P]** **Report/Record**	**Final test &Viva Voce**	**Total Marks**
1-0-1	10	40	25	25	**100**

Total Marks distribution		
Total Marks	**CIA (Marks)**	**ESE**
100	100	-

SYLLABUS

MODULE I: Chain Surveying, Calculation of area

Introduction: Importance and principles of Surveying.

Chain Surveying: Types of chains and tapes, chaining and ranging, method of taking offsets. Chaining on sloping ground. Errors in chaining.

Calculation of area: General methods of determining areas by dividing the area into triangles. By offsets to base line-average ordinate rule, trapezoidal rule and Simpsons rule

Practical: Computation of area using chain surveying

MODULE II: Compass surveying and Theodolite surveying

Compass Surveying: Bearings and angles, computation of angles from bearings, designation of bearings.

Theodolite Surveying: Theodolite, its temporary and permanent adjustment, measurement of horizontal & vertical angles.

Practical: Computation of height of a building using Theodolite

MODULE III : Levelling and Contouring

Levelling: Principles of leveling; Study of instruments – Dumpy level and leveling staff, Temporary and permanent adjustments of level, Booking and reduction of levels – 'line of collimation method' and 'rise and fall method'. Basic ideas on plotting of longitudinal and cross sections

Contouring – Contour interval, Contour Maps characteristics, use and interpretation.

Practical: Determination of elevation of points on ground by differential levelling

MODULE IV: Modern surveying equipment

Introduction to modern surveying equipment: Total Station, 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.
Practical: Computation of height, distance and area using Total Station

MODULE V: Global Positioning System and Geographical Information System

Global Positioning Systems-Components, principles, and application of GPS
Geographical Information System- Basics, Map projections- methods, components of GIS, GIS operations
Practical: Demonstration of hand held GPS

Text books

1. Punmia, B. C., Jain and Jain, A. K., Surveying (Vol. I and II), Laxmi Publications (P) Ltd., New Delhi, 16th Edition, 2016.
2. Kanetkar and Kulkarni, 'Surveying and Levelling', VolI, Pune VidyarthiGriha, 2008.
3. N. Madhu, R. Sathikumar, Satheesh Gopi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson Education India Publishers2006
4. Agrawal, N. K., 2004, Essentials of GPS, Spatial Networks: Hyderabad.

Reference books

1. Duggal, S. K., Surveying (Vol. I and II), Tata Mc Graw Hill, 2015.
2. Schoffield, W., 2001, Engineering surveying, V edition, Butterworth: Oxford.
3. Kang-tsung Chang, Introduction to GIS, Tata McGraw-Hill Publishing Co. Ltd, 8e, 2016
4. John Ormsbee Simonds, Landscape Architecture, Fourth Edition: A Manual of Land Planning and Design
5. C. Venkatramaiah, Textbook of Surveying, Universities Press (India) Private Limited, 2011
6. James M Andersen, Edward M Mikhail, Surveying Theory and Practice, McGraw Hill education, 7e, 1998
7. Parkinson, B. W., Spilker, J. J., 1996, Global Positioning System: Theory and Applications, Vol 1, American Institute of Aeronautics and Astronautics, Inc.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours (14)
	MODULE 1	
1.1	Introduction: Importance and principles of Surveying, Chain Surveying: Types of chains and tapes,	1
1.2	Chaining and ranging, method of taking offsets, Chaining on sloping ground. Errors in chaining,	1
1.3	Calculation of area: General methods of determining areas- by dividing the area into triangles, By offsets to base line-average ordinate rule, trapezoidal rule and Simpsons rule	1
	MODULE II	
2.1	Compass Surveying: Bearings and angles, Computation of angles from bearings, designation of bearings	1

2.2	Theodolite Surveying: Theodolite, its temporary and permanent adjustment	1
2.3	Measurement of horizontal and vertical angles	1
MODULE III		
3.1	Levelling: Principles of leveling, Study of instruments- Dumpy level and leveling staff, Temporary and permanent adjustments of level	1
3.2	Booking and reduction of levels – line of collimation method, rise and fall method	1
3.3	Basic ideas on plotting of longitudinal and cross-section, Contouring: Contour interval, Contour Maps characteristics, use and interpretation	1
MODULE IV		
4.1	Introduction to modern surveying equipments: Total Station, GPS, Distomat, Digital Levels and Auto-Levels, Electromagnetic distance measurement (EDM)- Principle of EDM	1
4.2	Total Station – Parts of a Total Station – Accessories – Advantages and Applications	1
4.3	Field Procedure for total station survey, Errors in Total Station Survey	1
MODULE V		
5.1	Global Positioning Systems-Components, principles, and application of GPS	1
5.2	Geographical Information System- Basics, Map projections-methods, components of GIS	1

LESSON PLAN FOR LAB COMPONENT (10 hours)

No.	Topic	No. of Hours	Experiment
1	Chain Surveying	2	Computation of area using chain surveying
2	Theodolite	2	Computation of height of a building using Theodolite
3	Differential levelling	2	Determination of elevation of points on ground by differential levelling
4	Total Station	2	Computation of height, distance and area using Total Station
5	Study of Instruments & Repeat class	2	Distomat and handheld GPS

CO Assessment Sample Questions

1

1. Explain the need of working from whole to part in surveying.

2. Explain the method of taking offsets in chain surveying.

3. The following perpendicular offsets were taken from a chain line to an irregular boundary. Calculate area between chain line and irregular boundary by Simpson's rule

Chainage (m)	0	30	60	90	120
Offset length (m)	2.2	3.1	2.4	2.8	3.2

2

1. Following are the observed fore bearings of different survey lines. Determine the corresponding back bearings in reduced bearing system.

Survey line	Fore bearing
AB	120 ° 50'
BC	356 ° 27'
CD	S32° 10' E
DE	N68° 02' W

Differentiate between methods of repetition and reiteration for measurement of horizontal angles.

3

1. Describe the temporary adjustments of dumpy level.

2. The following staff readings were observed in a level field book. Determine the reduced levels of all the stations by 'Height of Instrument' method.. The reduced level of station A is 110.5 m.

Station	B.S	I.S.	F.S.
A	0.665		
B		0.825	
C		2.54	
D	3.20		0.385
E			1.4

3. Determine the reduced levels of stations A, B, C and D by 'Rise and Falll method.

Station	B.S	I.S.	F.S.	Remarks
A	2.285			RL of station A =
B	1.650		2.265	
C		2.105		

<table>
<tr><td></td><td><table>
<tr><td>D</td><td></td><td></td><td>1.960</td><td>100.2m</td></tr>
</table></td></tr>
<tr><td>4</td><td>1. Explain the principle of EDM in total station.
2. Describe the field procedure for total station survey.</td></tr>
<tr><td>5</td><td>1. Explain the principle and components of GPS.</td></tr>
</table>

23ARK308	COMPUTER APPLICATIONS 1	L	T	P	S	C	Year of Introduction
		0	0	2	2	2	2023

Preamble:
The course will enable the students to prepare documents, 3D drawings and images, for presentation during various stages of design development.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Create, Edit analyze and Print spreadsheets with data.
CO 2	Create and Edit Technical Drawings in 3D
CO 3	Render and take printout of 3D Drawings
CO 4	Create, Edit and present 3D animations and walkthroughs
CO 5	Create scaled models using Digital printing and fabrication tools

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓				✓			✓		✓		
CO 2	✓				✓			✓		✓		
CO 3	✓				✓			✓		✓		
CO 4	✓				✓			✓		✓		
CO 5	✓				✓			✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember			✓	
Understand	✓	✓	✓	
Apply	✓	✓	✓	
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Practical [L- T]			Total Marks
		Assignment	Lab Test-1	Lab Test-2/ Portfolio	
	10	60	15	15	**100**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	100	-	-

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
NA	-	-	-

SYLLABUS
MODULE I EXCEL
Excel- Creation, Editing and Formatting of spreadsheets in MS Excel. Data entry and sorting, Generation of tables, graphs and charts, Queries, Formulas, Review and Printing of MS Excel documents.
MODULE II 3D CAD BASICS (AUTOCAD)
Understanding the co-ordinate system, 3D primitives, solid modeling, and surface modeling. Basic exercises in 3D CAD software (AutoCAD). Isometric views, perspectives, manipulation of camera angles, viewpoints, etc.
MODULE III 3D RENDERING AND MODELING
Rendering 3D views using material palettes, colours, textures, shades and shadows. Inserting objects from digital libraries and other sources, using software such as 3DS Max, Lumion, V Ray.
MODULE IV 3D ANIMATION AND WALKTHROUGHS
3D animation, walk-through sequences, superimposing animated videos over base images.
MODULE V 3D PRINTING AND DIGITAL FABRICATION
Introduction to Software and tools for 3D printing, Laser cutting, Digital fabrication

Reference books

1. De Levie, R. (2004). Advanced Excel for scientific data analysis. Oxford University Press, USA.
2. Shoukry, Y., & Pandey, J. (2020). Practical Autodesk AutoCAD 2021 and AutoCAD LT 2021: A no- nonsense, beginner's guide to drafting and 3D modeling with Autodesk AutoCAD. Packt Publishing Ltd.
3. Omura, G., & Benton, B. C. (2013). Mastering AutoCAD 2014 and AutoCAD LT 2014: Autodesk Official Press. John Wiley & Sons.
4. Schreyer, A. C. (2012). Architectural Design with SketchUp: Component-based Modeling, Plugins, Rendering, and Scripting. John Wiley & Sons.
5. Derakhshani, D., & Munn, R. L. (2007). INTRODUCING 3DS MAX 9: 3D FOR BEGINNERS (With CD).John Wiley & Sons.
6. Cardoso, J. (2021). V-Ray 5 for 3ds Max 2020: 3D Rendering Workflows Volume 1. CRC Press.
7. Kuhlo, M., & Eggert, E. (2013). Architectural Rendering with 3ds Max and V-Ray: Photorealistic Visualization Markus Kuhlo. Routledge.
8. Cardoso, C. (2014). Mastering Lumion 3D. Packt Publishing Ltd.
9. Caudron, R., & Nicq, P. A. (2015). Blender 3D By Example. Packt Publishing Ltd.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [24 hours]
MODULE 1 [4 hours]		
1.1	Excel- Creation, Editing and Formatting of spreadsheets in MS Excel.	2
1.2	Data entry and sorting, Generation of tables, graphs and charts, Queries, Formulas, Review and Printing of MS Excel documents.	2
MODULE II [8 hours]		
2.1	Understanding the co-ordinate system, 3D primitives, solid modeling, and surface modeling.	2
2.2	Drafting and editing in 3D CAD software (AutoCAD).	2
2.3	Generation of Isometric views, perspectives, manipulation of camera angles, viewpoints, etc. **Exercise:** Present 3D image created using AutoCAD.	4
MODULE III [4 hours]		
3.1	Rendering 3D views using material palettes, colours, textures, shades and shadows.	2
3.2	Inserting objects from digital libraries and other sources, using software such as 3DS Max, Twin motion, Lumion, V Ray **Exercise:** Submit colour printout of rendered 3D image	2
MODULE IV [4 hours]		
4.1	3D animation, walk-through sequences, superimposing animated videos over base images **Exercise:** Present 3D walkthrough	4
MODULE V [4 hours]		
5.1	Introduction to Software and tools for 3D printing, Laser cutting, Digital fabrication **Project:** Group work to create scaled model.	4

LESSON PLAN FOR LAB COMPONENT			
No.	**Topic**	**No. of Hours**	**Activity**
MODULE I: EXCEL			
1.1	Introduction to MS Excel and Data Entry	1	1. Introduction to the Excel interface, including the ribbon, cells, and worksheets. 2. Create a personal spreadsheet with sample data. 3. Sort and organize the data in the spreadsheet.

1.2	Creating Tables, Graphs, and Charts	1	1. Introduction to the concept of data tables and how to create them. 2. Create different types of graphs and charts from the data. 3. Create a sample table and a pie chart.
1.3	Formulas and Functions	1	1. Introduce basic mathematical functions (e.g., SUM, AVERAGE, MAX, MIN). 2. Introduction to writing custom formulas. 3. Work with a more complex dataset to calculate specific values using formulas.
1.4	Review and Printing	1	1. Discuss document review features like spell check and comments. 2. Adjust the print settings for a given spreadsheet and understand the choices 3. Review and print a sample Excel document.
MODULE II: 3D CAD BASICS (AUTOCAD)			
2.1	Introduction to 3D CAD and AutoCAD Basics	4	1. Familiarizing 3D CAD concepts. 2. Introduction to AutoCAD interface and basic 2D drawing commands. 3. Create 3D primitives (e.g., cubes, spheres).
2.2	Isometric Views and Camera Manipulation	4	4. Introduction to isometric drawing techniques. 5. Adjust viewpoints and manipulate camera angles. 6. Create an isometric drawing.
MODULE III: 3D RENDERING AND MODELING			
3.1	Introduction to 3D Rendering	2	1. Introduction to the basics of 3D rendering, materials, and lighting. 2. Introduce rendering software like 3DS Max or V-Ray.
3.2	Rendering Techniques and Object Insertion	2	1. Discuss shading, shadows, and material palettes. 2. Illustrate inserting 3D objects from libraries. 3. Render a scene.
MODULE IV: 3D ANIMATION AND WALKTHROUGHS			
4.1	Introduction to 3D Animation	2	1. Introduce the basics of 3D animation. 2. Introduce animation software like 3DS Max or Lumion.

4.2	Creating Walkthrough Sequences	2	1. Demonstrate how to set up a camera path. 2. Illustrate camera movement and how to animate objects. 3. Create a walkthrough sequence.
MODULE V: 3D PRINTING AND DIGITAL FABRICATION			
5.1	Introduction to 3D Printing and Digital Fabrication	2	1. Explain the concepts of 3D printing and laser cutting. 2. Introduce relevant software and tools. 3. Discuss the process from digital design to physical object.
5.2	Hands-on 3D Printing and Laser Cutting	2	1. Demonstrate the operation of 3D printers and laser cutters. 2. Guide students through printing and cutting simple objects. 3. Discuss safety and maintenance procedures.
CO ASSESSMENT SAMPLE QUESTIONS			
1	Analyze a dataset of monthly sales figures from the past year.		
2	Create a 3D architectural model of a modern house using AutoCAD.		
3	Create a photorealistic 3D interior rendering of a living room using 3DS Max.		
4	Create a 3D architectural walkthrough of a commercial building project.		
5	Produce a scaled architectural model of a building.		

SEMESTER 4

23ARD401	ARCHITECTURAL DESIGN – III	L	T	P	S	C	Year of Introduction
		0	0	8	8	8	2023

Preamble:

The course introduces the students to issues related with the design of human habitat, its components and space standards. It also helps to understand residential spaces in a specific context, relationship between human behaviour and space through site visits and studio exercises. It also seeks to explore volume of space, shape, form, function, climatic consideration, and material sensitivity through design exercise, and to understand the needs of privacy, communal spaces, efficiency of open spaces and ideas of extended living areas.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Summarize technical data regarding site, building byelaws, space standards, building services and other architectural design criteria and analyze them for designing a residential space. (Remember, Understand, Analyze)
CO 2	Analyze and document case studies for designing a residential space based on different parameters to prepare well-defined inferences. (Understand, Analyze, Evaluate)
CO 3	Apply the knowledge acquired through live and literature data (site, data collection, case studies etc.) in devising complex space planning solutions. (Apply, Analyze, Evaluate, Create)
CO 4	Design a residential space and prepare presentation drawings with necessary architectural details. (Apply, Create)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓				✓	✓	✓		✓		
CO 2	✓	✓				✓	✓	✓	✓	✓		
CO 3	✓	✓						✓				
CO 4	✓	✓			✓	✓	✓	✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools	End Semester Examination (Jury)
	Reviews	
Remember	✓	✓
Understand	✓	✓
Apply	✓	✓
Analyse	✓	✓
Evaluate	✓	✓
Create	✓	✓

Assessment tools: Reviews of Data collected, Site study and analysis, user group study and analysis, Concept development and design evolution, drawing preparation and design presentations and models

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Studio [P]		Total Marks
		Project-1	**Project-2**	
	10	90		**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
200	100	100	Jury

End Semester Examination [ESE]: Pattern

ESE will be the portfolio evaluation by a panel of jury.

SYLLABUS

MODULE I: Minor Project

Documentation of Live Case Study of a Residence/ Rural settlement - its components and space standards.
Documentation shall include:

- Site plan, floor plans, elevations, sections
- Spatial hierarchy and zoning diagrams
- Furniture layouts
- Circulation and movement patterns
- User interaction mapping
- Study of Building Materials & Construction Technology
- Determinants of Built Form – Climatic factors, Social & Cultural Aspects, Technological Impact, Regulatory Framework etc.

Students shall utilize digital scanning tools such as iPad Pro with LiDAR, drone-based mapping, or smartphone apps.

MODULE II: Major Project

Design of a simple building for residential use in the immediate or observable environment with a focus on program and use. Exercises relating personal experiences to behavioral needs and translating them into architectural program requirements.

Reference books

1. Arthur L. Guptill and Susan E. Meyer, 'Rendering in Pen and Ink' , Watson-Guptill, 1997
2. Francis D. K. Ching, 'Architectural Graphics', Wiley, 2009.
3. Francis D. K. Ching, ‘Architecture: Form, Space and Order’, John Wiley & Sons, 2007.
4. Geoffrey Broadbent `Design in Architecture’ John Wiley and Sons, 1973.
5. Neuferts' Architect's Data
6. Simon Unwin, ‘Analizing Architecture’, Routledge, 2003

7. Simon Unwin, 'An Architecture Notebook Wall' Routledge, 2000
8. Simon Unwin, 'Doorway', Routledge, 2007
9. Roth, L. M. 'Understanding Architecture: Its Experience, History and Meaning', 3rd Ed. Philadelphia: West-view press, 2013
10. Rudolf, A 'The dynamics of architectural form', Berkeley and Los Angeles: University of California Press, 1977.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [104]
	MODULE 1 [32 hours]	
1.1	Documentation of Live Case Study of a Residence/ Rural settlement, its components and space standards.	16
1.2	Study based on residential typologies, user needs and its translation into design programs.	8
1.3	Study on building materials, construction technology & the various determinants of built form.	8
	MODULE II [72 hours]	
2.1	Introduction to the initial design parameters which include choice of Geography/situation (context), User Group/development model, and Development guidelines (byelaws).	8
2.2	Data regarding building byelaws, space standards, building services and other architectural design criteria and adopt them for designing a residential space.	8
2.3	Site studies, Analysis and Inferences	8
2.4	Case studies, Analysis and Inference, Design brief	8
2.5	Concept development, Design development/ Form Development	8
2.6a	Detailed drawings, Detailing of architectural features- preliminary	8
2.6b	Detailed drawings, Detailing of architectural features- final	8
2.7	Models	8
2.8	Portfolio preparation	8

		L	T	P	S	C	Year of

23ARS402	HISTORY OF ARCHITECTURE & CULTURE - III						Introduction 2023
		3	0	0	3	3	

Preamble:

The course enables to create an appreciation of architectural developments in the historical context in the minds of students. To explore the cultural and contextual determinants that produced a specific architectural vocabulary. To understand architecture as a process, evolving within specific cultural contexts considering the aspects of politics, religion, society, climate, geography, technology, influences and character of built forms.

Course Outcomes: After the completion of the course the student will be able to

CO1	Discuss the evolution of Church Architecture in a historical context.
CO2	Understand and analyse the architectural characteristics of church architecture of Eastern and Western Roman empire as an outcome of various social, political and economic influences and as a response to the cultural and climate conditions.
CO3	Evaluate the technological innovations in the evolution of church architecture styles in various regions and periods.
CO4	Identify and evaluate renaissance characteristics through visual and formal analysis of architecture
CO5	Compare and discuss cross-cultural linkages in indigenous church architecture of Kerala

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓								✓		
CO 2	✓	✓								✓		
CO 3	✓	✓								✓		
CO 4	✓	✓								✓		
CO 5	✓	✓								✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply				
Analyse	✓	✓	✓	✓
Evaluate				
Create				

Assessment tools: Sketching, site visits, presentations

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 Questions with one question from each module, and 4 marks for each question. Answer all questions in Part A. Marks: (5x4 =20 marks)	10 questions with 2 questions from each module, of which the student should answer any one from each module. One or two questions can have sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I: Early Christian Architecture, Byzantine Architecture

Early Christian Architecture: Typology - Catacombs, earliest churches. Basilican church typology: planning, construction and other features. Old St. Peter's church. **Byzantine Architecture**: Centralized church typology: Spatial planning, construction and other features, Greek cross and Latin cross, knowledge of placing a dome over a regular polygonal plan with pendentives Example- Hagia Sophia, Constantinople. Old St. Peter's church.

MODULE II: Romanesque

Romanesque: Historical Context- Characteristics of Romanesque architecture - Development of Barrel vaulting into groined systems – leading to ribbed vault– Development of church plan. Detail study of Italian Romanesque Architecture - Example - PISA CATHEDRAL WITH BAPTISTERY & CAMPANILE.

MODULE III: Gothic Architecture

Gothic Architecture - Architectural background, Characteristics of Gothic

churches and cathedrals, Evolution of structural systems- Pointed ribbed vaulting, Flying buttresses, Rose windows, Gargoyles, Tracery. Example – REIMS CATHEDRAL, FRANCE

MODULE IV: Renaissance Architecture

Renaissance Architecture - Filippo Brunelleschi, Alberti. Characteristics of Renaissance architecture, Mannerism. Example - CATHEDRAL OF ST. PETER, Characteristics of Baroque architecture- BAROQUE, Detailed study of PIAZZA OF ST. PETER, ROME, ROCOCO STYLE.

MODULE V: Church Architecture of Kerala

Church Architecture of Kerala – Evolution, Characteristics of Indigenous Church Architecture of Kerala, Example – St. Mary's Church, Kalloopara. Advent of Portuguese- Cultural Assimilation - Influences in Church Architecture of Kerala-, Example - St. Mary's Basilica, Kalloorkad.

Reference books

1. Sir Banister Fletcher, A History of Architecture (Century Edition) / Butterworth Heinemann, CBS Publishers & Distributors,1999
2. An Gympel, KONEMANN, The Story of Architecture FROM ANTIQUITY TO THE PRESENT.
3. Pier Liugi Nervi, General Editor – History of World Architecture – Series, HARRY N. Abrams, Inc. Pub, New York, 1972.
4. S .Lloyd and H. W. Muller, History of World Architecture Series, Faber and Faber Ltd., London, 1986. • Spiro Kostof – History of Architecture – Setting and Rituals, Oxford University Press, London,
5. A World History of Architecture / Marian Moffett, Michael Fazio & Lawrence Wodehouse / McGraw-Hill
6. Encyclopedia of Architectural Technology / Ed: Pedro Guedes / McGraw-Hill
7. CRASH COURSE IN ARCHITECTURE / Eva Howarth / Caxton Editions
8. The Great Ages of World Architecture / G. H. Hiraskar / Dhanpat Rai
9. The Civilization of the Renaissance in Italy, 1860, English translation, by SGC Middlemore, in 2 vols., • London, 1878)
10. Erwin Panofsky, Renaissance and Renascences in Western Art, (New York: Harper and Row, 1960)
11. Arnold Hauser, Mannerism: The Crisis of the Renaissance and the Origins of Modern Art, Cambridge: Harvard University Press, 1965, ISBN 0-674-54815-9
12. Wolfflin, Heinrich (1971). Renaissance and Baroque. London: Collins.
13. Stefan Muthesius (1994). Art, architecture and design in Poland, 966-1990: an introduction. K.R. Langewiesche Nachfolger H. Koster Verlagsbuchhandlung. p. 34. ISBN 3-7845-7611-7.
14. Francis Ching, Mark Jarzombek, Vikram Prakash, A Global History of Architecture, Wiley Press, 2006.
15. Jean-Francois Gabriel, "Classical Architecture for the Twenty-first Century", Norton, 2004

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36 hours]
MODULE 1 [8 hours]		
1.1	**Early Christian Architecture**: Typology - Catacombs, earliest churches.	2
1.2	Basilican church typology: planning, construction, and other features.	1
1.3	Old St. Peter's church.	1
1.4	**Byzantine Architecture**: Centralized church typology: Spatial planning, construction and other features	1
1.5	Construction and other features: Greek cross and Latin cross.	1
1.6	Knowledge of placing a dome over a regular polygonal plan with pendentives Example- Hagia Sophia, Constantinople. Old St. Peter's church.	2
MODULE II [6 hours]		
2.1	**Romanesque:** Historical Context- Characteristics of Romanesque architecture	2
2.2	Development of Barrel vaulting into groined systems – leading to ribbed vault– Development of church plan.	2
2.3	Detail study of Italian Romanesque Architecture - Example - PISA CATHEDRAL WITH BAPTISTERY & CAMPANILE.	2
MODULE III [6 hours]		
3.1	**Gothic Architecture** - Architectural background	2
3.2	Characteristics of Gothic churches and cathedrals	1
3.3	Evolution of structural systems- Pointed ribbed vaulting, Flying buttresses	1
3.4	Evolution of structural systems- Rose windows, Gargoyles, Tracery.	1
3.5	Example – REIMS CATHEDRAL, FRANCE	1
MODULE IV [8 hours]		
4.1	**Renaissance Architecture** - Filippo Brunelleschi, Alberti.	2
4.2	Example - CATHEDRAL OF ST. PETER	1
4.3	Characteristics of Renaissance architecture, Mannerism.	2
4.4	Characteristics of Baroque architecture- BAROQUE	2

4.5	BAROQUE, Detailed study of PIAZZA OF ST. PETER, ROME, ROCOCO STYLE.	1
MODULE V [8 hours]		
5.1	**Church Architecture of Kerala** – Evolution, Characteristics of Indigenous Church Architecture of Kerala	2
5.2	Example – St. Mary's Church, Kalloopara.	2
5.4	Advent of Portuguese- Cultural Assimilation - Influences in Church Architecture of Kerala-, Example - St. Mary's Basilica, Kalloorkad.	2
5.5	Comparison – different styles of church architecture	2

CO ASSESSMENT SAMPLE QUESTIONS	
1	How did the Old St. Peter's church exemplify the architectural and design innovations of Early Christian Architecture, and what were its key characteristics?
2	How did the Hagia Sophia exemplify the architectural and design innovations of the Byzantine Architecture, and what were its key characteristics?
3	How did the Romanesque period contribute to the development of church architecture and what were the technological advancements in construction techniques?
4	Elaborate on the Architectural Marvel of St. Peter's Cathedral under the Renaissance Architecture with neat sketches.
5	Elaborate on characteristics of Church Architecture of Kerala with relevant examples and sketches.

23ARS403	LANDSCAPE DESIGN AND SITE PLANNING	L	T	P	S	C	Year of Introduction
		2	0	2	4	4	2023

Preamble:
To enable the students to understand the principles of landscape design, construction techniques, site planning etc. and imbibe the importance of integrating landscape design with the built environment.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Demonstrate a comprehensive understanding of the elements and principles of landscape design and study historic precedents to appreciate their application in design.
CO 2	Analyze site contexts and apply site-planning principles to develop a responsive site design.
CO 3	Apply landscape design principles, including slope analysis, grading, drainage, and landform modifications in design projects.
CO 4	Exhibit knowledge about various construction techniques and plant materials in landscape design.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										✓
CO 2	✓	✓	✓		✓			✓		✓		✓
CO 3	✓	✓			✓			✓				✓
CO 4	✓	✓							✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze	✓	✓	✓	✓
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Assignment	Test-1	Portfolio & Viva	Total Marks
	05	15	15	15	**50**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 3 marks. Marks: (5X3 =15 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 7 marks. Marks: (5x7 = 35 marks)	50
	Total Marks: 15	Total Marks: 35	Total Marks: 50

SYLLABUS

MODULE I: Introduction to Landscape Architecture

Introduction to Landscape Architecture, definition, importance, need and scope.

Landscape elements (Major and Minor Elements, Natural and Manmade elements, Tangible, and Intangible elements, Soft and Hard landscape elements).

Understanding the visual characteristics (color, form, texture) and the non-visual characteristics (smell, touch, sound) of these elements and their application in functional, aesthetic and environmental goals.

Principles of landscape design (harmony, balance, symmetry, contrast, etc.)

Ancient Gardens: Mesopotamia, Persia, Japan, ancient and medieval gardens in India; Mughal and Rajput Landscapes; Colonial landscape development in India (Lutyens Delhi).

MODULE II: Context Analysis and Site Planning Process

Site Studies and Site Planning - Objective of Site Planning, Site Planning Process, Understanding site as an active network, Contextual Analysis - Physiographic, Biological, Land use, Infrastructure, Regulatory, Cultural and Historic contexts.

Elements in site design, considerations and methods used, design process.

Studio Exercise – Develop a site zoning scheme for any building typology based on contextual analysis

MODULE III: Landscape Design

Slope Analysis – Contour interval – Characteristics, uses of contours.

Basic grading principles, Cut and fill processes, Retaining walls. Surface drainage.

Earth form grading; Landform modifications – mounds, berms, swales.

Studio Exercise – Slope Analysis of a contoured site.

MODULE IV: Landscape Engineering &Construction

Circulation: Organization of vehicular and pedestrian circulation, Parking.

Level Changes: Retaining Wall, Steps and Stairs, Ramps and Slopes, Plazas

Planting and Paving: Planters and Beds, Edges and Boundaries, Hardscaping

Water elements: Pool types and water bodies.

MODULE V: Study of Plant Materials

Trees, shrubs, ground cover, climbers, Indoor plants.

Plant selection criteria - Functional, visual, ecological, and microclimatic aspects.

Green Practices, Energy efficient site planning, Role of plant material in environmental improvement (e.g., soil conservation, modification of microclimate). Planting for shelter, windbreaks, and shelterbelts.

Text books

1. Lynch, K. Site Planning, Cambridge: The MIT Press. 1962
2. Motloch, J. L. Introduction to Landscape Design, US: John Wiley and sons
3. Kevin Lynch, 'Site Planning', MIT Press, Cambridge, MA. 1957.
4. White T. Edward, 'Site Analysis: Diagramming Information for Architectural Design',Architectural Media Publisher, 1983

Reference books

1. Bose, T.K. and Choudhary, K. Tropical Garden Plants in Colour. Horticulture and Allied Publishers. 1991.
2. Dee, C. Form and Fabric in Landscape Architecture: A visual introduction, UK: Spon Press.2001
3. Laurie, M. An Introduction to Landscape Architecture, NY: American Elsevier Pub.Co Inc.1975
4. Simonds, J.O. Landscape Architecture: The Shaping of Man's Natural Environment, NY: McGraw Hill Book Co. Inc. 1961.
5. Simonds, J.O. Landscape Architecture: A manual of Site Planning and Design, McGraw Hill, 1961.
6. Thomas H. Russ, 'Site Planning and Design Hand Book', Pearson Education, 2002.
7. John Ormsbee Simonds, 'Landscape Architecture: A manual of Site Planning and Design', McGraw Hill, 1961.
8. McHarg, lan, 'Design with Nature', Wiley Series in Sustainable Design,1995

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [48]

MODULE 1[10 hours]		
1.1	Introduction to Landscape Architecture	1
1.2	Landscape Architecture- definition, importance, need and scope	1
1.3	Role of landscape design in architecture	1
1.4	Landscape elements (Major and Minor Elements, Natural and)Manmade elements	2
1.5	Landscape elements (Tangible, and Intangible elements, Soft and Hard landscape elements).	1
1.6	Understanding the visual characteristics (color, form, texture) and non-visual characteristics (smell, touch, sound) of landscape	1
1.7	Principles of landscape design (harmony, balance, symmetry, contrast, etc.)	1
1.8	Ancient Gardens: Mesopotamia, Persia, Japan	1
1.9	Mughal and Rajput Landscapes in India	1
1.	Colonial landscape development in India (Lutyens Delhi)	1
MODULE II [10 hours]		
2.1	Site Studies and Site Planning - Objective of Site Planning	1
2.2	Site Planning Process.	1
2.3	Understanding site as an active network, Contextual Analysis - Physiographic, Biological, Land use	1
2.4	Understanding site as an active network, Contextual Analysis - Infrastructure, Regulatory, Cultural and Historic contexts	1
2.5	Elements in site design, considerations and methods used	1
2.6	Design process	3
2.7	Studio Exercise – Develop a site zoning scheme for any building typology based on contextual analysis	2
MODULE III [9 hours]		
3.1	Slope Analysis – Contour interval – Characteristics, uses of contours	1
3.2	Basic grading principles	1
3.3	Cut and fill processes	1
3.4	Retaining walls. Surface drainage	1

3.5	Earth form grading; Landform modifications – mounds, berms, swales	1
3.6	Studio Exercise – Slope Analysis of a contoured site	4
MODULE IV [8 hours]		
4.1	Circulation: Organization of vehicular and pedestrian circulation	2
4.2	Parking	1
4.3	Level Changes: Retaining Wall	1
4.4	Steps and Stairs, Ramps and Slopes, Plazas	1
4.5	Planting and Paving: Planters and Beds,	1
4.6	Edges and Boundaries, Hardscaping	1
4.7	Water elements: Pool types and water bodies	1
MODULE V [11 hours]		
5.1	Trees, shrubs	1
5.2	Ground cover, climbers	1
5.3	Indoor plants	1
5.4	Plant selection criteria - Functional	1
5.5	Plant selection criteria - Visual, ecological, and microclimatic aspects	1
5.6	Plant selection criteria - Ecological	1
5.7	Plant selection criteria - Microclimatic aspects	1
5.8	Green Practices	1
5.9	Energy efficient site planning	1
5.10	Role of plant material in environmental improvement (e.g., soil conservation, modification of microclimate)	1
5.11	Planting for shelter, windbreaks, and shelterbelts	1

CO ASSESSMENT SAMPLE QUESTIONS	
CO1	1. Distinguish between tangible and intangible elements of landscape architecture. (Understanding) 2. Analyze the principles of harmony and contrast in the context of Mughal and Rajput Garden designs. (Analysis)

CO2	1. What are the key steps in the site planning process? Explain each step with an example. (Understanding) 2. Why is it important to understand site as an active network in landscape design? Provide examples to support your answer. (Application)
CO3	1. Perform a slope analysis of a given contoured site, explaining the importance of contour intervals. (Analysis) 2. How do landform modifications like mounds and berms contribute to functional and aesthetic design? Illustrate with sketches (Understanding)
CO4	1. Explain how trees, shrubs, and ground covers contribute to soil conservation and microclimate modification. (Remembering) 2. Design a vehicular and pedestrian circulation plan for a mixed-use development. What are the key consideration? (Understanding)

23ARB404	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES - IV	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

The course

- Introduces the study of building materials, their applications and construction methods.
- Familiarize the students with market study of building components and details.
- Enables students to understand conventional as well as vernacular and traditional building materials and practices.
- Enables students to understand prevailing BIS specifications

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Discuss the properties, types, uses and construction aspects of wood substitutes in the building industry.
CO 2	Illustrate the design principles and construction techniques of different types of wall systems in steel, masonry concrete and glass through site visits, practical exercises, and drawings.
CO 3	Illustrate the basic load bearing concepts and construction techniques of different types of floor systems in steel, and concrete with the help of site visits, practical exercises, and drawings.
CO 4	Discuss the basic load bearing concepts and construction techniques of different types of roof systems in steel, and wood with the help of site visits, practical exercises, and drawings.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										
CO 2	✓	✓			✓					✓		✓
CO 3	✓	✓			✓					✓		✓
CO 4	✓	✓	✓		✓					✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Portfolio	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test -2/ Portfolio/ Viva	

	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

There will be three parts; Part A, B and C. Part A (15 marks) will contain 6 questions with at least one question from each module, having 2.5 marks for each question. Students should answer all the questions.

Part B (15 marks) will contain 4 questions with 2 questions from each theory- based modules, of which the student should answer any one from each module. Each question carries 7.5 marks.

Part C (20 marks) will have two drawing questions (may have sub questions), from the two drawing-based modules, of which the student should answer any one. The question carries 20 marks.

PATTERN	**PART A**	**PART B**	**PART C**	**ESE Marks**
PATTERN 1	6 Questions, at least one from each module and each question carries 2.5 marks Marks: (6x2.5 =15 marks)	Total 4 Questions; 2 Questions from each theory-based module, answer any one from each module, and each carry 7.5 marks. Marks: (2x7.5 = 15 marks)	Total 2 Questions, 1 Question from each drawing-based module, answer any one, and each carry 20 marks. Marks: (1x20 = 20 marks.	**50**
	Total Marks: 15	Total Marks: 15	Total Marks: 20	

SYLLABUS

MODULE I: Wood Substitutes.

Industrial products as substitutes for natural hardwood. Characteristics, physical properties, areas of application.

Study of available forms and sizes of Veneers and veneer plywood, particle board, hard board, fiberboard, block board, lamina-boards, glulam, laminates, cement particle board, e-board, bamboo ply, etc.

Site visit: Industries of Wood substitutes

Exercise: Market survey of wood substitutes

MODULE II: Wall systems.

Structural frames, bearing walls and metal stud walls.
Concrete columns, concrete walls, precast concrete walls panels and columns, tilt-up construction. Masonry walls unreinforced and reinforced, solid walls and cavity walls, masonry columns and pilasters, lintels and sunshades, IS Codes
Structural steel framing, steel columns, light gauge steel studs, balloon framing.
Glass block walling system.
Discussion: Aspect ratio and stability of walls
Drawings: Precast concrete walls and connections, lintels and sunshades, Structural steel framing.
Site Visit

MODULE III: Floor systems

Concrete and Steel
Concrete: One-way slab, One-way joist slab, Two-way slab, Two-way slab and Beam, Precast construction, Alternative technology.
Steel: One-way beam system, Two-way beam system, Triple beam system, Moment connections, Shear connections, Semi rigid connections, Open- web steel joists, Metal decking, Light-gauge steel joists.
Discussion: Basic load bearing concepts of floor systems.
Exercise: Site visits to study shuttering and placement of reinforcement for concrete floors and beams.
Drawings: Reinforcement details of one-way slab and two-way slab with beams. Open web steel joist framing.
Metal decking.
Site Visit

MODULE IV: Roof Systems.

Introduction to roof systems of buildings. Flat roof, Sloping roof and curved roof. Deciding the slope or curvature of the roof.
Wooden rafter framing: Roof terminology. Different types of rafter framing and their construction details.
Wood trusses. Construction details of joints and connections of members. Construction details of traditional wood roofs of Kerala.
Structural Steel roof framing: Steel rigid frames, Different types of Steel trusses and their construction details.
Construction details of joints and connections of members.
Introduction to Space frames and Composite roof systems
Discussion: Planning a good roof system. Use roof systems to cater certain functional

needs including environmental control.

Exercise: Documentation of traditional roof systems of Kerala.

Sketches: Steel and Composite roof systems

Site Visit

Text books

1. Arthur Lyons, 'Materials for Architects and Builders', Elsevier Butterworth-Heinemann, 2004.
2. Francis DK Ching, 'Building Construction Illustrated' (4th edition), Wiley-India, New Delhi, 2012.
3. Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
4. H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
5. P C Varghese, 'Building Materials', Prentice Hall of India Pvt. Ltd, New Delhi, 2010.

Reference books

1. RC Smith & TL Honkala, 'Principles and Practices of Light Construction', Prentice Hall, Englewood Cliff, NJ 07632, 1986.
2. Relevant BIS codes.
3. R Barry, 'The Construction of Buildings (Vol. I-II)', 6th edition, Affiliated East-West Press Pvt. Ltd., New Delhi, 1996.
4. Rosen Harold J, Construction Materials for Architecture, Krieger Pub Co, 1992.
5. B McKay, 'Building Construction', Orient Longman 21, London, 1938-44.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1 [9 hours]	
1.1	Wood Substitutes - Industrial products as substitutes for natural hardwood	1
1.2	Characteristics, physical properties of Wood Substitutes	1
1.3	Areas of application of Wood Substitutes	1
1.4	Study of available forms and sizes of Veneers	1
1.5	Veneer plywood, particle board, hard board,	1
1.6	Fiberboard, block board, lamina-boards, glulam, laminates,	1
1.7	Cement particle board,	1

1.8	E-board, bamboo ply, etc.	1
1.9	Site visit: Industries of Wood substitutes	1
1.10	Exercise: Market survey of wood substitutes	1
MODULE II [9 hours]		
2.1	Wall systems. Structural frames, bearing walls and metal stud walls.	1
2.2	Concrete columns, concrete walls, precast concrete walls panels and columns, tilt-up construction.	1
2.3	Masonry walls unreinforced and reinforced, solid walls and cavity walls, masonry columns and pilasters, lintels and sunshades,	1
2.4	IS Codes Structural steel framing, steel columns, light gauge steel studs, balloon framing.	1
2.5	Glass block walling system.	1
2.6	Discussion: Aspect ratio and stability of walls Drawings: Precast concrete walls and connections.	2
2.7	Drawings: RCC lintels and sunshades, Structural steel framing.	2
MODULE III [9 hours]		
3.1	Floor systems Concrete and Steel	1
3.2	Concrete: One-way slab, One-way joist slab, Two-way slab, Two-way slab and Beam	1
3.3	Precast construction, Alternative technology. Steel: One-way beam system, Two-way beam system, Triple beam system,	1
3.4	Moment connections, Shear connections, Semi rigid connections	1
3.5	Open- web steel joists, Metal decking, Light-gauge steel joists	1
3.6	Exercise: Site visits to study shuttering and placement of reinforcement for concrete floors and beams. Drawings: Reinforcement details of one-way slab and two-way slab with beams.	2
3.7	Discussion: Basic load bearing concepts of floor systems. Open web steel joist framing. Metal decking. Site Visit	2
MODULE IV [8 hours]		
4.1	Roof Systems - Introduction to roof systems of buildings. Flat roof, Sloping roof and Curved roof. Deciding the slope or curvature of the roof.	1

4.2	Wooden rafter framing: Roof terminology. Different types of rafter framing and their construction details. Wood trusses.	1
4.3	Construction details of joints and connections of members. Construction details of traditional wood roofs of Kerala.	1
4.4	Structural Steel roof framing: Steel rigid frames, Different types of Steel trusses and their construction details. Construction details of joints and connections of members. Introduction to Space frames and Composite roof systems	1
4.5	Exercise: Documentation of traditional roof systems of Kerala. Sketches: Steel and Composite roof systems	2
4.6	Discussion: Planning a good roof system. Use roof systems to cater certain functional needs including environmental control. Site Visit	2

CO ASSESSMENT SAMPLE QUESTIONS	
PART A	
1	Write a short note on cement particle board.
2	Explain unreinforced masonry walls
3	Explain traditional floor systems.
4	Write a short note on RCC floor
5	What are the key aspects of wood joist framing?
6	Write a brief overview of space frames.
PART B	
CO1	(a) Describe in detail any 5 types of wood substitutes, their properties and application in building construction.
	(b) Describe in detail the available forms and sizes of veneers and veneer plywood.
CO4	(a) Explain in detail the different types of steel trusses and their construction details of joints and connections of members.
	(b) Describe the different types of roof systems used in building construction, its properties and use.
PARTC	
CO2	(a) Draw the construction details of Open web steel joist framing and label all parts.
CO3	(b) Draw the construction details of one way slab and label all the parts and write specifications.

23ARB405	CLIMATE AND BUILT FORM – II	L	T	P	S	C	Year of Introduction
		2	0	1	0	3	2023

Preamble:

The course introduces the students to climate responsive architecture and enable them to apply climate responsive design strategies in the design of built environment. Students will learn the process of building design for climatic context involving solar geometry, natural ventilation and daylighting. Energy efficiency and energy use in building with a brief introduction to energy modelling is introduced through the course.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Apply climate responsive design strategies in the design of shelters for tropical climates
CO 2	Choose materials for building envelops based on the thermophysical properties
CO 3	Experiment with the factors affecting ventilation and daylighting
CO 4	Analyze the climate responsive design strategies used in the existing buildings of tropical climates

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓				✓					
CO2	✓		✓		✓							
CO3	✓	✓										
CO4	✓				✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓		✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 Questions with one question from each module, and 4 marks for each question. Answer all questions in Part A. Marks: (5x4 =20 marks)	10 questions with 2 questions from each module, of which the student should answer any one from each module. One or two questions can have sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: 5 X 8 = 40 marks	

SYLLABUS

MODULE I: Sun and design process

Solar geometry – sun path at different latitudes, Solar angles – altitude and azimuth angles, Solar chart

Designing for the sun – orientation, planning of the rooms; Shading – types of shading devices, Shadow angles and design process of shading devices

MODULE II: Heat transfer in buildings

Heat exchange process in buildings
Thermophysical properties of materials – conductance, resistance and transmittance (U value)
Absorbance reflectance and emittance
Specific heat and thermal capacity
Sol air temperature and solar gain factor
Periodic heat flow

MODULE III: Ventilation, air movement and Daylighting

Ventilation and air movement

Functions of ventilation

Wind and ventilation – factors affecting ventilation

Stack effect and ventilation

Induced ventilation – sun induced and wind induced ventilation

Exercises (Lab):

1. Measurement of wind velocity and wind direction – study on the factors affecting

ventilation in indoor spaces

MODULE IV: Daylighting

Photometric quantities
Components of daylight entering a building
Daylight factor and design sky concepts
Daylighting in tropical climates – warm humid and hot dry climates

Exercises (Lab):

1. Measurement of indoor illumination – study on the effects of opening positions and sizes, effects of shading devices

MODULE V: Application of climate responsive design - examples

Climate response in vernacular buildings – examples from tropical climates.
Climate response in the vernacular architecture of Kerala.
Case studies of climate responsive modern buildings from tropical climates

Text books

1. Koenisberger O. H., Ingersoll T. G., Mayhew A., Szokolay S. V., Manual of Tropical Housing and Building, Orient Blackswan, 1975.

Reference books

1. Givoni B., Man, Climate and Architecture, Elsevier Publishing Company Limited, 1969.
2. Olgyay V., Design with Climate, Princeton University Press, 2015.
3. Krishan A., et al., Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings, Tata McGraw-Hill Education, 2001.
4. Baker N., Steemers K,. Daylight Design of Buildings: A Handbook for Architects and Engineers, Routledge, 2014.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
MODULE 1 [6 hours]		
1.1	Solar geometry – sun path at different latitudes	1
1.2	Solar angles – altitude and azimuth angles	1
1.3	Solar chart	1
1.4	Designing for the sun – orientation, planning of the rooms	1
1.5	Shading – types of shading devices	1
1.6	Shadow angles and design process of shading devices	1
MODULE II [7 hours]		
2.1	Heat exchange process in buildings	1
2.2	Thermophysical properties of materials – conductance, resistance and transmittance (U value)	1

2.3	Absorbance reflectance and emittance	1
2.4	Specific heat and thermal capacity	1
2.5	Sol air temperature and solar gain factor	2
2.6	Periodic heat flow	1
MODULE III [9 hours]		
3.1	Ventilation and air movement	1
3.2	Functions of ventilation	1
3.3	Wind and ventilation – factors affecting ventilation	2
3.4	Stack effect and ventilation	1
3.5	Induced ventilation – sun induced and wind induced ventilation	1
3.6	**Exercises (Lab):** 1. Measurement of wind velocity and wind direction – study on the factors affecting ventilation in indoor spaces	3
MODULE IV [8 hours]		
4.1	Photometric quantities	1
4.2	Components of daylight entering a building	1
4.3	Daylight factor and design sky concepts	1
4.4	Daylighting in tropical climates – warm humid and hot dry climates	2
4.5	**Exercises (Lab):** 1. Measurement of indoor illumination – study on the effects of opening positions and sizes, effects of shading devices	3
MODULE V [6 hours]		
5.1	Climate response in vernacular buildings – examples from tropical climates.	2
5.2	Climate response in the vernacular architecture of Kerala.	2
5.3	Case studies of climate responsive modern buildings from tropical climates	2

CO ASSESSMENT SAMPLE QUESTIONS	
1	Evaluate azimuth angle and altitude angle from sun path diagrams of a location. Design shading devices based on the evaluated angles. Suggest site planning and building design strategies based on the solar geometry.
2	Compare and contrast different building envelope materials based on their thermophysical properties, and justify the selection of the most suitable materials for a tropical climate.
3	Exercises (Lab): 1. Measurement of wind velocity and wind direction 2. Study the factors affecting ventilation in indoor spaces 3. Suggest design strategies for the studied conditions 4. Conduct an experiment or simulation to analyze the impact of various factors (such as building orientation, openings, and shading devices) on daylighting in a tropical building model.
4	Select an existing building in a tropical climate as a case study, analyze its climate-responsive design strategies, and propose modifications to enhance its performance in terms of thermal comfort and sustainability.

23ACC406	THEORY OF STRUCTURES - IV	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Preamble:

The course provides fundamental concepts of reinforced concrete and its design. It enables the students to design and detail reinforced concrete structural elements such as beam, slab, column, and footing. The course also trains the students to use the code of practice for reinforced concrete design, IS 456: 2000.

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Comprehend the design philosophy of the Limit state method. [Understand]
CO 2	Recall the structural behavior of elements subjected to flexure and compression. [Remember]
CO 3	Analyze the reinforced concrete elements such as beam, slab, column and footing subjected to dead and live loads to determine BM, SF, AF, and deflection. [Analyze]
CO 4	Applying the principles of limit state method to design the reinforced concrete elements such as beam, slab, column and footing subjected to dead and live loads following IS 456 and SP 16. [Apply]
CO 5	Preparation of structural drawings of the designed reinforced concrete elements such as beam, slab, column and footing following SP 34. [Apply]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓										
CO3	✓	✓										
CO4	✓	✓	✓									
CO5	✓	✓	✓							✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze	✓	✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assign	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: 40	

SYLLABUS

MODULE I (Introduction to Limit State Method and Design of Singly Reinforced Beams)

Introduction - Plain and reinforced cement concrete - Design loads and load combinations - Design philosophy of Limit state method - Limit state of collapse and Limit state of serviceability - Analysis and design of singly reinforced beams by limit state method, check for deflection and detailing.

MODULE II (Design of Doubly Reinforced and Flanged Beams)

Analysis and Design of Doubly reinforced beams by limit state method, check for deflection and detailing; Concept of T - beams and L - beams (Concept only).

MODULE III (Design of Slabs)

Slabs - Classification - Load distribution and structural action of one way and two way slabs; Design and detailing of One Way slab; Design and detailing of two way slab with corners free to lift up and corners held down condition

MODULE IV (Design of Columns)

Columns - Classification - Effective length - Limit state of collapse - Compression Design and detailing of short columns subjected to axial loads - Column interaction curves; Design and detailing of short columns subjected to combined axial load and uniaxial bending [Using SP 16 Charts].

MODULE V (Design of Footings and Staircase)

Footings - Types of footings; Design and detailing of isolated footings - Square and

Rectangular shapes only - Subjected to Axial compressive loads alone;
Staircase - Structural action of stairs spanning longitudinally and transversely (Concept only)

Text books

1. Unnikrishnan Pillai and Devadas Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1999.
2. M. L. Gambhir, Fundamentals of reinforced concrete design, Prentice Hall India Learning Private Limited, 2006.
3. M. L. Gambhir, Design of reinforced concrete structures, Prentice Hall India Learning Private Limited, 2008.

Reference books

1. R. Park and T. Paulay, Reinforced concrete structures, Wiely, 1975.
2. P. C. Varghese, Limit state design of reinforced concrete, Prentice Hall India Learning Private Limited, 2008.
3. S.N. Sinha, Reinforced Concrete Design – Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1998.
4. P.Dayaratnam, Design of Reinforced Concrete Structures, Oxford and IBH Publishing Co., 1983.
5. C. Sinha and S.K. Roy, Fundamentals of Reinforced Concrete, S.Chand& Co., New Delhi, 1983.
6. B.C. Punmia, Reinforced Concrete Structures, Vol, 1 & 2 Laxmi publications, Delhi, 1994.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours (36)
MODULE 1 (8 Hours)		
1.1	Introduction - Plain and reinforced cement concrete	1
1.2	Design loads and load combinations	1
1.3	Design philosophy of Limit state method - Limit state of collapse and Limit state of serviceability	1
1.4	Analysis of singly reinforced beams	1
1.5	Design of singly reinforced beams - basic rules for design	1
1.6	Design example, check for deflection and detailing	3
MODULE II (7 Hours)		
2.1	Analysis of Doubly reinforced beams	1
2.2	Design of Doubly reinforced beams - design rules	2
2.3	Design examples of Doubly reinforced beams by limit state method	2
2.4	Check for deflection and detailing	1

2.5	Concept of T - beams and L - beams (Concept only)	1
MODULE III (7 Hours)		
3.1	Slabs - Classification - Load distribution and structural action of one way and two-way slabs	1
3.2	Design and detailing of One-Way slab	2
3.3	Design and detailing of two-way slab with corners free to lift up	2
3.4	Design and detailing of two-way slab with held down condition	2
MODULE IV (8 Hours)		
4.1	Columns - Classification - Effective length - Limit state of collapse - Compression	1
4.2	Design rules for short column subjected to axial loads	1
4.3	Design and detailing of short column subjected to axial loads - numerical examples	2
4.4	Column interaction curves	1
4.5	Design rules for short columns subjected to combined axial load and uniaxial bending [Using SP 16 Charts]	1
4.6	Design and detailing of short columns subjected to combined axial load and uniaxial bending [Using SP 16 Charts] - numerical examples	2
MODULE V (6 Hours)		
5.1	Footings - Types of footings	1
5.2	Design principles of isolated footings – Square and Rectangular shapes only - Subjected to Axial compressive loads alone	2
5.3	Design and detailing of isolated footings - square and rectangular shapes only subjected to Axial compressive loads alone - numerical problems	2
5.4	Staircase - Structural action of stairs spanning longitudinally and transversely (Concept only)	1
CO ASSESSMENT SAMPLE QUESTIONS		
CO1	1. Explain the term limit state design. 2. Enumerate the five limit states commonly used in limit state design. 3. Explain the term factored load and characteristic load.	
CO2	1. What are different types of shear reinforcement in beam? 2. What are the purposes of lateral ties in a column? 3. Explain the terms balanced, over reinforced and under reinforced sections. 4. What is meant by equivalent length of a column?	
CO3	1. A rectangular beam 250mm wide and effective depth 450mm has 4 bars of 20mm diameter. Find the moment of resistance of the section	

	if M20 concrete and Fe 415 grade steel are used. As per IS 456:2000 find the limiting moment of resistance also. 2. A square column 300mm x 300 is reinforced with 8 bars of 16mm diameter. Assuming M25 concrete and Fe 415 steel, determine the safe axial load carrying capacity of the column.
CO4	1. Design a one-way slab with 3.5 m clear span supported on 230 mm thick walls on all four sides. The edges are simply supported. The live load on the slab is $2kN/m^2$. Use M20 concrete and Fe 415 steel. 2. Design a short circular column of diameter 50cm and length 3m to carry a factored load of 1200kN and a factored moment of 120kNm. Use M20 concrete and Fe 415 grade steel. Design the lateral reinforcement also.
CO5	1. Draw a typical detailing for a two way slab to show all the reinforcement and mark all reinforcement with assumed values. 2. Draw a typical detailing for a square footing subjected to axial compressive load to show all the reinforcement and mark all reinforcement with assumed values.

23AEC407	BUILDING SERVICES-II (ELECTRICAL, LIGHTING & ILLUMINATION)	L	T	P	S	C	Year of Introduction
		2	1	0	3	3	2023

Preamble:

This course is designed to give an insight for architecture students in setting up electrical systems in buildings. This course covers different wiring systems, illumination systems, earthing systems and protection systems for various installations.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Identify the standards of electric supply systems in buildings.
CO 2	Choose appropriate wiring systems, earthing systems and protection systems for domestic dwellings.
CO 3	Design the electrical layout for any given building.
CO 4	Compare and contrast different illumination systems.
CO 5	Design the interior and exterior lighting systems for various installations.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓					✓		✓				✓
CO 2	✓					✓				✓		
CO 3	✓		✓			✓		✓				✓
CO 4	✓					✓						
CO 5	✓		✓			✓		✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3hrs

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	**60**
	Total Marks: 20	Total Marks: 40	

SYLLABUS

MODULE I: Basics of Electrical systems

Introduction to electrical services, General awareness of IS codes- Introduction of IS 732, IS 5216, IS 2309 -Classification of voltages, standards and specification, Single and three phase supply basics, Supply and distribution of electricity to buildings- Transformer basics, Substations-Types, Symbols used in electrical wiring drawing layouts.

MODULE II: Electrical installations in buildings

Main and distribution boards -Diagram Electric meter-basics, Panel board, MCB, RCCB, MCCB working, uses, fuses-basics and types, Earthing for safety – Types- Pipe earthing, plate earthing, ISI specifications, Lightning protections.

MODULE III: Electrical wiring design

Introduction to Indian electricity rules. Electrical wiring design- Electrical wiring system in domestic and light commercial buildings- Conduits, types of wiring, UG cables-basics, Accessories (Switches and Outlets, switch boards), Basic household wiring components (eg: Ceiling rose) Electrical load calculations Exercise in load calculation. (Numerical based on problems up to sub circuit calculation only for exams)

MODULE IV: Illumination and lighting

Commonly used terms in illumination. Laws of illumination, Measurement of luminous flux and lux meter – Working. Lighting systems for building - Natural/ Artificial Direct/Indirect - General/Local Light sources (Incandescent, Fluorescent,

HID, HPS and LPS, LED-Comparison) and Luminaries - Day lighting and day lighting factor.
Energy efficient lighting, Alternative sources of lighting, Basic idea of solar panels and its installation, Scope of ECBC-Lighting and controls, Electrical and renewable energy systems, Introduction to GRIHA- Criterion related to Energy efficiency and Renewable Energy utilization.

MODULE V: Lighting design and calculation

Lighting design and calculation Local/general lighting calculation-Lumen method Criteria and standards for different purpose/activity illumination-Residence, Office, Institution, Hospital and commercial display lighting. Outdoor lighting– Street Lighting –(Arrangement, Types), flood lighting(Sports stadia) Swimming pool lighting and underwater luminaries.

Text books

- M K Giridharan, Electrical Systems Design Data Hand book, M/s I K International Publishers, New Delhi, 2011 (Data book approved for use in examination)
- Raina & Bhattacharya, Electrical Wiring, Design and Estimation, New Age International Publishers, 1991

Reference books

- Aly.S. Dadras, Electrical systems for Architects, McGraw-Hill Inc.,US, 1995
- H.Cotton, Electrical Technology, Sir Isaac Pitman & Sons, Ltd, 1922
- L.Uppal, Electrical wiring, Estimating and Costing, Khanna Publishers, 1987

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours (36)
	MODULE 1 (6 hours)	
1.1	Introduction to electrical services, General awareness of IS codes-	1
1.2	Introduction of IS 732, IS 5216, IS 2309 -Classification of voltages, standards and specification.	1
1.3	Single and three phase supply basics, Supply and distribution of electricity to buildings.	2
1.4	Transformer basics, Substations-Types.	1
1.5	Symbols used in electrical wiring drawing layouts	1
	MODULE II (8 hours)	
2.1	Main and distribution boards	1
2.2	Diagram Electric meter-basics,	2

2.3	Panel board, MCB	1
2.4	RCCB, MCCB working, uses.	1
2.5	Fuses-basics and types,	1
2.6	Earthing for safety – Types-Pipe earthing, plate earthing,	1
2.7	ISI specifications, Lightning protections	1
MODULE III (8 hours)		
3.1	Introduction to Indian electricity rules.	1
3.2	Electrical wiring design- Electrical wiring system in domestic and light commercial buildings-	2
3.3	Types of wiring, UG cables-basics.	1
3.4	Accessories (Switches and Outlets, switch boards), Basic household wiring components (eg: Ceiling rose)	1
3.5	Electrical load calculations	1
3.6	Exercise in load calculation. (Numerical problems)	1
3.7	Exercise in load calculation. (Numerical problems)	1
MODULE IV (8 hours)		
4.1	Commonly used terms in illumination. Laws of illumination,	1
4.2	Measurement of luminous flux and lux meter – Working	1
4.3	Lighting systems for building Natural/ Artificial Direct/Indirect General/Local	1
4.4	Light sources (Incandescent, Fluorescent, HID, HPS and LPS, LED-Comparison) and Luminaries	1
4.5	Day lighting and day lighting factor. Energy efficient lighting, Alternative sources of lighting.	1
4.6	Basic idea of solar panels and its installation.	1
4.7	Scope of ECBC-Lighting and controls, Electrical and renewable energy system.	1
4.8	Introduction to GRIHA- Criterion related to Energy efficiency and Renewable Energy utilization	1

MODULE V (6 hours)		
5.1	Lighting design and calculation Local/general lighting calculation	1
5.2	Lumen method	1
5.3	Criteria and standards for different purpose/activity illumination-Residence, Office, Institution	1
5.3	Hospital and commercial display lighting.	1
5.4	Outdoor lighting– Street Lighting –(Arrangement, Types), flood lighting (Sports stadia)	1
5.5	Swimming pool lighting and underwater luminaries.	1

CO ASSESSMENT SAMPLE QUESTIONS	
1	What is IS 732? Explain its significance.
2	Why is earthing important for any building? Explain in detail the various methods of earthing.
3	Discuss the steps involved in the electrical wiring design in buildings. A residential building has 3 bedrooms, 1 drawing room, 1 kitchen, 3 bathroom and 1 sit out. Make your own assumption for number of electrical points on each sub-circuit and answer the following 1. Draw the layout of the building with electrical symbols 2. Calculate the connected load 3. Calculate the number of sub-circuits required
4	What are the special features to be considered in lighting for physically handicapped and elderly people? Compare HID lamp and incandescent lamp.
5	A shop 16m x 10m is illuminated with 200W incandescent lamps. If a CU of 0.8 and an MF of 0.75 are selected, and illumination of 260 lux is required at the workplace, Calculate the number of luminaires required. Take the mounting height as 2m.

23ARK408	COMPUTER APPLICATIONS II	L	T	P	S	C	Year of Introduction
		0	0	2	0	0	2023

Preamble:

To enable the students to prepare and use parametric CAD drawings for presentation, quantity estimation and analysis during various stages of design development.

Prerequisite: 23ARK201 Computer Studio and Digital Art.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Create and edit a database for office management
CO 2	Create and Edit parametric CAD drawings
CO 3	Render and create walkthroughs of parametric CAD drawings
CO 4	Calculate quantity estimate from parametric drawings
CO 5	Analyze parametric drawings for energy, wind, thermal comfort, Acoustics etc.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓				✓			✓		✓		
CO 2	✓				✓			✓		✓		
CO 3	✓				✓			✓		✓		
CO 4	✓				✓			✓		✓		
CO 5	✓				✓			✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember			✓	
Understand	✓	✓	✓	
Apply	✓	✓	✓	
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Practical [L- T]			Total Marks
		Assignment	Lab Test1	Lab Test 2 /Portfolio	
	10	60	15	15	**100**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	100	-	-

SYLLABUS

MODULE I

Data-base management: Information filing and profiling, Technical Record-keeping, and document transmission.

MODULE II

Building Information Modeling (BIM) – Introduction

Use of BIM software to create 3D models of buildings and generate 2D drawings and documentation.
BIM workflow, parametric modeling, visualization, and simulation.

MODULE III

BIM – Rendering and Animation
Create realistic and expressive images and videos from BIM models using various software tools. Lighting, materials, textures, cameras, effects, post-processing, keyframes, curves, transitions, and sound.

MODULE IV

BIM –Project management, generate schedules and cost estimates.
Data management, clash detection, coordination, communication, collaboration, and problem-solving using BIM tools and techniques.

MODULE V

Software for simulations studies -
Use of various software applications to analyze the performance of buildings and urban environments in terms of energy efficiency, thermal comfort, daylighting, earthquake, ventilation, acoustics, and wind effects.

Reference books

1. Foulkes, L. (2020). Learn Microsoft Office 2019: A Comprehensive Guide to Getting Started with Word, PowerPoint, Excel, Access, and Outlook. Packt Publishing Ltd.
2. Wing, E. (2016). Autodesk Revit 2017 for Architecture: No Experience Required. John Wiley & Sons.
3. Vandezande, J., Krygiel, E., & Read, P. (2013). Mastering Autodesk Revit Architecture 2014: Autodesk Official Press. John Wiley & Sons.
4. Stine, D. J. (2021). Interior Design Using Autodesk Revit 2022. Sdc Publications.
5. MacKenzie, S. H., & Rendek, A. (2015). ArchiCAD 19–The Definitive Guide. Packt Publishing Ltd.
6. Anderson, K. (2014). Design energy simulation for architects: Guide to 3D graphics. Routledge.
7. Hemsath, T. L., & Bandhosseini, K. A. (2017). Energy modeling in architectural design. Routledge.
8. Oliveira, S., Marco, E., & Gething, B. (2020). Energy modelling in architecture: A practice guide. RIBA Publishing.
9. Garg, V., Mathur, J., & Bhatia, A. (2020). Building Energy Simulation: A Workbook Using Designbuilder™. CRC Press.

10. Baker, N. V., Fanchiotti, A., & Steemers, K. (2013). Daylighting in architecture: A European reference book. Routledge.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [28 hours]
	MODULE I [4 hours]	
1.1	Data-base management: Information filing and profiling.	2
1.2	Technical Record-keeping, and document transmission.	2
	MODULE II [6 hours]	
2.1	Building Information Modeling (BIM) - Introduction	2
2.2	Use of BIM software to create 3D models of buildings and generate 2D drawings and documentation.	2
2.3	BIM workflow, parametric modeling, visualization, and simulation.	2
	MODULE III [6 hours]	
3.1	BIM – Rendering and Animation	2
3.2	Create realistic and expressive images and videos from BIM models using various software tools. Lighting, materials, textures, cameras, effects, post processing, key frames, curves, transitions, and sound.	2
3.3	Effects: Lighting, materials, textures, cameras, effects, post processing, key frames, curves, transitions, and sound.	2
	MODULE IV [4 hours]	
4.1	BIM – Project management, generate schedules and cost estimates.	2
4.2	Data management, clash detection, coordination, communication, collaboration, and problem-solving using BIM tools and techniques	2
	MODULE V [4 hours]	
5.1	Use of various software applications to analyze the performance of buildings and urban environments in terms of energy efficiency and thermal comfort.	2
5.2	Analyze the performance of buildings and urban environments in terms of daylighting and earthquake.	1
5.3	Analyze the performance of buildings and urban environments in terms of ventilation, acoustics, and wind effects.	1

LESSON PLAN FOR LAB COMPONENT

No.	**Topic**	**No. of Hours**	**Activity**
MODULE I: Data-base management			

1.1	Data-base management: Information filing and profiling.	2	1. Database Setup and Fundamentals 2. Data Entry and Validation 3. Querying and Profiling 4. Case Study and Review
1.2	Technical Record-keeping, and document transmission.	2	1. Introduction to Technical Record-keeping 2. Hands-on Technical Documentation 3. Document Transmission Techniques
MODULE II: Building Information Modeling (BIM)			
2.1	Building Information Modeling (BIM) - Introduction	1	1. Overview of BIM 2. BIM Software Familiarization 3. Creating a Basic BIM Model
2.2	Use of BIM software to create 3D models of buildings	2	1. Step-by-Step 3D Model Creation 2. Collaborative BIM Exercise 3. Advanced 3D Modeling Techniques
2.3	Generate 2D drawings and documentation using BIM software	2	1. Introduction to 2D Drawing in BIM 2. BIM Software Tools for 2D Documentation 3. Advanced 2D Documentation Techniques
2.4	BIM workflow, parametric modeling, visualization, and simulation.	1	1. Introduction to BIM Workflow 2. Parametric Modeling Basics 3. Visualization Techniques in BIM 4. Simulation and Analysis in BIM
MODULE III: BIM – Rendering and Animation			
3.1	BIM – Rendering and Animation	2	1. Introduction to Rendering in BIM 2. BIM Rendering Techniques 3. Animating BIM Models
3.2	Create realistic and expressive images and videos from BIM models using various software tools. Lighting, materials, textures, cameras,	2	1. Creating Realistic Images 2. Dynamic Visualization: Video Creation
3.3	Effects, post processing, key frames, curves, transitions, and sound.	2	1. Advanced Effects and Post Processing 2. Sound Integration
MODULE IV: BIM tools and techniques			
4.1	BIM – Project management, generate schedules and cost estimates.	2	1. Introduction to BIM Project Management 2. Creating Project Schedules 3. Cost Estimation in BIM

4.2	Data management, clash detection, coordination, communication, collaboration, and problem-solving using BIM tools and techniques	2	1. Introduction to Data Management in BIM 2. Clash Detection and Coordination 3. Communication and Collaboration in BIM 4. Problem-Solving Techniques
MODULE V: Software for simulations studies			
5.1	Use of various software applications to analyze the performance of buildings and urban environments in terms of energy efficiency and thermal comfort.	2	1. Introduction to Building Performance Analysis 2. Software Tools for Performance Analysis 3. Energy Efficiency Analysis 4. Thermal Comfort Simulation
5.2	Analyze the performance of buildings and urban environments in terms of daylighting and earthquake.	1	1. Daylight Simulation Exercise 2. Software Tools for Seismic Analysis 3. Seismic Analysis Exercise
5.3	Analyze the performance of buildings and urban environments in terms of ventilation, acoustics, and wind effects.	1	1. Software Tools for Ventilation Analysis- exercises 2. Software Tools for Acoustic Analysis 3. Software Tools for Wind Effects Analysis

	COASSESSMENTSAMPLE QUESTIONS
1	Create and edit a database for office management
2	Create and Edit parametric CAD drawings
3	Render and create walkthroughs of parametric CAD drawings
4	Calculate quantity estimate from parametric drawings
5	Analyze parametric drawings for energy, wind, thermal comfort, Acoustics etc.

SEMESTER 5

23ARD501	ARCHITECTURAL DESIGN – IV	L	T	P	S	C	Year of Introduction
		0	0	9	9	9	2023

Preamble:

The course intends to introduce the issues related with design of multi-functional spaces with complex features incorporating built and unbuilt spaces. It helps to study, analyze the site characteristics and summarize the opportunities and potentials in the context of the design problem. It also helps to evolve design solutions for a sustainable space in a specific context by integrating architectural ideals, spatial planning, materials and construction methodology.

Prerequisite: Architectural Design III

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Summarize technical data regarding site, building byelaws, space standards, building services and other architectural design criteria and analyze them for designing multi-functional spaces with complex features.
CO 2	Analyze architectural design cases for designing multi-functional spaces with complex features based on different parameters to prepare well defined inferences
CO 3	Apply the knowledge acquired through live and literature data (site, data collection, case studies etc.) in devising complex space planning solutions.
CO 4	Design multi-functional spaces with complex features and prepare presentation drawings with necessary architectural details.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓				✓	✓	✓		✓		
CO 2	✓	✓					✓	✓	✓	✓		
CO 3	✓	✓				✓		✓				
CO 4	✓	✓			✓	✓	✓	✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools	End Semester Examination (Jury)
	Reviews	
Remember	✓	✓
Understand	✓	✓
Apply	✓	✓
Analyse	✓	✓
Evaluate	✓	✓
Create	✓	✓

Assessment tools: Reviews of Data collected, Site study and analysis, user group study and analysis, Concept development and design evolution, drawing preparation and design presentations and models

Mark Distribution of CIA				
Course Structure [L-T-P]	**Attendance**	**Studio [P]**		**Total Marks**
		Project-1	**Project-2**	
	10	90		**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
200	100	100	--

End Semester Examination [ESE]: Pattern

ESE will be the portfolio evaluation by a panel of jury.

SYLLABUS

MODULE I: Minor Project

Study, analysis and design considerations of site planning and landscape – preparation of detailed drawings and presentations. Focus on the site and context of major project and its relationship to the built environment. Factors- user behavior, services and construction details.

MODULE II: Major Project

Design of multi-functional spaces with complex features incorporating built and unbuilt spaces on vegetated and contoured site. Emphasis on the site and context as prime generators for design decisions.
Typology/ Projects: Resorts, Recreation, Multi-functional Offices, Assembly, Convention, Institution/Education use etc.

Reference books

1. Arthur L. Guptill and Susan E. Meyer, 'Rendering in Pen and Ink' , Watson-Guptill, 1997
2. Francis D. K. Ching, 'Architectural Graphics', Wiley, 2009.
3. Francis D. K. Ching, ‘Architecture: Form, Space and Order’, John Wiley & Sons, 2007.
4. Geoffrey Broadbent `Design in Architecture’ John Wiley and Sons, 1973.
5. Neuferts' Architect's Data
6. Simon Unwin, ‘Analizing Architecture’, Routledge, 2003
7. Simon Unwin, ‘An Architecture Notebook Wall’ Routledge, 2000
8. Simon Unwin, ‘Doorway’, Routledge, 2007
9. Roth, L. M. ‘Understanding Architecture: Its Experience, History and Meaning’, 3rd Ed. Philadelphia: West-view press, 2013
10. Rudolf, A ‘The dynamics of architectural form’, Berkeley and Los Angeles: University of California Press,1977.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [108 hours]
MODULE I [36 hours]		
1.1	Introduction to the Minor project Study on site planning and landscape- topics related.	9
1.2	Site and context and their relationship to the built environment.	9
1.3	Activities, services and construction methods, phenomena of social utilizations, growth and change to be studied and analyzed	9
1.4	Detailed reports and presentations	9
MODULE II [72 hours]		
2.1	Introduction to major project – Space Standards and building codes for the given project and presentation of Data collection	9
2.2	Case studies, Analysis and Inferences	9
2.3	Site studies, Analysis and Inferences	9
2.5	Emphasis on the site and context as prime generators of design decisions. Design brief, Concept development, Design development/ Form Development	9
2.6	Prefinal drawings, Sketching and Detailing of architectural features	9
2.7	Detailed drawings, Detailing of architectural features	9
2.8	Models	9
2.9	Portfolio preparation	9

CO Assessment Questions	
CO1	1) Data regarding site, building bye laws, space standards, user needs, regulations, context, and environmental factors. building services and other architectural design criteria and analyze them for designing
CO2	1) Case study with focus on access, parking, site layout, building layout 2) Case study to study site planning approaches in building projects
CO3	1) Preparation of design solution with focus on site contours, parking, building layout, functional requirements and other context-specific services required. 2) Detailing of spatial layout, site-planning and services, etc.
CO4	1) Presentation of detailed architectural drawings 2) Model

23ARS502	HISTORY OF ARCHITECTURE AND CULTURE-IV	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

The course enables the students to create an appreciation of architectural developments in historical context, to explore the cultural and contextual determinants of Islamic Architecture, determinants that produced a specific architectural vocabulary, and to understand architecture as a process evolving within cultural contexts considering the aspects of politics, religion, society, climate, geography, technology and heritage.

Course Outcomes: After the completion of the course the student will be able to:

CO 1	Demonstrate a comprehensive understanding of Islamic architecture, including their origins, key characteristics, and prominent examples.
CO 2	Critically analyze the influence of determining factors (cultural, social, political, and religious influences) on Islamic architecture
CO 3	Demonstrate an understanding of technological advancements, construction techniques and materials from Islamic architecture
CO 4	Appraise the relevance of Islamic architecture, identifying examples on how the past influences modern architectural practices.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓				✓				✓		
CO 2	✓	✓				✓				✓		
CO 3	✓	✓				✓				✓		
CO 4	✓	✓				✓				✓		
CO 5	✓	✓				✓				✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyse			✓	
Evaluate			✓	
Create			✓	

Assessment tools: Sketches, video presentations

Mark Distribution of CIA

Course Structure [L-T]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 Questions, each question carries 4 marks Marks: (4x5 =20 marks)	There will be 10 questions with 2 questions from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I

Rise of Islam - **Salient features of Mosques**
Parts of a Mosque: Mihrab, Minbar, Dome, Minaret, Pendentive, Squinch, Muqarnas, Arch.
Umayyad Mosque, Great Mosque of Cordoba
Palace of Alhambra. Shah Mosque- Isfahan.

MODULE II

Islam in India – Mamluk dynasty - Qutb Minar, Quwwat-ul – Islam Mosque complex
Khalji Dynasty - Alai Darwaza- Tughlaq dynasty - Tomb of Ghiyas ud din Tughluq, Khirki Masjid
Sayyid dynasty-Tomb of Mohammed Shah, Lodi dynasty - Tomb of Sikander Lodi, Shish Gumbad
Sur dynasty - Tomb of Sher Shah Suri, Purana Quila

MODULE III

Islamic Architecture – Provincial
Architectural Development of the provincial styles in regions of –Punjab, Bengal, Gujarat, Deccan
Example of Punjab style – Tomb of shah Rukni Alam

Example of Bengal style – Chota sona masjid, Gaur
Example of Gujarat style – Jami masjid, Ahmedabad
Examples of Deccan style – Gol gumbaz, Bijapur, & Charminar, Hyderabad

MODULE IV

Islamic Architecture – Mughal
Development of the Mughal style under the different rulers - Babur, Humayun, Akbar, Jahangir, Shahjahan and Aurangzeb
Important examples - Humayun's Tomb
Fatehpur Sikhri- layout and buildings, Akbar's tomb
Taj Mahal – architecture and landscape.
Red Fort- planning and design,
Bibi Ka Maqbara
Mughal landscape with special reference to Shalimar Bagh.

MODULE V

Indo Saracenic architecture - Mysore palace, Senate House (University of Madras), Napier Museum at Thiruvananthapuram
Islamic architecture in Kerala
Cheraman mosque, Juma Masjid Thazhathangadi
Mishkal masjid, calicut.
Video documentation of a mosque of heritage significance and seminar

Text books

1. Brown, P. (1942). Islamic Architecture 3. Hatrle, JC, The Art and Architecture of the Indian Subcontinent (Harmonds worth, Penguin, 1987).
2. Grover, S. (1996). *Islamic architecture in India*. South Asia Books.
3. Shokoohy, M. (2013). Muslim Architecture of South India: The Sultanate of Malbar and the Traditions of Maritime Settlers on the Malabar and Coromandel Coasts (Tamil Nadu, Kerala, and Goa). Routledge.

Reference books

1. Sir Banister Fletcher, "A History of Architecture", CBS Publications (Indian Edition), 1999.
2. A Global History of Architecture/ Francis. D. K. Ching, Mark Jarzombek, Vikramaditya Prakash. Published by John Wiley and sons, Third edition 2017
3. Koch, E. (1991). Mughal Architecture. An Outline of its History and Development (1526-1858).
4. Asher, C. B., Asher, C. E. B., & Asher, C. B. (1992). Architecture of Mughal India (Vol. 4). Cambridge University Press.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1[6 hours]		
1.1	Rise of Islam - Salient features of Mosques	1
1.2	Umayyad Mosque, Great Mosque of Cordoba	1
1.3	Palace of Alhambra.	1
1.4	Shah Mosque- Isfahan.	1

1.5	Parts of a Mosque: Mihrab, Minbar, Dome, Minaret	1
1.6	Pendentive, Squinch, Muqarnas, Arch.	1
MODULE II [8 hours]		
2.1	Islam in India – Mamluk dynasty - Qutb Minar,	1
2.2	Quwwat-ul - Islam mosque complex	1
2.3	Khalji Dynasty - Alai Darwaza	1
2.4	Tughlaq dynasty - Tomb of Ghiyas ud din Tughluq, Khirki Masjid	1
2.5	Sayyid dynasty-Tomb of Mohammed Shah	1
2.6	Lodi dynasty - Tomb of Sikander Lodi, Shish Gumbad	1
2.7	Sur dynasty - Tomb of Sher Shah Suri,	1
2.8	Purana Quila	1
MODULE III [5 hours]		
3.1	ISLAMIC ARCHITECTURE – PROVINCIAL – Example of Punjab style – Tomb of shah Rukni Alam	1
3.2	Example of Bengal style – Chota sona masjid, Gaur	1
3.3	Example of Gujarat style – Jami masjid, Ahmedabad	1
3.4	Examples of Deccan style – Golgumbaz, Bijapur	1
3.5	Charminar, Hyderabad	1
MODULE IV [9 hours]		
4.1	Islamic Architecture – Mughal, Development of the Mughal style under the different rulers – Babur- Gardens	1
4.2	Bega Begam & Akbar: Humayun's Tomb	1
4.3	Fatehpur Sikhri- layout and buildings	1
4.4	Fatehpur Sikhri- layout and buildings	1
4.5	Akbar's tomb	1
4.6	Taj Mahal – architecture and landscape.	1
4.7	Red Fort- planning and design,	1
4.8	Red Fort- planning and design,	1
4.9	Bibi Ka Maqbara Mughal landscape with special reference to Shalimar Bagh.	1

MODULE V [8 hours]		
5.1	Indo saracenic architecture - Mysore palace,	1
5.2	Senate House (University of Madras)	1
5.3	Napier Museum at Thiruvananthapuram	1
5.4	Islamic architecture in Kerala,Cheraman mosque.	1
5.5	Juma Masjid Thazhathangadi	1
5.6	Mishkal masjid, Calicut.	1
5.7	Exercise: Case study, video documentation of a mosque of heritage significance - Seminar	1
5.8	Seminar on the mosque of heritage significance	1

CO Assessment questions	
CO1	Compare and contrast the architectural features of the Palace of Alhambra and the Shah Mosque in Isfahan. How do these structures exemplify the diversity within Islamic architecture?
CO2	Analyze how cultural, social, political, and religious influences shaped the architectural developments during the Mamluk dynasty in India. Provide specific examples from structures like the Qutb Minar and the Quwwat-ul-Islam mosque complex.
CO3	Examine the construction techniques employed in the development of Mughal architecture, with a specific focus on the Taj Mahal. How did the use of materials and construction methods contribute to the durability and aesthetic appeal of this iconic structure?
CO4	Identify and discuss specific instances where Indo-Saracenic architecture, as seen in structures like the Mysore Palace and Senate House, has influenced modern architectural trends. How have these influences been adapted in contemporary constructions?

23ARS503	INTERIOR DESIGN	L	T	P	S	C	Year of Introduction
		1	0	1	2	2	2023

Preamble:

Interior Design, a specialized course within the realm of architecture, primarily focuses on ensuring functional, safe, and visually appealing spaces for inhabitants. This course work is intended to delve into the intricate details and construction techniques intrinsic to interior design. The curriculum encompasses product design elements relevant to interior design and will associate with other subjects like Design, Graphics, Art Appreciation, BMC, and CAD. Furthermore, the course will integrate a small segment dedicated to design exercises, involving current or past semester works, fostering a holistic understanding of design principles and application. The course work also focuses on exercises related to site visits, market surveys, presentations, and reports, all aimed at providing practical experience and enhancing communication and analytical skills within the field of interior design.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Identify and analyse design principles in interiors (Analyse).
CO 2	Comprehend the relationship between spaces, design elements, materials and construction techniques and apply in design of a work space including furniture design (Apply)
CO 3	Apply concepts of color and lighting in the design of interior spaces (Apply)
CO 4	Apply aspects of building services in the design, detailing and basic costing of all the works under the scope of an interior designer (Apply)
CO 5	Draw freehand sketches and views, and demonstrate presentation techniques and use of various presentation medium (Apply)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓									✓		✓
CO 2	✓									✓		✓
CO 3	✓		✓							✓		✓
CO 4	✓		✓		✓					✓	✓	✓
CO 5	✓				✓					✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Portfolio	Other tools	
Remember	✓			✓
Understand	✓	✓		✓
Apply		✓	✓	✓
Analyse	✓	✓		✓
Evaluate		✓		✓
Create			✓	

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Portfolio**	
	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	50	50	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	Part A will contain 2 questions from each of the first four modules, of which the student should answer any one. Each question carries 5 marks. Marks: (4x5 = 20 marks)	Part B will have one drawing question, and there will be two or more sub divisions. The question carries 30 marks. Marks: (1x30= 30 marks)	50
	Total Marks: 20	Total Marks: 30	

SYLLABUS

MODULE I

Principles of interior design
Development of interior design concepts; Classification of decorative design; Elements and principles of design
Case studies to learn its application in interior design.

MODULE II

Ergonomics and Introduction to Furniture and fittings
Importance of ergonomics in work
Furniture and furnishings, Natural elements in interiors and plantscaping details.
Materials in construction and construction techniques – doors, windows, cupboards, partitions, joineries, false ceilings, paneling
Design a work space with furniture using ergonomic principles.

MODULE III

Color
Concept of colour - significance of colour in the interiors and exteriors-Dimensions of colour - Hue, value, intensity, Effects of Hue, value and Intensity; Application of

colour harmonies in the interiors and exteriors –Effects of light on colour, Illusion of colour, psychology of colour, effect of colour on each other.

Lighting

Importance of lighting – Lighting in interiors – importance, classification based on sources, uses, illumination, factors to be considered in lighting for different areas; Artificial lighting - light sources, types and uses of light, specific factors in lighting – measurements of lighting and economy in lighting,

Psychological aspects of light, Avoidance of glare – Glare its types and prevention, Lighting accessories – Selection of lamps and lighting fixtures, lighting for various areas and specific activities, modern features in lighting design.

MODULE IV

Services in interiors

Environmental control in interiors, Mechanical systems - Lifts and Escalators; Sanitary services – Water supply within buildings, drainage system, sanitary fittings; Air conditioning - types of air Conditioning, application in building; Ventilation-natural and mechanical, guidelines for natural ventilation; Electrical services-electrical fixtures and electrical layout; ducting, paneling, false ceiling, material specifications

Drawing - Service layout – electrical, mechanical, sanitary, ducting, fixtures, false ceiling

MODULE V

Presentation in Interior Design

Prepare presentations using various rendering techniques, working drawings and detailing.

Reference books

1. Allison, Diana, Estimating and Costing for Interior Designers: A Step-by-StepWorkbook, Fairchild Books, 2014
2. Bapat S. V., Basic Design & Anthropometry, Pratima Bapat, Pune, 1993.
3. Bapat S. V., Living Areas – Internal Spaces, Pratima Bapat, Pune, 1993.
4. Barratt K., 'Logic and Design: In Art, Science & Mathematics, Design Books, 2005
5. Ching F. D. K., Interior Design Illustrated, John Wiley, 2012.
6. Ching, F. D. K., Architecture - Form, Space & Order, Van Nostrand Reinhold Inc.,1996
7. Halse A. O., Use of Colours in Interiors, McGraw Hill, 1968.
8. Moxon Sian, Sustainability in Interior Design, Laurence King Publishing, March 2012
9. Pickering E., Architectural Design, John Wiley, 1933.
10. Plunkett Drew, Construction and Detailing for Interior Design. Laurence King 2010, 2015
11. William McDonough & Michael Braungart, Cradle to Cradle: Remaking the Way We Make Things, North Point Press, 2002
12. Winchip Susan M, Sustainable Design for Interior Environments, Fairchild Publications

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [24]
MODULE 1[4 hours]		
1.1	Development of interior design concepts;	1
1.2	Classification of decorative design;	1
1.3	Elements and principles of design	1
1.4	Case studies to learn its application in interior design.	1
MODULE II [5 hours]		
2.1	Importance of ergonomics in work	1
2.2	Furniture and furnishings, Natural elements in interiors and plantscaping details.	1
2.3	Materials in construction and construction techniques – doors, windows, cupboards, partitions, joineries, false ceilings, paneling	1
2.4	*Design a work space with furniture using ergonomic principles.*	2
MODULE III [5 hours]		
3.1	Concept of colour - significance of colour in the interiors and exteriors-Dimensions of colour - Hue, value, intensity, Effects of Hue, value and Intensity;	1
3.2	Application of colour harmonies in the interiors and exteriors –Effects of light on colour, Illusion of colour, psychology of colour, effect of colour on each other.	1
3.3	Importance of lighting – Lighting in interiors – importance, classification based on sources, uses, illumination, factors to be considered in lighting for different areas; Psychological aspects of light, Avoidance of glare – Glare its types and prevention.	1
3.4	Artificial lighting - light sources, types and uses of light, specific factors in lighting – measurements of lighting and economy in lighting,	1
3.5	Lighting accessories – Selection of lamps and lighting fixtures, lighting for various areas and specific activities, modern features in lighting design.	1
MODULE IV [6 hours]		
4.1	Environmental control in interiors, Mechanical systems - Lifts and Escalators;	1

4.2	Sanitary services – Water supply within buildings, drainage system, sanitary fittings;	1
4.3	Air conditioning - types of air Conditioning, application in building;	1
4.4	Ventilation- natural and mechanical, guidelines for natural ventilation;	1
4.5	Electrical services- electrical fixtures and electrical layout; ducting, paneling, false ceiling, material specifications	1
4.6	*Drawing - Service layout – electrical, mechanical, sanitary, ducting, fixtures, false ceiling*	1
MODULE V [4 hours]		
5.1	Prepare presentations using various rendering techniques, and detailing - work space	2
5.2	Prepare presentations using various rendering techniques and detailing - service layouts	2

CO Assessment Sample Questions	
CO1	1. What factors do you consider when creating an interior design concept for a residential area versus a commercial space? 2. How do you differentiate between various decorative design styles (e.g., modern, traditional, minimalist, eclectic)? 3. How do you incorporate the fundamental elements of design, such as line, shape, and form, into an interior space?
CO2	1. What specific ergonomic considerations should be made when designing workstations or office setups for a diverse workforce? 2. How do advancements in technology impact the application of ergonomic principles in modern work environments? 3. What factors should be considered when selecting furniture and furnishings for residential versus commercial spaces?
CO3	1. How does natural lighting versus artificial lighting affect the perception of colors and textures within a room? 2. Discuss the interplay between color selection and lighting placement to enhance or alter the perceived dimensions of a room?
CO4	1. How do you ensure the seamless integration of building services such as electrical, plumbing, HVAC, and lighting systems within your interior design concepts? 2. What factors or variables do you consider when budgeting for building services, and how do you ensure cost-effectiveness without compromising quality?
CO5	1. Prepare a working drawing for the interior layout of a bedroom.

23ARB504	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES V	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

To introduce the design principles and construction techniques of various vertical transportation methods. To familiarize with advanced structural concepts through site visits, case studies and drawings.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Illustrate and explain the design principles and construction techniques of vertical transportation methods such as ramps and stairs through site visits, case studies, and drawings.
CO2	Illustrate and explain the design principles and construction techniques of vertical transportation methods such as elevators and escalators through site visits, case studies, and illustrations.
CO3	Examine advanced structural concepts related to prestressed concrete structures and tensile structures through site visits, case studies, and illustrations.
CO4	Examine advanced structural concepts related to folded plates, pneumatic & kinetic structures and portal frames through site visits, case studies, and drawings.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓								✓		✓
CO2	✓	✓			✓					✓		✓
CO3	✓	✓			✓					✓		✓
CO4	✓	✓			✓					✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Assignments	Test 1	Portfolio	
Remember				
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test -2/ Portfolio/ Viva	
	5	30	7.5	7.5	**50**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	PART C	ESE Marks
PATTERN1	6 Questions, atleast one from each module and each question carries 2.5 marks Marks: (6x2.5 =15 marks)	Total 4 Questions; 2 Questions from each theory-based module, answer any one from each module, and each carries 7.5 marks. Marks: (2x7.5 = 15 marks)	Total 2 Questions, 1 Question from each drawing-based module, answer any one, and each carries 20 marks. Marks: (1x20 = 20 marks.	50
	Total Marks: 15	Total Marks: 15	Total Marks: 20	

SYLLABUS

MODULE I

Vertical Transportation Systems.

Study the various means of vertical transportation such as ramps and stairs. Planning of vertical transportation systems – design parameters.

Ramps: Planning of ramps, slope, finishes, safety precautions and need for constructing ramps.

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

Discussion: Recent developments in vertical transportation- ramps, stairs.

Drawings: RCC and Composite Staircase

Site Visit/ Case study

MODULE II

Vertical Transportation Systems.

Study the various means of vertical transportation such as elevators and escalators.

Elevators: Planning and grouping of elevators. Elevator design parameters. Quality of elevator service. Different types of elevators – passenger elevators, observation elevators, hospital elevators and freight elevators. travelators. Vertical transportation system in skyscrapers.

Escalators: Planning and details of escalators. Comparison with elevator in terms of its use.

Discussion: Recent developments in vertical transportation- escalators, elevators.

Illustrations: escalators and elevators
Site Visit/ Case study

MODULE III

Advanced Structural Concepts in Architecture

Prestressed concrete structures: Precast prestressed construction. Use and examples of various prestressed structures. Two-way waffle slab, Two-way flat plate, Two-way flat slab, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab.
Tensile structures: Concept of tensile structures, formation, classification, use and examples of various cable structures. Application of cable structures in architecture. Materials and construction methods of membrane structures.

Exercise: Case studies of tensile structures and coffered slab.
Illustrations: Tensile structures and coffered slab

MODULE IV

Advanced Structural Concepts in Architecture

Plate structures: Definition, classification and application, concept and application of 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.

Discussion: Role of structural grids in planning.
Exercise: Case studies of folded plates, pneumatic, kinetic and portal frame
Drawings: folded plates and Portal frames

Text books

1. Arthur Lyons, 'Materials for Architects and Builders', Elsevier Butterworth Heinemann, 2004.
2. Francis DK Ching, 'Building Construction Illustrated' (4th edition), Wiley-India, New Delhi, 2012.
3. Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
4. H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
5. P C Varghese, 'Building Materials', Prentice Hall of India Pvt. Ltd, New Delhi, 2010.

Reference books

1. R Barry, 'The Construction of Buildings (Vol. I-II)', 6th edition, Affiliated East-West Press Pvt. Ltd., New Delhi, 1996.
2. RC Smith & TL Honkala, 'Principles and Practices of Light Construction', Prentice Hall, Englewood Cliff, NJ 07632, 1986.
3. Relevant BIS codes.
4. Rosen Harold J, Construction Materials for Architecture, Krieger Pub Co, 1992.
5. W B McKay, 'Building Construction', Orient Longman 21, London, 1938-44.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36]
MODULE 1[9 hours]		
1.1	Vertical Transportation Systems. Study the various means of vertical transportation such as ramps and stairs. Planning of vertical transportation systems – design parameters. Ramps: Planning of ramps, slope, finishes, safety precautions and need for constructing ramps.	1
1.2	Stairs: Planning staircases - Standards, rules and regulations. Components of stairs. Stair plans- stairs with straight, circular and curved flights.	1
1.3	Construction details of Wood stair, fire escape stairs, Concrete stair, Steel stair and Composite stair. *Discussion: Recent developments in vertical transportation- ramps, stairs.*	1
1.4	Drawings: RCC and Composite Staircase	3
1.5	Site Visit/ Case study	3
MODULE II [9 hours]		
2.1	Vertical Transportation Systems. Study the various means of vertical transportation such as elevators and escalators. Elevators: Planning and grouping of elevators. Elevator design parameters. Quality of elevator service.	1
2.2	Different types of elevators – passenger elevators, observation elevators, hospital elevators and freight elevators. travelators. Vertical transportation system in skyscrapers.	1
2.3	Escalators: Planning and details of escalators. Comparison with elevator in terms of its use. *Discussion: Recent developments in vertical transportation- escalators, elevators.*	1
2.4	Drawings: escalators and elevators	3
2.5	Site Visit/ Case study	3
MODULE III [9 hours]		
3.1	Advanced Structural Concepts in Architecture. Prestressed concrete structures: Precast prestressed construction. Use and examples of various prestressed structures.	1
3.2	Two-way waffle slab, Two-way flat plate, Two-way flat slab, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab.	1
3.3	Tensile structures: Concept of tensile structures, formation, classification, use and examples of various cable structures. Application of cable structures in architecture. Materials and construction methods of membrane structures	1

3.4	Exercise: Case studies of tensile structures and coffered slab. Site Visit/ Case study	3
3.5	*Drawings: Tensile structures and coffered slab*	3
MODULE IV [9 hours]		
4.1	Advanced Structural Concepts in Architecture Plate structures: Definition, classification and application, concept and application of folded plates, flat slab and coffered slab.	1
4.2	Special Structures: Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures	1
4.3	Portal frames: Definition, and Application. Discussion: Role of structural grids in planning.	1
4.4	Exercise: Case studies of folded plates, pneumatic, kinetic and portal frame Site Visit/ Case study	3
4.5	Drawings: folded plates and Portal frames	3

CO ASSESSMENT SAMPLE QUESTIONS	
CO1	1) State briefly the requirements of a good staircase. 2) Plan a staircase for a residential building in which the vertical distance between each floor is 3.36m. The size of the stair hall is limited to 4.5m x 3m.
CO2	1) What are travelators? 2) With the help of a neat sketch, explain the common parts of an escalator and their functions.
CO3	1) List out some of the uses and examples of prestressed concrete structures. 2) Discuss the type of materials and construction methods used in membrane structures.
CO4	1) Explain the advantages of folded plates. 2) Design a portal framed structure for a building of span 15m x 8m. Principal components shall be shown along with joinery details.

23ACC505	THEORY OF STRUCTURES V	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Preamble:

The course provides an understanding of the fundamental concepts of steel and timber structures and their design. The course covers design and detailing of steel structural elements and design of timber structures. After this course students will be able to design and detail steel structural elements and timber structures.

Course Outcomes:

	After the completion of the course the student will be able to:
CO1	Comprehend the design philosophies of Limit state method and working stress method. [Understanding]
CO2	Design proper bolted or welded connections for steel structures subjected to given set of loading. [Apply]
CO3	Recall the structural behaviour of elements subjected to tension, compression, and flexure. [Understanding]
CO4	Apply the principles of limit state method to design the steel elements such as tension members, compression members, and flexural members subjected to dead and live loads following IS 800: 2007. [Apply]
CO5	Apply the principles of working stress method to design the timber elements such as beams and columns.[Apply]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓	✓									
CO3	✓	✓	✓									
CO4	✓	✓	✓									
CO5	✓	✓	✓									

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA					
CourseStructure [L-T-P]	**Attendance**	**Theory [L-T]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
2-1-0	4	12	12	12	40

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE] Pattern			
Pattern	**Part A**	**Part B**	**ESE Marks**
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: [5×8 = 40 marks]	Total Marks: 60

SYLLABUS

MODULE 1 (Bolted & Welded Connections for Steel Structures)

Introduction to steel and steel structures, Properties of steel; Structural steel sections Limit state design concept Types of Connection, Analysis and Design of Bolted and Welded Connection (Moment Connection not required).

MODULE 2 (Tension members)

Tension members, Types of sections, net area, Design of tension members Plate and single angled member.

MODULE 3 (Compression Members & Column Bases)

Compression Members-Design of Struts -normal sections, single angled section. Solid and Built-up Columns for axial load Battens and lacing (Only theory is required) Column Bases-Design of slab bases only.

MODULE 4 (Design of Steel Elements)

Flexural members laterally restrained and laterally unrestrained beams
Simple and compound beams (Concept only)
- Design of laterally restrained beam.

MODULE 5 (Design of timber elements-beams and columns)

Introduction to Working stress method of design Timber structures, Types of timber Classification, allowable stresses Design of timber beams –flexure, shear, bearing and deflection considerations

Flitched timber beam-Types of Flitched Beam-Design of flitched timber beam Design of timber column.

Text Books:

1. S. Ramachandra, Design of Steel Structures - Standard Book House, Delhi, 1984
2. N. Subramanian, Design of Steel Structures, Oxford Publications
3. S.K Duggal, Limit State Design of Steel Structures, Mc Graw Hill Publications

Reference Books:

1. SP 6 Part 1: 1964 (Reaffirmed 2003), Handbook for structural engineers - 1. Structural steel sections
2. A.S. Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
3. Dayaratnam P., Design of Steel Structures, Oxford and IBH Publishing Co.
4. Gurucharan Singh, Design of Steel Structures, Standard Publishers, New Delhi, 1982
5. L.S. Negi, Design of Streel Structures Tata McGraw Hill Publishing Company Ltd. New Delhi, 1997
6. IS 883: 2016 Code of Practice for Design of Structural Timber in Buildings, Bureau of Indian Standards, New Delhi
7. IS 3629: 1986: Specification for structural Timber in building, Bureau of Indian Standards, New Delhi
8. IS 800 Code of Practice for use of Structural Stee in General Building Construction, Bureau of Indian Standards, New Delhi
9. National Building Code of India, 1983, Part VI, Structural Design, Bureau of Indian Standards, New Delhi

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1 (8 HOURS)	
1.1	Introduction to steel sections, Material Property of steel sections.	1
1.2	Explain advantages and disadvantages of steel construction, different types of steel sections.	1
1.3	Types of Connections in steel structures. Explain different types of connections used – its advantages and disadvantages.	1
1.4	Analysis of Bolted Connection & calculation of efficiency of joints.	1
1.5	Explain the IS code method of analysis of bolted connection,	1

	Problems.	
1.6	Design of Bolted Connection, Explain the IS code method of design of bolted connection, problems.	1
1.7	Analysis of Welded Connection & calculation of efficiency	1
1.8	Problems from bolts and welded joints, Class activity/assignment 1	1
MODULE II (7 HOURS)		
2.1	Design of tension member –introduction	1
2.2	Explaining the IS code method, concept of shear lag, net area etc	1
2.3	Analysis of tension member	1
2.4	Design of tension member– plate member	1
2.5	Design of tension member– single angled member	1
2.6	Explaining the IS code method of design of tension members, problems.	1
2.7	Tutorial session.	1
MODULE III (7 HOURS)		
3.1	Compression Member- introduction.	1
3.2	Explain the design procedure of compression members.	1
3.3	Design of Strut – normal sections, Explain the IS code method of Design.	1
3.4	Design of Strut – single angled section.	1
3.5	Solid and Built–up Columns for axial load	1
3.6	Column Bases - introduction	1
3.7	Design of Column bases –slab base, Discussion on code provisions, design examples.	1
MODULE IV (6 HOURS)		
4.1	Battens and lacing – design procedure	1
4.2	Discussion on codal provisions.	1
4.3	Design of laterally restrained beam.	1
4.4	Problems on laterally restrained beam.	1

4.5	Tutorial session.	2
MODULE V (7 HOURS)		
5.1	Introduction to timber beam, Types of timber – Classification	1
5.2	Allowable stresses in timber- Explain the various stresses acting indifferent timber members	1
5.3	Design of beams – flexure, shear, bearing and deflection considerations	1
5.4	Flitched timber beam -introduction	1
5.5	Types of Flitched Beam- Classification	1
5.6	Design of flitched timber-Discussion on code provisions, design examples	1
5.7	Design of timber column- Discussion on code provisions, design examples	1

CO Assessment Sample Questions		
CO1	1	Explain Limit state of Design.
	2	State Hooke's Law.
CO2	1	Define pitch, gauge and edge distance of a bolted connection with sketches.
	2	Differentiate between fillet weld and butt weld? Give sketches.
CO3	1	Explain Tension members
	2	Design a welded single-angle tension member to carry a tensile load of 150 kN. The angle is connected to a 8 mm thick gusset plate.
CO4	1	Explain the design procedure of Battens and lacing.
CO5	1	Design a wooden simply supported beam of clear span 5 m. The bearing at each end is 32 cm. The dead load of roof covering is 2 kN/m² and live load is 2.5 kN/m². In addition to the above loads it carries a UDL of 15 kN/m. The beams are placed at a distance of 2.7 m c/c. Assume that teak wood is used.
	2	Mention the advantages of flitched timber beams. Sketch any two types.

23AMC506	BUILDING SERVICES III- (HVAC, FIRE FIGHTING AND SAFETY)	L	T	P	S	C	Year of Introduction
		3	0	0	3	0	2023

Preamble:

The course addresses the fundamentals and principles of mechanical ventilation systems. Topics include fundamentals of Refrigeration and HVAC, Air-Conditioning and equipment, techniques and methods of air conditioning and fundamentals of fire safety.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Summarize the fundamentals of Refrigeration, HVAC
CO 2	Recall principles of Air-Conditioning and required components and equipment
CO 3	Analyse factors that affect human comfort
CO 4	Apply the techniques and methods of air conditioning, distribution of conditioned air and represent them in drawings using symbols and legends
CO 5	Summarize the fundamentals of fire safety in the requirements of buildings and preparedness of occupants in detecting and fighting fire and represent the components of fire-fighting systems in drawings using symbols and legends

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2	✓	✓										
CO3	✓	✓										
CO4	✓	✓										
CO5	✓	✓	✓			✓						✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test 1	Test 2	
	4	12	12	12	**40**

Total Marks distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 Questions, one from each module and each question carries 4 marks Marks: (5x4 =20 marks)	There will be 10 questions with 2 questions from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I

Modes of heat transfer. Basic laws of Conduction, convection and radiation. Heat transfer through Composite wall, composite cylinders, thermal resistance, overall heat transfer coefficient and its importance. Simple numerical examples, Insulation material used in air-conditioned building. Vapour compression refrigeration Cycle-pressure enthalpy diagram. COP.

MODULE II Components

Components of vapour compression refrigeration system, compressors, reciprocating compressors, rotary compressors, scroll compressors, hermetically sealed compressors, their relative merits and demerits, type of evaporators, condensers - air cooled, water cooled, evaporative type, their application and selection, expansion devises, capillary tube, automatic expansion valve.
Refrigerants, properties, ODP, GWP, environment friendly refrigerants and their comparison and application.

MODULE III Psychometric chart

Psychometric chart, psychometric processes, DBT, WET, dew point temperature, Absolute Humidity, Relative Humidity, Specific Humidity, specific volume, Humidity measurements, human comfort, effective temperature, comfort chart, Simple numerical examples
Air conditioning - Capacity of an air condition machine, TONS, EER, ISEER, star rating, cooling load calculation, factors effecting cooling load calculation, sensible and latent heat load, room sensible heat factor. Grand sensible heat factor. heat load due to mixing of outdoor air, numbers of air changes per hour, need of mixing outdoor air,

factors to consider percentage of outdoor air mixing and their methods. Cooling load calculations, Simple numerical examples.

MODULE IV Air conditioning machines

Types of air conditioning machines, split, cassette system, window, central air conditioning, direct expansion, chilled water system of air conditioning, fan coil unit, double duct system, reheat system, Zonal system, air – water system, relative merits and demerits. Selection criteria of different models.
Air distribution systems- supply duct, return duct, location of return duct opening, throw, AHU, Duct lay out pattern, wall duct system, ceiling duct system, Types of diffusers. Air filters, HEPA filters, Symbols and legends used in building HVAC layout. Concept of Ventilation, necessity and types of ventilation.
Case Study or Simple drawings of central air conditioning system for an auditorium, for a seminar hall, for an office.
Elementary ideas on HVAC simulation software

MODULE V Fire and safety

Fire sources, spreading, and growth decay curve, Fire Hydrants, Stand Pipe & Hose Systems -Principles of fire behavior, Fire safety design principles _ NBC Planning considerations in buildings – non-combustible materials, egress systems, Exit Access – Distance between exits, exterior corridors – Maximum travel distance, Doors, Smoke proof enclosures
General guidelines for design for Auditoriums, concert halls, theatres, other building types, window egress, accessibility for disabled. NBC guidelines – lifts lobbies, stairways, ramp design, fire escapes and A/C, electrical systems.
Heat smoke detectors – sprinkler systems, Firefighting pump and water requirements, storage – wet risers, Dry rises
Elementary ideas on fire and smoke simulation software

Text books

1. William H.Severns and Julian R Fellows, “Air conditioning and Refrigeration”, John Wiley and Sons, London, 1988
2. “Fire Safety: National Building Code of India 1983” published by Bureau of Indian Standards.
3. National Building Code of India, 2005 (NBC 2005).

Reference books

1. A.F.C. Sherratt, “Air conditioning and Energy conservation”, The Architectural Press, London, 1980
2. Andrew H Buchanan, “Design for fire safety”, First edition John Wiley & Sons Ltd., New York., 2001Monograph Series, Springer International Publishing, 2020

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours(Total 36 hours)
MODULE 1 (6 hours)		
1.1	Modes of heat transfer. Basic laws of Conduction, convection and radiation.	1 (L)
1.2	Heat transfer through Composite wall	1 (L)
1.3	Heat transfer through composite cylinders,	1 (L)
1.4	Thermal resistance, overall heat transfer coefficient and its importance.	1 (L)
1.5	Simple numerical examples, Insulation material used in air-conditioned building.	1 (L)
1.6	Vapour compression refrigeration Cycle- pressure enthalpy diagram. COP.	1 (L)
MODULE II (8 hours)		
2.1	Components of vapour compression refrigeration system, compressors, reciprocating compressors	1 (L)
2.2	Rotary compressors	1 (L)
2.3	Scroll compressors	1 (L)
2.4	Hermetically sealed compressors, their relative merits and demerits	1 (L)
2.5	Types of evaporators	1 (L)
2.6	Condensers - air cooled, water cooled, evaporative types, their application and selection	1 (L)
2.7	Expansion devices, capillary tube, automatic expansion valve.	1 (L)
2.8	Refrigerants, properties, ODP, GWP, environment friendly refrigerants and their comparison and application.	1 (L)
MODULE III (7 hours)		
3.1	Psychometric chart, psychometric processes, DBT, WET, dew point temperature, Absolute Humidity, Relative Humidity, Specific Humidity, specific volume, Humidity measurements, human comfort, effective temperature, comfort chart, Simple numerical examples	1 (L)
3.2	Air conditioning - Capacity of an air-conditioning machine, TONS, EER, ISEER, star rating, Cooling load calculation	2 (L)

3.3	Factors effecting cooling load calculation, sensible and latent heat load, room sensible heat factor. Grand sensible heat factor.	1 (L)
3.4	Heat load due to mixing of outdoor air, numbers of air changes per hour, need of mixing outdoor air,	1 (L)
3.5	Factors to consider percentage of outdoor air mixing and their methods.	1 (L)
3.6	Cooling load calculations, Simple numerical examples.	1 (L)
MODULE IV (8 hours)		
4.1	Types of air conditioning machines, split, cassette system, window, central air conditioning, direct expansion	1 (L)
4.2	Chilled water system of air conditioning, fan coil unit, double duct system, reheat system	1 (L)
4.3	Zonal system, air – water system, relative merits and demerits. Selection criteria of different models.	1 (L)
4.4	Air distribution systems- supply duct, return duct, location of return duct opening, throw, AHU,	1 (L)
4.5	Duct lay out pattern, wall duct system, ceiling duct system,	2 (L)
4.6	Types of diffusers. Air filters, HEPA filters, Symbols and legends used in building HVAC layout.	1 (L)
4.7	Case Study or Simple drawings of central air conditioning system for an auditorium, for a seminar hall, for an office.	1 (L)
MODULE V (8 hours)		
5.1	Fire sources, spreading, and growth decay curve	1 (L)
5.2	Principles of fire behavior, Fire safety design principles	1 (L)
5.3	NBC Planning considerations in buildings – non-combustible materials, egress systems, Exit Access	1 (L)
5.4	Distance between exits, exterior corridors – Maximum travel distance, Doors, Smoke proof enclosures	1 (L)
5.5	General guidelines for egress design for Auditoriums, concert halls, theatres, other building types, window egress, accessibility for disabled.	1 (L)
5.6	NBC guidelines – lifts lobbies, stairways, ramp design, fire escapes and A/C, electrical systems.	1 (L)
5.7	Heat smoke detectors – sprinkler systems,	1 (L)
5.8	Firefighting pump and water requirements, storage – wet risers, Dry rises	1 (L)

CO Assessment Sample Questions	
1	1. Modes of heat transfer 2. Thermal resistance, heat transfer coefficient – numerical examples
2	1. Components of vapour compression refrigeration system, compressors, reciprocating compressors, rotary compressors, scroll compressors, hermetically sealed compressors and their merits and demerits 2. Condensers, Evaporators, Refrigerants
3	1. Psychrometric chart and its application with numerical 2. Factors for cooling load calculation 3. Numerical for cooling load calculation
4	1. Types of air conditioning machines 2. Air distribution systems 3. Air conditioning duct layout for an auditorium, seminar hall
5	1. Fire safety design principles 2. Planning considerations in buildings for fire safety 3. Water requirements and equipment for fire fighting

23ARB508	WORKING DRAWINGS	L	T	P	S	C	Year of Introduction
		0	0	2	2	2	2023

Preamble:

This course is designed to provide students with a deep understanding of the standards and conventions essential for the preparation of architectural drawings. The course aims to equip students with the proficiency needed to create detailed architectural and construction drawings, specific to mid-rise/high-rise building. The students shall produce a complete set of working drawings showing an understanding of structural systems and building engineering services including electrical, HVAC, Lifts and escalators, Fire safety, Interior and Exterior finishes etc.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Apply standards and conventions in the preparation of architectural drawings in AUTOCAD.
CO 2	Apply the skill and techniques for preparing Sanction drawings, working drawings, detail drawings and service drawings for architectural project.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓				✓	✓		✓
CO2	✓				✓				✓	✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Assignments	Other tools	
Remember			
Understand	✓	✓	-
Apply	✓	✓	-
Analyse			
Evaluate			
Create			

Assessment tools: One day problem

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Portfolio/ Viva	
	10	50	20	20	**100**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	100	-	-

SYLLABUS

MODULE I: Introduction to Working Drawings

Understanding drawing scales and proportions
Introduction to drafting conventions and standards
Using standardized symbols and abbreviations for common architectural elements
Types of Working Drawings: Schematic Drawings, Detail Drawings, Drawings for Statutory Approval, As-built Drawings.

MODULE II: Detailed Working Drawing of Plans, Elevations, and Sections

Developing detailed floor plans for medium-rise/ high-rise buildings
Annotation and dimensioning techniques for plans
Creating elevation drawings showcasing details on exterior: finishes, cladding, and architectural elements like cornices and eaves.
Creating cross-sectional drawings showcasing material specification

MODULE III: Service Drawings and Structural Drawings

Electrical plans: Layout - location of electrical outlets, switches, fixtures, and equipment.
Plumbing plans: layout of plumbing fixtures, pipes, and drainage systems.
HVAC plans: Ductwork and ventilation layouts
Detailing structural components: Foundations, beams, and columns

MODULE IV: Construction Details

Creating schedules for doors, windows, finishes, and other elements
Integrating material specifications
Placing labels, callouts, and notes for clarity and communication
Provides specific details for interior elements like staircases, railings, built-in features, cabinets, furniture etc.

Text books

1. Lerrs Jack Engineering Construction Specification
2. Liebing W Ralph and Raul Ford Mimi Architectural working drawings 2nd ed John Wiley and Sons New York 1983
3. Macey W Frank Specification in Detail 5th ed Technical Press Ltd London 1955
4. Shah MG and Others Building drawing with an integrated approach to build environment 3rd ed Tata McGraw-hill Pub. Co. Ltd New Delhi 1996
5. Lewis R Jack Building Construction Specifications Prentice Hall Inc New Jersey 1975
6. Datta BN Estimating and Costing in Civil Engineering Theory and Practice 23rd ed UBS Pub New Delhi 1993
7. Wakita Osamu A & Linde Richard M The professional practice of architectural detailing 2nd ed New York Wiley 1987
8. Robert C Mc Hugh Working Drawing Hand Book New York VNR 1977

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [24]
MODULE 1[2 hours]		
1.1	Understanding drawing scales and proportions Introduction to drafting conventions and standards Using standardized symbols and abbreviations for common architectural elements	1
1.2	Types of Working Drawings: Schematic Drawings, Detail Drawings, Drawings for Statutory Approval, As-built Drawings.	1
MODULE II [8 hours]		
2.1	Developing detailed floor plans for medium-rise/ high-rise buildings Annotation and dimensioning techniques for plans	1
2.2	Developing detailed floor plans for medium-rise/ high-rise buildings	2
2.4	Creating elevation drawings	1
2.5	Creating elevation drawings showcasing details on exterior finishes, cladding, and architectural elements like cornices and eaves.	2
2.7	Creating cross-sectional drawings	1
2.8	Creating cross-sectional drawings showcasing material specification	1
MODULE III [8 hours]		
3.1	Electrical plans: Layout	1
3.2	Electrical plans: Layout - location of electrical outlets, switches, fixtures, and equipment.	1
3.3	Plumbing plans: layout	1
3.4	Plumbing plans: layout of plumbing fixtures, pipes, and drainage systems.	1
3.5	HVAC plans: layout	1
3.6	HVAC plans: Ductwork layouts with specification	1
3.7	Detailing structural components: Foundations	1
3.8	Detailing structural components: beams, and columns	1
MODULE IV [6 hours]		
4.1	Creating schedules for doors, windows, finishes, and other elements	1

4.2	Integrating material specifications for doors, windows, finishes, and other elements	1
4.3	Placing labels, callouts, and notes for clarity and communication	1
4.4	Specific details for interior elements like staircases, railings	1
4.5	Specific details for built-in features, cabinets, furniture etc.	1
4.6	Specification for interior elements like staircases, railings, built-in features, cabinets, furniture etc.	1

CO ASSESSMENT QUESTIONS	
CO1	Prepare AUTOCAD drawings of S4 Residential Project. Drawing should include Plan, Section through stairs, Elevation.
CO2	Prepare sanction drawings of S4 Major Project (Residential Project). Drawing should include Plan, Section through stairs, Elevation, Location Sketch, Site Plan, Service plan, Area Details, Schedule of Openings
	Prepare Working drawings for S4 Major Project. (Residential Project)
	Prepare Electrical Layout for the Residential Project.
	Prepare Joinery Drawing for kitchen cabinet or Living area shelf (Residential Project)
	Portfolio of all works done in class

SEMESTER 5
ELECTIVE 1

23ARE507.1	PRINCIPLES OF HUMAN SETTLEMENTS	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course intends to give insight to the students about understanding and analyzing the evolution of habitat through various stages of human history. The course tries to lay a foundation for a general understanding of Human Settlements by analyzing the fundamental elements that have moulded the very existence of the human race made possible by a habitat. This course should become a prelude to learning the Sustainability, Planning, and Urbanization of modern settlements.

Prerequisite: Nil.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Comprehend basic concepts in the planning of human settlements. [Understand level]
CO 2	Understand the emergence and scope of ekistics and its need in shaping Human Settlements. [Understand level]
CO 3	Appreciate different theories in the planning of human settlements. [Understand level]
CO 4	Analyze various parameters and their effects on the current and future process of planning human settlements. [Analyze level]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓				✓	✓				✓	
CO 2	✓	✓				✓	✓				✓	
CO 3	✓	✓				✓	✓				✓	
CO 4	✓	✓				✓	✓				✓	

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	✓
Analyze	✓	✓	✓	✓
Evaluate			✓	
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I: Evolution of Human Settlements

History and evolution of human settlements, environmental factors, form, size, and materials used; Settlement patterns of Mesopotamia, Indus Valley, Mayan, renaissance period, Industrial Revolution, and post-war Era (world war –I)

MODULE II: Science of Human Settlements

Evolution of Human settlements as a subject. The Vancouver Declaration on Human Settlements, "Ekistics" and the contribution of C. A. Doxiadis, elements and classification of human settlement-their functions and Linkages.

MODULE III: Forms of Human Settlement

Human settlements in different forms- Concentric, Grid Iron, Linear, and Radial with examples; Patterns of Human Settlement, Factors influencing the growth and decay of human settlements.

MODULE IV: Planning Concepts

Planning concepts and their relevance to Indian Planning practice with case examples- Ebenezer Howard-Garden city concept, Patrick Geddes- Conservative surgery, C.A. Perry- Neighborhood concept, Le Corbusier- Radiant City concept; City as an organism; Emerging Concepts: global city, inclusive city, safe city, etc.; City of the future and future of the city; Shadow cities, divided cities.

Master plan, Planning area, land use plan and Zoning regulations, Zonal plan

MODULE V: Case study

Case study of a Master plan to identify Planning area, land use plan and Zoning regulations

Case studies for various planning concepts

Textbooks

1. C.A. Doxiadis, Ekistics: An introduction to the Science of Human Settlements (Oxford University Press, London, 1968)
2. House Form and Culture (Foundations of Cultural Geography) Paperback – by Amos Rapoport

Reference books

1. The Vancouver Declaration on Human Settlements by United Nations: 1976
2. Cities in A Globalizing World – Global Report on Human Settlements 2001: by United Nations
3. Hall, P., 2001, Cities of tomorrow: an intellectual history of urban planning and design in the twentieth century, Blackwell, London.
4. McLaughlin, J. B., 1969, Urban and Regional Planning. A systems approach, Faber and Faber, London.
5. Faludi, A., 1973, A Reader in Planning Theory, Pergamon Press, London.
6. Peter, G. H. and Tewdwr-Jones, 2011, Urban and Regional Planning, M., Routledge, London. Fifth Edition.
7. Healey, P., 1997, Collaborative Planning: Shaping Places in Fragmented Societies, Macmillan, London

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1[6 hours]	
1.1	History and evolution of human settlements	1
1.2	Environmental factors, form, size, and materials used	1
1.3	Settlement patterns of Mesopotamia, Indus Valley, Mayan	1
1.4	Settlement patterns of Renaissance period	1
1.5	Settlement patterns of Industrial Revolution	1
1.6	Settlement patterns of post-war Era (world war –I)	1
	MODULE II [6 hours]	
2.1	Evolution of Human settlements as a subject	1
2.2	The Vancouver Declaration on Human Settlements	1
2.3	"Ekistics" and the contribution of C. A. Doxiadis	1
2.4	Elements and classification of human settlement-functions and Linkages.	1
2.5	Human settlement- functions	1
2.6	Human settlement- Linkages.	1

MODULE III [7 hours]		
3.1	Human settlements in different forms- Concentric with examples	1
3.2	Human settlements in different forms- Grid Iron with examples	1
3.3	Human settlements in different forms- Linear with examples	1
3.4	Human settlements in different forms- Radial with examples	1
3.5	Patterns of Human Settlement	1
3.6	Factors influencing the growth of human settlements	1
3.7	Factors influencing the decay of human settlements	1
MODULE IV [10 hours]		
4.1	Planning concepts and their relevance to Indian Planning practice with case examples	1
4.2	Ebenezer Howard-Garden city concept	1
4.3	Patrick Geddes- Conservative surgery	1
4.4	C.A. Perry- Neighborhood concept	1
4.5	Le Corbusier- Radiant City concept	1
4.6	City as an organism	1
4.7	Emerging Concepts: global city, inclusive city, safe city, etc.	1
4.8	City of the future and future of the city	1
4.8	Shadow cities, divided cities.	1
4.9	Scope and Content of Master plan, Planning area, land use plan and Zoning regulations	1
4.10	Zonal plan- need, linkage to master plan and land use plan	1
MODULE V [7 hours]		
5.1	Case study – Master Plan	2
5.2	Urban Renewal Plan- Redevelopment, Rehabilitation and Conservation- JNNURM and case studies	1
5.3	Case studies- Emergence of new forms of developments- self-sustained communities, SEZ	2
5.4	Transit-oriented development and related case studies	1
5.5	Integrated townships and related case studies	1

CO Assessment Sample Questions	
1	1. Enlist the characteristic features of the settlement pattern of the Indus Valley civilisation. 2. Infer the attributes that affect the settlement pattern of Kerala. 3. Explain with relevant cases the impact of the Industrial Revolution in the planning of human settlements.
2	1. Write a short note on the concept of 'Ekistics'. 2. What are the principal aspects for consideration in the development of Settlement Planning? Briefly describe the features of settlement patterns during the ancient period. 3. Elaborate on how Doxiadis's theory of "Ekistics" contributed to the human settlements.
3	1. What are grid forms in human settlement? 2. Explain the different patterns of settlements with suitable examples. 3. Describe in detail the factors influencing the growth and decay of human settlements. Substantiate with examples 4. Write a short note on 'garden city'. 5. Discuss any four emerging concepts in planning for human settlements. 6. Explain with relevant case examples on any four planning concepts that evolved in India.
4	1. Define TOD. 2. Differentiate Master plan, zonal plan and land use plan. 3. What is meant by PUD? Explain in detail its need and applicability.

23ARE507.2	APPRECIATION OF ART IN ARCHITECTURE	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Course Objectives

The student will understand the disciplinary differences in art, including various types of art, the concept of beauty, and aesthetics. The course gives insight into the evolution of art and design by tracing its history through different ages. It helps to recognize the importance of visual perception and the influence of design elements from nature.

Prerequisite: Nil

Course Outcomes: After the completion of the course, the student will be able to disseminate human aspects of visual art and visual design

CO 1	Study and interpret the disciplinary differences between visual art and visual design
CO 2	Analyse and infer the semiotics of a visual design
CO 3	Study and analyze the theories of visual design and cognitive processes related to visual design
CO4	Analyse and infer the visual design trends through secondary data collection and case studies.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓									✓	✓
CO 2	✓	✓								✓	✓	✓
CO 3		✓					✓				✓	
CO 4	✓	✓					✓	✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply			✓	
Analyse	✓	✓		✓
Evaluate	✓	✓		✓
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test 2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIE (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Mark
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS

MODULE I

Defining the disciplinary differences between Visual art and design: Introduction to various types of Art, Concepts of beauty, and Aesthetics. Evolution of art and design.

Evolution of visual design:

Influence of the Industrial Revolution on design: Emergence of modern art movements (Cubism, Futurism, Dadaism), The impact of technology on visual aesthetics.

20th Century to Contemporary Design: Mid-century modern design, Pop Art and

consumer culture, Post modernism and the digital age.

MODULE II

Theoretical Perspective:

Information Processing approach: Attention and Perception, Theories of selective and

Sustained attention. **Perception:** Perceptual organization, Top Down and Bottom-up approaches, Subliminal perception, Pattern recognition in perception, Signal detection and Vigilance.

MODULE III

Environment and Response:

Individual (environmental perception, spatial cognition, visual comfort).

Social (proxemics, territoriality, crowding, privacy); **Environmental** cues and behavior.

Expression of Art and Design: Factors influencing the process of visual art and visual design. Forms and functions. Review of selected examples.

MODULE IV

Syntactics and terminology of semiotics. Signs and systems of meaning.

Relationship of semiotics to linguistics. Definition of language sign. The meaning of the language system and structures. Relationship of image to language. Visual applications on the dialogue between the language code and image code. Paintings, photographs, iconographs, video art and how they explain abstract theoretical concepts.

MODULE V

Course project: Analyze a minimum of 5 current research works in the domain of visual design and write a review summary article and presentation. Students should understand the current trends in visual research and its application.

Textbooks

1. Cantanese, A. J. and Snyder, J. C. (1988). Introduction to Architecture. New York: McGraw hill Books Co.
2. Haberlandt, K. (1997). Cognitive psychology. Allyn & Bacon.
3. Anshel, J. (2005). Visual ergonomics handbook. CRC Press.
4. Fred, S. K. (2009). Art through the ages a Global History. 3rd Ed. Clark Baxter.
5. Heidegger, M. (1993). The origin of the work of Art-Basic writings. Harper Collins.
6. Heskett, J. (2002). Design-A very short introduction. Oxford University Press.
7. Neisser, U. (2014). Cognitive psychology: Classic edition. Psychology Press.

8. Sherman, A., & Morrissey, C. (2017). What is art good for? The socio-epistemic value of art. Frontiers in Human Neuroscience, 11, 411.
9. History of Art: A Global View" by Marilyn Stokstad

Reference books

1.Haberlandt, K. (1997). Cognitive psychology. Allyn & Bacon.

2.Anshel, J. (2005). Visual ergonomics handbook. CRC Press.

3.Pinker, S. (Ed.). (1986). Visual cognition. MIT press.-

4.Heidegger, M. (1993). The origin of the work of Art-Basic writings. Harper Collins.

5.Heskett, J. (2002). Design-A very short introduction. Oxford University Press.

6.Rapoport, A. (1969). House Form and Culture. New Jersey: Prentice-Hall.

7.Bundesen C. A theory of visual attention. Psychol Rev. 1990 Oct;97(4):523-47. doi: 10.1037/0033-295x.97.4.523. PMID: 2247540.

8.Berger, John (2008). Ways of Seeing. British Broadcasting Corporation and Penguin Books.

9.Semiotics of Art (1986). Ladislav Matejka and Irwin R. Titunik (eds.) The MIT Press.

10.Eco, Umberto. Semiotics and the Philosophy of Language.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1 (8 hours)	
1.1	**Defining the disciplinary differences between visual art and design:** Introduction to various types of art, concepts of beauty, and aesthetics. Evolution of art and design.	4
1.2	**Evolution of visual design:** Understanding the basics of visual design, Overview of major art movements through history, The relationship between art and culture.	4
	MODULE II (8 hours)	
2.1	**Information Processing Approach:** Attention and Perception, Theories of Selective and Sustained Attention. **Perception:** perceptual organization, top-down and bottom-up approaches, subliminal perception, pattern recognition in perception, signal detection, and vigilance.	4
2.2	Thinking and Language: mental imagery, concepts, decision making; nature of language, language development.	4
	MODULE III (7 hours)	

3.1	**Environment and Response:** ***Individual*** (environmental perception, spatial cognition, visual comfort). ***Social*** (proxemics, territoriality, crowding, privacy), **environmental** cues and behavior.	3
3.2	**Expression of Art and Design:** Factors Influencing the process of Visual Art and visual design. Forms and functions. Review of selected examples.	4
MODULE IV (8 hours)		
4.1	**Syntactics and terminology of semiotics.** Signs and systems of meaning. Relationship of semiotics to linguistics. Definition of language sign.	4
4.2	**The meaning of the language system and structures**. Relationship of image to language. Visual applications on the dialogue between the language code and image code. Paintings, photographs, iconographs, video art and how they explain abstract theoretical concepts.	4
MODULE V (5 hours)		
5.1	**Introduction to Course project –** Students should download and research any of five recent articles related to visual ergonomics/ art appreciation/ design thinking. Read and understand the tools and methods used in the paper. Present a report and verbal presentation.	5
CO Assessment Sample Questions		
CO1	1. What are the disciplinary differences between visual art and design, and how can these distinctions be defined? 2. Provide an introduction to various types of art, highlighting key characteristics and distinguishing features of each. 3. Trace the evolution of art and design, examining key historical developments that have shaped their current forms and practices.	
CO2	1. What is semiotics, and how does it relate to visual design? 2. How is the concept of a language sign defined within the context of semiotics? 3. Discuss the significance of semiotics in decoding and conveying meaning through various visual mediums.	
CO3	1. What is the information-processing approach, and how does it contribute to our understanding of attention and perception? 2. Discuss the theories of selective sustained attention and their implications in information processing.	

	3. What is perceptual organization, and how does it influence our overall perception? Provide examples to illustrate the concept.
CO4	1. Analyze a minimum of 5 current research works in the domain of visual design and write a review summary article and presentation. Students should understand the current trends in visual research and its application.

23ARE507.3	BEHAVIOURAL AND ENVIRONMENTAL STUDIES IN ARCHITECTURE	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course attempts to give an insight into the relationship between environmental and behavior and its relevance to architectural design. The student is exposed to the area of environmental and behavioral studies-its origin and evolution, its multi-disciplinary approach, research undertaken, and importantly its application in user-oriented design.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Describe the integrated nature of environment and behavior in architectural design
CO 2	Summarize environment and behavior theories in architectural design
CO 3	Interpret individual behavioral responses in various environments.
CO 4	Analyze architectural design aspects for different user groups and built environments based on behavioral studies.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓						✓					
CO 2	✓	✓	✓				✓					
CO 3	✓	✓	✓	✓				✓	✓	✓	✓	
CO 4	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply			✓	
Analyse	✓	✓		✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test1**	**Test-2 Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each module, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Introduction to Environment and behavior studies

Environmental Behavior studies, Principles, Relevance, Scope, Focus areas. Introduction to the term Environmental psychology as relation between human behaviour and natural and built environment.
Difference from other branches of psychology.

MODULE II

Environment and Response

Individual (environmental perception, spatial cognition, comfort, anthropometrics)
Social (proxemics, territoriality, crowding, privacy)
Environmental cues and behavior, CPTED

MODULE III

Theories in Environment – Behavior studies- need and purpose

Brief introduction to influential theories

Behavior setting, Stimulation Theories-Arousal theory, Overload theory under stimulation, stress theory

Integral theories-Inter actionism, Transnationalism, Organismic theories;

Control theories-personal control, Boundary regulation, learned helplessness, Operant theory

MODULE IV

Design considerations for different user groups.

Designing for different age/abilities/gender, Children, Youth, Women, Elderly, Persons with special needs, Gender and space

MODULE V

Case studies to understand the behavioral aspects in built environments

Design for various environments- Residential, Learning, Healthcare, Workplace, Retail, Hospitality.

Reference books

1. Robert Gifford, 'Environmental Psychology: Principles and Practice', Optimal Books, 2007.
2. Rapoport, A. (1990). The meaning of the built environment: A nonverbal communication approach. University of Arizona Press.
3. Lawson, B. (2007). Language of space. Routledge.
4. Canter, D. V., & Lee, T. (1974). Psychology and the built environment. Architectural Press.
5. John Zeisel 'Enquiry by Design: Tools for Environment-Behaviour Research', Cambridge University Press, 1984
6. Clovis Heimsath, 'Behavioural Architecture', McGraw Hill, 1977
7. Robert Sommer, 'The Behavioural Basis of Design', Englewood Cliffs, 1969.
8. Gwen Bell, Edwina Randall, 'Urban Environment and Human Behaviour'- An Annotated Bibliography', Dowden Hutchinson Ross, 1973
9. Christopher Alexander, 'A Pattern Language', Oxford University Press, 1977

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Environmental Behavior Studies-Concept, Relevance	1
1.2	Environmental Behavior Studies-Principles	1
1.3	Environmental Behavior studies-Scope, Focus areas	1
1.4	Introduction to the term Environmental psychology	1
1.5	Environmental psychology as relation between human behaviour and the natural and built environment.	1
1.6	Difference of Environmental behavior studies from other branches of psychology.	1
MODULE II [9 hours]		
2.1	Environment and Response: Individual-Environmental perception	1
2.2	Environment and Response: Individual-Spatial cognition and comfort	1
2.3	Environment and Response: Individual-Anthropometrics	1
2.4	Environment and Response: Social-Proxemics	1
2.5	Environment and Response: Social-Territoriality	1
2.6	Environment and Response: Social-Crowding	1
2.7	Environment and Response: Social-Privacy	1
2.8	Environmental cues and behavior	1
2.9	Crime prevention through Environmental design (*CPTED*)	1
MODULE III [10 hours]		
3.1	Brief introduction to influential theories, Behavior setting	1
3.2	Stimulation theories-Arousal theory	1

3.3	Stimulation theories- Overload theory under stimulation, stress theory.	1
3.4	Stimulation theories- stress theory.	1
3.5	Integral theories-Interactionism	1
3.6	Integral theories- Transnationalism	1
3.7	Integral theories- Organismic theories	1
3.8	Control theories-Personal control, Boundary regulation	1
3.9	Control theories- Learned helplessness	1
4.0	Control theories- Operant theory	1
MODULE IV [7 hours]		
4.1	Introduction-Designing for different age/abilities/gender	1
4.2	Design considerations for different user groups-Children	1
4.3	Design considerations for different user groups-Youth	1
4.4	Design considerations for different user groups-Women	1
4.5	Design considerations for different user groups-Elderly	1
4.6	Design considerations for different user groups-Persons with special needs	1
4.7	Gender and space	1
MODULE V [4 hours]		
4.1	Case studies to understand the behavioral aspects in built environments Design for various environments- Residential	1
4.2	Design for various environments- Learning	1
4.3	Design for various environments- Healthcare, Hospitality.	1

4.4	Design for various environments- Workplace, Retail.	1

CO Assessment Sample Questions	
1	How does an understanding of the integrated nature of environment and behavior contribute to better architectural design? Provide examples to illustrate your point.
2	Explain the key principles of "stimulation theories" in environment-behavior studies. How can these theories inform the design of a workspace to enhance productivity and well-being?
3	In what ways the social aspects like proxemics, territoriality, crowding, and privacy influence the design of spaces?
4	How can architects incorporate the principles of gender and space into their designs to create more inclusive environments? Provide practical design strategies and examples.

23ARE507.4	ARCHITECTURAL JOURNALISM	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

This course aims to provide a comprehensive understanding of the origin and evolution of architectural journalism, shedding light on its developmental trajectory. The focus extends to exploring photojournalism and its practical applications within the realm of architectural reporting. Furthermore, the syllabus delves into the intricacies of communication, unraveling its definition, meaning, theory, and conceptual framework. Students will grapple with various forms and potential barriers to effective communication, fostering a nuanced comprehension of this essential aspect. Emphasizing the societal impact of communication, the syllabus seeks to reorganize perspectives on the role of communication in shaping our collective understanding. Additionally, ethical considerations in the professional practice of architectural reporting will be scrutinized, fostering a connection between communication ethics and journalistic responsibilities within the architectural domain.

Prerequisite: Nil

Course Outcomes: After the completion of the course, the student will be able to

CO 1	Interpret the concepts of architectural journalism and conduct reviews of architectural literature.
CO 2	Develop the ability to create a document using various writing techniques and styles.
CO 3	Prepare writeup using different frameworks.
CO 4	Demonstrate photo visualization in architectural reporting.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1						✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓			✓	✓				✓		
CO 3					✓	✓				✓	✓	✓
CO 4			✓		✓					✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyse	✓	✓		✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	**60**
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Ethical and responsible journalism, Reflections on Architectural Journalism, Architectural Criticism, and Architectural Communications.

Reviews and critiques of buildings and designs.

Assignments:

- Write Reviews and critiques of buildings and designs.
- Features on architectural projects.
- Essays on architectural theory and practice.

MODULE II

Writing Techniques and Styles

Writing for a lay audience vs. a professional audience.

Descriptive writing and vivid imagery.

Crafting engaging headlines and leads.

MODULE III

The framework of write-ups: for journal articles, magazines, newsletters.

Assignments: Create engaging and informative content on architectural themes:

- Blogging, social media, and online platforms.
- Multimedia content (videos, podcasts, infographics).
- SEO and online audience engagement.

MODULE IV

Architectural photography and visual storytelling- Principles of the still camera- parts of a still camera - functions of lenses, shutter, viewfinder, focusing system etc.

Assignment:

• A visual narration (photo/video) of sustainability and environmental considerations in architecture.

MODULE V

Students work on their final projects, which can include an in-depth feature, a series of building reviews, or a multimedia presentation.

Peer review and feedback on final projects

Textbooks

1. Agarwal V. B., Handbook of Journalism.
2. Atoe Wayne, "Architecture and Critical imagination", John Wiley & sons, Ltd., 1978.
3. Feininger,Andreas, Complete Color Photographer. London: Thamos & Hadso, 1971.
4. Freeman,Michael. Introduction to Photography. London: Greenwood Press, 1990.
5. Harold Evens, Handling News Paper Text.

Reference books

1. Kamath K. V., Journalist handbook.
2. Kerus, Robert L. Photo Journalism. New Jersey: Prentice-Hall, 1980
3. Roger Hicks, Practical Photography, Cassel. London 1996.
4. Sammon, Rick Complete Guide to Digital Photography. New York: W.W.Norton, 2004.

No.	COURSE SCHEDULE	No. of Hours [36 hours]
	MODULE 1 [8 hours]	
1.1	Reflections on Architectural Journalism, Architectural Criticism, and Architectural Communications: Explore the ethical considerations and responsibilities associated with architectural journalism, including accuracy, integrity, and sensitivity to cultural and environmental issues.	4
1.2	Assignment (anyone from the list) ● Write Reviews and critiques of buildings and designs. ● Features on architectural projects. ● Essays on architectural theory and practice.	4
	MODULE II [5 hours]	
2.1	**Writing Techniques and Styles** Writing for a lay audience vs. a professional audience.	2
2.2	Descriptive writing and vivid imagery. Crafting engaging headlines and ledes.	3
	MODULE III [7 hours]	
3.1	**Framework of write- ups:** for journal article, magazine, newsletter.	3
3.2	**Writing for Digital and New Media** Blogging, social media, and online platforms. Multimedia content (videos, podcasts, infographics). SEO and online audience engagement.	4
	MODULE IV [8 hours]	
4.1	**Architectural photography and visual storytelling-** Principles of the still camera- parts of a still camera – functions of lenses, shutter, viewfinder, focusing system etc.	4
4.2	A visual narration (photo/video)	4
	MODULE V [8 hours]	
5.1	**Introduction to Course project –** Students work on their final projects, which could include an in-depth feature, a series of building reviews, or a multimedia presentation. Peer review and feedback on final projects.	8

CO Assessment Sample Questions	
CO1	Anyone Assignments: • Write Reviews and critiques of buildings and designs. • Features on architectural projects. • Essays on architectural theory and practice.
CO2	**Create engaging and informative content on architectural themes:** • Blogging, social media, and online platforms. • Multimedia content (videos, podcasts, infographics). • SEO and online audience engagement.
CO3	**Assignment:** A visual narration (photo/video) of sustainability and environmental considerations in architecture
CO4	Students work on their final projects, including an in-depth feature, a series of building reviews, or a multimedia presentation.

SEMESTER 6

23ARD601	ARCHITECTURAL DESIGN- V	L	T	P	S	C	Year of Introduction
		0	0	10	10	10	2023

Preamble:

The course exposes students to the challenges of designing climate-responsive buildings that are multi-functional, multi storied, and service intensive. The course places a strong emphasis on the integration of building services including HVAC, plumbing, electrical, and fire protection systems in the design solutions. The course will help students demonstrate an understanding of integrating vertical and horizontal circulation systems, structural safety, latest advancements in building systems, automation, and smart technologies that underpin modern architectural design.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Summarize technical data regarding site, building bye laws, space standards, building services and other architectural design criteria and analyze them for designing multi-functional, multi storied, and service intensive buildings.
CO2	Analyze architectural cases for designing multi-storeyed buildings having a complex array of activities and services to prepare well defined inferences.
CO3	Apply the knowledge acquired through live and literature data (site, data collection, case studies etc.) in functional service intensive solutions to complex space planning problems.
CO4	Design multi-functional, multi storied, and service intensive buildings and prepare presentation drawings with necessary architectural details.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓			✓	✓	✓	✓		✓
CO2	✓	✓		✓		✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓		
CO4	✓	✓	✓	✓	✓	✓	✓	✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools		End Semester Examination
	Reviews	Other tools	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyze	✓	✓	✓
Evaluate	✓	✓	✓
Create	✓	✓	✓

Other Assessment tools: Site study and analysis, Critical analysis of case study, Sketching, Reviews, Panel presentation, One Day Problem

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	Studio [P]			**Total Marks**
		Assignments	**Project-1**	**Project-2**	
	10	90			**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**Jury (Marks)**	**ESE Duration**
200	100	100	Jury

End Semester Examination [ESE]:
ESE will be the portfolio evaluation by a panel of jury.

SYLLABUS

MAJOR PROJECT

To expose the students to the challenges of designing multi-functional, multi storied, service intensive, built environments having a complex array of activities and services. Projects shall have enough emphasis on:

Building Services Integration: HVAC systems, Plumbing and sanitation systems, Electrical systems, Fire protection and safety systems

Circulation Systems: Vertical circulation (elevators, escalators, stairs), Horizontal circulation (corridors, walkways, atriums), Accessibility and universal design considerations.

Technology Integration: Smart building systems and automation, Digital tools, Energy-efficient technologies, Water conservation, Waste management, Renewable energy integration.

Climate-Responsive Design Strategies: Bioclimatic design principles, Passive design strategies for different climatic zones, Case studies of climate-responsive buildings.

Spatial Efficiency and Occupant Comfort: Parking solutions, Optimal floor layouts, Circulation paths, Natural lighting, Ventilation, Acoustics.

Typology/ Projects: Multi-storied commercial buildings, Shopping Malls, Hotels, Public/semi-public buildings, Office buildings, Apartments, Mixed-Use Developments.

Reference books

1. Time-saver Standards for Building Types. (1980). United Kingdom: McGraw-Hill.

2. Neufert, E., Jones, V. (1988). Architects' Data. United Kingdom: Wiley.
3. Ching, F. D. K. (2012). Architecture: Form, Space, and Order. Germany: Wiley.
4. Kloft, E. and Johann, E. (2003). High-rise Manual: Typology and Design, Construction and Technology. Germany: Birkhäuser-Publishers for Architecture.
5. Osamu, A. W., Linde, R. M. and Bakhoum, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken: John Wiley & Sons.
6. Guptill, A. L. (1997). Rendering in Pen and Ink: The Classic Book on Pen and Ink Techniques for Artists, Illustrators, Architects, and Designers. United States: Clarkson Potter/Ten Speed.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [120 hours]
	STAGE 1 **Understanding Design Parameters and Case Studies [30 hours]**	
1.1	Introduction to Major Project Design Parameters	4
1.2	Preliminary studies – Data Collection and User Study	6
1.3	Literature Case Studies and critical analysis	10
1.4	Live Case Studies on Functionally Complex Buildings	10
	STAGE II **Site Analysis and Contextual Study [20 hours]**	
2.1	Site Study and Site Analysis	10
2.2	Contextual Analysis: Urban and Natural Environment	10
	STAGE III **Conceptualization and Form Development [30 hours]**	
3.1	Conceptualization: horizontal and vertical layering of functions, spaces, circulation and services	10
3.2	Ideation and Iteration: understand the interrelationship of spaces, the space in between buildings, the structural and services integration.	10
3.3	Three-dimensional composition through study models, 3d sketches, digital models.	10
	STAGE IV **Design Process and Architectural Drawings [40 hours]**	
4.1	Preparation of finalized design drawings and presentations involving site layout, parking plan, floor plans, atrium floor plans, building sections and elevations	20

4.2	Preparation of detailed drawings of structural systems, HVAC Layout Plans, Ductwork and Ventilation Diagrams, Sanitary Sewer Layouts, Water Supply Distribution Plans, Electrical Layout Plans, Lighting Plans, Fire Sprinkler Layouts, Emergency Exit Plans, Elevator, Escalator, Stairwell Details, Accessible Ramp Details, Water Recycling System Plans, Waste Management Flow Charts, Shading Device Details etc. incorporated in the design solution.	10
4.3	Virtual and physical models.	10

23ARS602	HISTORY OF ARCHITECTURE AND CULTURE V	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

The course facilitates students in developing an appreciation for architectural developments after the Industrial Revolution in a historical context. It encourages exploration of the cultural and contextual determinants influencing modern Architecture, which gave rise to a distinctive architectural vocabulary. Additionally, it aims to foster an understanding of architecture as a process that evolves within cultural contexts, considering factors such as politics, religion, society, climate, geography, technology, and heritage.

Course Outcomes: After the completion of the course the student will be able to

CO1	Demonstrate a comprehensive understanding of an architectural style, including its origin, key characteristics, and prominent examples.
CO2	Critically analyse the influence of determining factors (cultural, social, political, and religious influences) on an architectural style
CO3	Demonstrate an understanding of technological advancements, construction techniques and materials of an architectural style
CO4	Appraise the relevance of an architectural style, identifying examples on how the past influences contemporary architectural practices.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓				✓		
CO2	✓	✓				✓				✓		
CO3	✓	✓				✓				✓		
CO4	✓	✓				✓				✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tests			End Semester Examination
	Test1	Test 2	Other Tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply			✓	
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	CIE (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE] Pattern:

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 Questions, one from each module and each question carries 4 marks Marks: (4x5 =20 marks)	Part B has 10 questions with 2 questions from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS
MODULE I
Technological advancements of 19th century – Industrial revolution New materials and techniques of construction Crystal palace, Eiffel tower Arts & Crafts movement – William Morris, Philip Webb Art nouveau – Victor Horta Antoni Gaudi- Sagrada Familia Prairie Style – Robie House Organic architecture- Taliesin School, Fallingwater - F.L.Wright
MODULE II
Modernism as a cultural movement Skyscraper development – steel frame technology and glass window innovations. Chicago School – Home Insurance Building, Auditorium Building Expressionism - Erich Mendelsohn De Stijl - Rietveld Schröder House Bauhaus - Walter Gropius, Mies van der Rohe International style –Le Corbusier, I.M. Pei, , Kenzo Tange, Richard Meier Luis Kahn, Oscar Niemeyer, Tadao Ando, Ken Yeang Critical Regionalism - Geoffrey Bawa
MODULE III
Modern and High tech – Santiago Calatrava, Richard Rogers, Renzo Piano, Norman Foster Brutalism-Paul Rudolph, Moshe Safdie Writings of Christopher Alexander, Jane Jacobs Postmodernism- Robert Venturi, Michael Graves, Philip Johnson Deconstructivism – Zaha Hadid, Frank Gehry, Daniel Libeskind

Archigram, Parametricism
Metabolist architecture

MODULE IV

City Planning and architecture of New Delhi – Edwin Lutyens
City Planning and architecture of Chandigarh - Le Corbusier,
City Planning of Bhubaneswar - Otto Königsberger
IIM Ahmedabad - Louis Khan

MODULE V

Indian Masters: B.V. Doshi , Achyut Kanvinde, Charles Correa , Raj Rewal, Nariman (Nari) Gandhi, Anant Raje, Laurie Baker, Joseph Allen Stein
Contemporary Trends: Bimal Patel, Karan Grover, Gerard da Cunha, Rahul Mehrotra, Christopher Charles Benninger, Sanjay Mohe
Exercise: Case study and stylistic analysis of an award-winning project completed within the last decade.

Reference books

1. Aldo Rossi, L'architettura della città (1966), translated as The Architecture of the City by Diane Ghirardo and Joan Ockman. Cambridge, MA: MIT Press, 1982
2. Charles Jencks, The Language of Post-Modern Architecture, 1984.
3. Christopher Alexander, Pattern Language, Oxford University Press, Oxford- 1977.
4. Diane Ghirardo, Architecture after Modernism, Thames and Hudson, London, 1990.
5. Filippo Tommaso Marinetti, "The Futurist Manifesto" (1909) in Ulrich Conrads, Programs and Manifestoes on Twentieth-Century Architecture (Cambridge, MA: MIT Press, 1970)
6. Giulio Carlo Argan, "On the Typology of Architecture," (1963) in Kate Nesbitt, Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory, 1965- 1995 (New York: Princeton Architectural Press, 1996
7. Jane Jacobs, The Death & Life of Great American cities, Random House Inc, 1961
8. Joan Ockman, "Introduction," Architecture Culture 1943-1968: A Documentary Anthology. Edited by Joan Ockman with the collaboration of Edward Eigen (New York: Rizzoli, 1993)
9. Kate Nesbitt, "Introduction," Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory, 1965-1995 (New York: Princeton Architectural Press, 1996)
10. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London, 1994.
11. K. Michael Hays, "Introduction," Architecture Theory Since 1968 (New York and Cambridge: Columbia Books of Architecture/MIT Press, 1998)
12. Krysta Sykes, "Introduction," Constructing a New Agenda: Architectural Theory, 1993-2009, edited by A. Krysta Sykes (New York: Princeton Architectural Press, 2010)
13. Le Corbusier, Versune architecture (1923), translated as Towards a New Architecture (New York: Dover, 1986
14. Michael Hays, "Afterword," Constructing a New Agenda: Architectural Theory, 1993-2009, edited by A. Krysta Sykes (New York: Princeton Architectural Press, 2010)
15. Philip Johnson and Mark Wigley, Deconstructivist Architecture. New York: Museum of Modern Art and Boston: Little, Brown, 1988)
16. Robert Venturi, Complexity and Contradiction in Architecture, The Architectural Press, London, 1977.
17. Vikram Adhitya Praksh, Chandigarh's Le Corbusier, The Struggle for Modernity in Post-colonial India, Mapir Publishing, 2002

COURSE CONTENT AND LECTURE SCHEDULE		
No.		No. of Hours (36)
MODULE 1 (6 Hours)		
1.1	Technological advancements of 19th century – Industrial revolution	1
1.2	New materials and techniques of construction Crystal palace, Eiffel tower	1
1.3	Arts & Crafts movement – William Morris, Philip Webb Art nouveau – Victor Horta	1
1.4	Antoni Gaudi- Sagrada Familia	1
1.5	Prairie Style – Robie House Organic architecture- Taliesin School,	1
1.6	Fallingwater - F.L.Wright	1
MODULE II (9 Hours)		
2.1	Modernism as a cultural movement Skyscraper development – steel frame technology and glass window innovations.	1
2.2	Chicago School – Home Insurance Building, Auditorium Building	1
2.3	Expressionism -Erich Mendelsohn De Stijl - Rietveld Schröder House	1
2.4	Bauhaus - Walter Gropius, Mies van der Rohe	1
2.5	International style –Le Corbusier, I.M.Pei,	1
2.6	Kenzo Tange, Richard Meier	1
2.7	Luis Kahn, Oscar Niemeyer	1
2.8	Tadao Ando, Ken Yeang	1
2.9	Critical Regionalism - Geoffrey Bawa	1
MODULE III (7 Hours)		
3.1	Modern and High tech – Santiago Calatrava	1
3.2	Richard Rogers, Renzo Piano, Norman Foster	1
3.3	Brutalism- Paul Rudolph, Moshe Safdie	1
3.4	Writings of Christopher Alexander, Jane Jacobs	1
3.5	Postmodernism- Robert Venturi, Michael Graves, Philip Johnson	1
3.6	Deconstructivism – Zaha Hadid, Frank Gehry, Daniel Libeskind	1
3.7	Archigram, Parametricism, Metabolist architecture	1

MODULE IV (6 Hours)		
4.1	City Planning and architecture of New Delhi – Edwin Lutyens	1
4.2	City Planning and architecture of New Delhi – Edwin Lutyens	1
4.3	City Planning and architecture of Chandigarh - Le Corbusier,	1
4.4	City Planning and architecture of Chandigarh - Le Corbusier,	1
4.5	City Planning of Bhubaneswar - Otto Königsberger	1
4.6	IIM Ahmedabad - Louis Khan	1
MODULE V (8 Hours)		
5.1	Indian Masters: B.V. Doshi , Achyut Kanvinde	1
5.2	Charles Correa, Raj Rewal	1
5.3	Nariman (Nari) Gandhi, Anant Raje	1
5.4	Laurie Baker, Joseph Allen Stein	1
5.5	Contemporary Trends: Bimal Patel, Karan Grover	1
5.6	Gerard da Cunha, Rahul Mehrotra,	1
5.7	Christopher Charles Benninger, Sanjay Mohe	1
5.8	Assignment Review and Discussion	1

Sample Questions [CO Assessment]	
CO1	How did the Crystal Palace exemplify the architectural and design innovations of the Industrial Revolution, and what were its key characteristics?
CO2	Analyze how the Arts & Crafts movement, particularly the work of Philip Webb, was shaped by cultural and social influences of the late 19th century.
CO3	How did the Chicago School contribute to the development of the skyscraper and what technological advancements were crucial in this context?
CO4	How has the modern architecture of the International Style contributed to sustainable and functional design in the present day?

23ARS603	ESTIMATION AND VALUATION	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Preamble:

The course provides the knowledge about various types of estimation and specification of work involved in building construction. It equips students to analyze the rate of various items of work with reference to the standard data and schedule of rate. This course develops capability of students to prepare the detailed estimate of building construction and also imparts basic knowledge of the valuation of land and buildings.

Course Outcomes: After the completion of the course the student will be able to

CO1	Explain basic terms related to estimation, quantity surveying and contract document.
CO2	Interpret the item of work from drawings and explain its general specification and unit of measurement.
CO3	Make use of given data from CPWD DAR/DSR for calculating the unit rate of different items of work associated with building construction
CO4	Develop detailed measurement of building
CO5	Explain various basic terms related to valuation of land and building

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓										✓	
CO2	✓											
CO3	✓	✓										
CO4	✓	✓										
CO5	✓	✓										

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	✓
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
2-1-0	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3hrs

End Semester Examination [ESE]:

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: 40	Total Marks: 60

SYLLABUS

MODULE I: Introduction

Estimation, Details required, Types of Estimates, Purpose.
Bill of Quantity -Typical format-use
Terms- Contingencies, Work-charge establishment, Tools and Plant, centage charge, Day work, Prime cost, Provisional sum & provisional Quantity, Overhead charges, Cost index, Contract documents (Brief description only)
Factors affecting the cost estimation of a structure – building shape, height, structural elements, service finishes, architectural features.
Introduction to building cost modelling

MODULE II: Specifications & Approximate estimate

Item of works- Identify various item of work from the drawings-units of measurement of various materials and works (focus may give to RCC residential building)
General rule & method of measurement with reference to Indian Standard Specifications-IS1200.
Specifications-General specification of all items of a residential building.
Introduction to Detailed specification (CPWD specifications)
Introduction to approximate estimate methods-plinth area method, cubic rate method, unit rate method and bay method-Numerical examples

MODULE III: Rate analysis

Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR.
Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing/Architectural work, masonry work, reference to latest DSR and latest DAR ((For working out analysis of rate-data from DSR/DAR should be provided)

MODULE IV: Calculation of detailed estimation for a building.

Quantity Surveying: Methods of building estimate-centre line method and long wall-short wall method.
Preparation of detailed estimate for simple buildings of load bearing walls.
Details of measurements and calculation of quantities & Abstract of estimate.

MODULE V: Introduction to valuation of properties

Valuation – purpose, factor affecting, introduction to terms-Value, Cost, Price, kinds of values Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase, Depreciation, obsolescence -Free hold and leasehold properties.
Methods of calculating depreciation – straight line method – constant percentage method, sinking fund method and quantity survey.
Various method of valuation of land (Brief description only)

Text books

1. Chakrabarthi, Estimation, costing and specification in Civil Engineering, 1981
2. Dutta B N, Estimation and costing in Civil Engineering, UBSPD,1992
3. Mahajan S P, Civil Estimating and Costing, Sathyaprakasam,1988

Reference books

1. IS 1200(1968), Methods of measurement of building and civil engineering works
2. Shah N. A., Quantity surveying and specification in Civil Engineering,1981

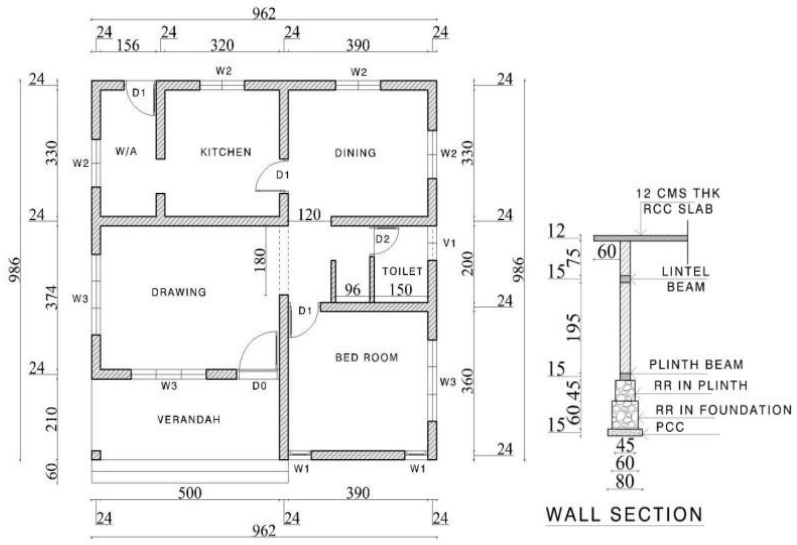
COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1(3 hours)	
1.1	Estimation, Details required, Types of Estimates, Purpose. Bill of Quantity -Typical format-use	1
1.2	Terms- Contingencies, Work-charge establishment, Tools and Plant, centage charge, Day work, Prime cost, Provisional sum & provisional Quantity, Overhead charges, Cost index, Contract documents (Brief description only)	1
1.3	Factors affecting the cost estimation of a structure – building shape, height, structural elements, service finishes, architectural features. Introduction to building cost modelling	1
	MODULE II (9 hours)	
2.1	Item of works- Identify various item of work from the drawings-units of measurement of various materials and works (focus may give to RCC residential building)	1

2.2	General rule & method of measurement with reference to Indian Standard Specifications-IS1200. Specifications-General specification of all items of a residential building.	1
2.3	Introduction to Detailed specification (CPWD specifications) Preparation of specification for materials of construction and items of work—Earthwork Excavation	1
2.4	Preparation of specification for materials of construction and items of work – R.R Masonry for foundation and Basement	1
2.5	Preparation of specification for materials of construction and items of work –Brickwork for superstructure	1
2.6	Preparation of specification for materials of construction and items of work –RCC work for roof slab	1
2.7	Preparation of specification for materials of construction and items of work –Plastering work for inside and outside	1
2.8	Introduction to approximate estimate methods-plinth area method, cubic rate method, unit rate method and bay method-Numerical examples	1
2.9	Introduction to building cost modelling	1
MODULE III (6 hours)		
3.1	Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR. Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing/Architectural work, masonry work, reference to latest DSR and latest DAR ((For working out analysis of rate-data from DSR/DAR should be provided)	1
3.2	Analysis of rates for main items of work in buildings based on PWD schedule of rates and standard data book ---Earthwork Excavation	1
3.3	Analysis of rates for main items of work in buildings based on PWD schedule of rates and standard data book --- Foundation	1
3.4	Analysis of rates for main items of work in buildings based on PWD schedule of rates and standard data book --- Brickwork for Superstructure	1
3.5	Analysis of rates for main items of work in buildings based on PWD schedule of rates and standard data book --- RCC work for roof slab	1
3.6	Analysis of rates for main items of work in buildings based on PWD schedule of rates and standard data book --- Plastering inside and outside	1
MODULE IV (13 hours)		
4.1	Quantity Surveying: Methods of building estimate-centre line method and long wall-short wall method.	1
4.2	Long-wall -short wall method- Numerical Problems	1

4.3	Long-wall -short wall method- Numerical Problems	1
4.4	Long-wall -short wall method- Numerical Problems	1
4.5	Centre -Line Method---Numerical Problems	1
4.6	Centre -Line Method---Numerical Problems	1
4.7	Centre -Line Method---Numerical Problems	1
4.8	Preparation of detailed estimate for simple buildings of load bearing walls- One Room Building	1
4.9	Preparation of detailed estimate for simple buildings of load bearing walls- Two Room Building	1
4.10	Preparation of detailed estimate for simple buildings of load bearing walls- Three Room Building	1
4.11	Preparation of detailed estimate for simple buildings of load bearing walls- single storey Building with more than 3 rooms	1
4.12	Preparation of detailed estimate for simple buildings of load bearing walls- Two storeyed Building with more than 3 rooms	1
4.13	Details of measurements and calculation of quantities & Abstract of estimate	1
MODULE V (5 hours)		
5.1	Valuation – purpose, factor affecting, introduction to terms-Value, Cost, Price, kinds of values, Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase,	1
5.2	Depreciation, obsolescence -Free hold and leasehold properties.	1
5.3	Methods of calculating depreciation – straight line method – constant percentage method, sinking fund method and quantity survey.	1
5.4	Various method of valuation of land (Brief description only) – belting method-development method-hypothecated buildings scheme method.	2

CO Assessment Sample Questions	
CO1 CO2	Define the terms i. Work Charged Establishments ii. Maintenance Cost iii. Cubic Rate Method iv. Long wall-short wall method & Centre line Method v. Standard Data Book. vi. Discuss about the five important terms related to an estimate. vii. What are the factors effecting the cost estimation of a structure?

	viii.	Explain about the four types of Approximate estimate methods
CO3 CO4	i.	Estimate the quantities for a. Earthwork Excavation b. R.R.Masonry for Foundation and Basement c. Brickwork for superstructure d. RCC Work for roof slab. E. Exterior Plastering and False ceiling for the residence shown in Figure  **Figure 1 – Residence (All dimensions are in cms)** **(D0 – 110X210, D1-90X210, D2-80X210, W1-60X150, W2-120X150, W3-180X150, V2-90X60)** *Assume missing data suitably.*
	ii.	Work out the unit rate for Random rubble masonry in superstructure above plinth level in cement Mortar in 1:6 ratio for 1m^3(1.10m^3 rubble @ Rs.1500/ m^3, and .30 m^3 cement mortar, 1.02 Mason @ Rs.1000/day, 1.62man @ Rs. 750/day and 0.3 woman @ Rs. 600/day) (For 1 m^3 of cement mortar needed - cement .25ton @ Rs 5400/ton, river sand 1.07 m^3 @ Rs1200/m3, 0.75 mason @ Rs. 1000/day and 0.07 man @ Rs.750/day) Add as necessary for water charges, Contractor's profit and overheads.
CO5	i.	Constant Percentage method of Depreciation
	ii.	Differentiate between any three methods in valuation of land.
	iii.	Explain briefly the various purposes of valuation.

23ARB604	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES VI	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

The course enables the students to

- Study building materials, their applications and construction methods.
- Familiarize themselves with market study of building components and details.

Course Outcomes: After the completion of the course the student will be able to

CO1	Explain the properties, types, uses and construction aspects of plastics, polymers and paint in the building industry.
CO2	Explain the properties, types, uses and construction aspects of floor finishes, cladding, and false ceiling in the building industry.
CO3	Illustrate and examine the types, design concepts and application areas of deep foundations through site visits, case studies, and drawings.
CO4	Illustrate and examine the design concepts, need for and importance of prefabrication & modular coordination through site visits, case studies, and drawings.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓			✓							
CO3	✓	✓			✓					✓		✓
CO4	✓	✓	✓		✓					✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test -2/ Portfolio/ Viva	
	5	30	7.5	7.5	**50**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	50	50	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	PART C	ESE Mar
PATTERN 1	6 Questions, at least one from each module and each question carries 2.5 marks Marks: (6x2.5 =15 marks)	Total 4 Questions; 2 Questions from each theory-based module, answer any one from each module, and each carries 7.5 marks. Marks: (2x7.5 = 15 marks)	Total 2 Questions, 1 Question from each drawing-based module, answer any one, and each carries 20 marks. Marks: (1x20 = 20 marks.	50 (3 hours
	Total Marks: 15	Total Marks: 15	Total Marks: 20	

SYLLABUS

MODULE I: Study of deep foundations.

Pile foundation: Bearing piles, friction piles – concrete, timber, steel and composite piles. Cased and uncased cast in situ concrete piles, Bored piles, pressure piles and precast concrete piles. Screw piles & disk piles. Under reamed piles. Bored compaction piles. Sand piles. Sheet piles. Pile cap.
Caissons: Box caissons, Open caissons & pneumatic caissons,
Timbering and trenching of foundations

Drawing: Various types of Pile foundations.
Site visits and case study of deep foundation construction

MODULE II: Plastics, Polymers and Paint.

Introduction, Polymerization, Polymer types, Properties of plastics. Plastics in construction, Environmental issues, recycling of plastic. Polymers- adhesives, sealants, building components. Discussion: advantages and disadvantages of using plastic in building construction. Exercise: Market study and sample collection of plastic building materials and components.
Paints, Distempers and varnishes: Characteristics of an ideal paint. Classification – various types of paints, their characteristics and purpose. Composition of paints. Painting process. Application of paints. Defects in painting works.

Market Survey

MODULE III: Prefabrication & Modular Coordination

Introduction to the concepts of standardization – need and importance. Introduction to concepts of Modular Coordination. Objectives of Modular coordination & definition of Basic Module. Modular controlling dimensions, Planning Modules and preferred Multi-modules.
Introduction to concepts of prefabrication. Advantages & disadvantages of onsite & off-site prefabrication. Methods of prefabrication & Examples of prefabricated components. Process of prefabrication. Various issues related to prefabrication industry & Examples of prefabrication concepts.
Discussion: Future architecture and prefabrication

Exercise: Documentation of pre-fabricated components.

Drawings: Design and draw prefabricated structural solution for buildings like public toilet facility, bus waiting shelter, kiosk etc

MODULE IV: Applied finishes - Floor finishes, Cladding, False Ceiling

Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, colored cement, mosaic, terrazzo, tiles, wood, parquet flooring, stone, etc.
Classification & properties of tiles used in flooring. Selection criteria & Methods of fixing various types of tiles. Different types of resilient and vibration resistive floor like rubber, Linoleum and PVC flooring. General character and construction process of traditional flooring.
Wall cladding- stone cladding, tile cladding, and metal cladding. Stucco finish.

Discussion: Selection of appropriate floor finish based on Cost, cleanliness & Hygiene.

Exercise: Case study of floor finishing techniques

Site Visit/ Case study/Market Survey

Text books

1. Arthur Lyons, 'Materials for Architects and Builders', Elsevier Butterworth Heinemann, 2004.
2. Francis DK Ching, 'Building Construction Illustrated' (4th edition), Wiley- India, New Delhi, 2012.
3. 'Harry Parker, 'Materials and Methods of Architectural Construction', John Wiley & Sons Canada, 1958.
4. H Leslie Simmons, 'Construction – Principles, Material & Methods', 7th edition, John Wiley & Sons Inc., New York, 2001.
5. P C Varghese, 'Building Materials', Prentice Hall of India Pvt. Ltd, New Delhi, 2010

Reference books

1. RC Smith & TL Honkala, 'Principles and Practices of Light Construction', Prentice Hall, Englewood Cliff, NJ 07632, 1986.
2. R Barry, 'The Construction of Buildings (Vol. I-II)', 6th edition, Affiliated East-West Press Pvt. Ltd., New Delhi, 1996.
3. Rosen Harold J, Construction Materials for Architecture, Krieger Pub Co, 1992.
4. W.B McKay, 'Building Construction', Orient Longman 21, London, 1938-44.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36 hours]
MODULE 1[12 hours]		
1.1	**Study of deep foundations.** Pile foundation: Bearing piles, friction piles – concrete, timber, steel and composite pile.	1
1.2	Cased and uncased cast in situ concrete piles	1
1.3	Bored piles, pressure piles and precast concrete piles.	1
1.4	Screw piles & disk piles, Under reamed piles, Bored compaction piles.	1
1.5	Sand piles, Sheet piles, Pile cap.	1
1.6	Caissons: Box caissons, Open caissons & pneumatic caissons.	1
1.7	Exercise: Drawings of various types of Pile foundations	3
1.8	Site visits and case study of deep foundation construction shall be done.	3
MODULE II [6 hours]		
2.1	**Plastics, Polymers and Paint.** Introduction, Polymerization, Polymer types. Polymers-adhesives, sealants, building components.	1
2.2	Properties of plastics. Plastics in construction, Plastic Environmental issues, recycling of plastic. Discuss the advantages and disadvantages of using plastic in building construction	1
2.3	Exercise: Market study and sample collection of plastic building materials and components.	1
2.4	Paints, Distempers and varnishes: Characteristics of an ideal paint. Defects in painting works.	1
2.5	Classification – various types of paints, their characteristics and purpose. Composition of paints. Painting process. Application of paints.	1
2.6	Exercise: Market study of Paints, Distempers and varnishes.	1
MODULE III [12 hours]		
3.1	Pre-fabrication & Modular Co-ordination Introduction to the concepts of standardization – need and importance. Introduction to concepts of Modular Coordination	1
3.2	Objectives of Modular coordination & definition of Basic Module.	1
3.3	Modular controlling dimensions, Planning Modules and preferred Multi-module.	1

3.4	Introduction to concepts of prefabrication. Advantages & disadvantages of onsite & off-site prefabrication.	1
3.5	Methods of prefabrication & Examples of prefabricated components.	1
3.6	Process of prefabrication. Various issues related to prefabrication industry	1
3.7	Examples of prefabrication concepts, Discussion: Future architecture and pre fabrication.	1
3.8	Exercise: Documentation of pre-fabricated components.	2
3.9	Drawings: Design and draw prefabricated structural solution for buildings like public toilet facility, bus waiting shelter, kiosk etc.	3
MODULE IV [6 hours]		
4.1	Applied finishes - Floor finishes Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, colored cement, mosaic, terrazzo, tiles, wood, parquet flooring, stone, etc.	1
4.2	Classification & properties of tiles used in flooring. Selection criteria & Methods of fixing various types of tiles.	1
4.3	Different types of resilient and vibration resistive floor like rubber, Linoleum and PVC flooring. General character and construction process of traditional flooring.	1
4.4	*Discussion: Selection of appropriate floor finish based on Cost, cleanliness & Hygiene.* *Exercise: Case study of floor finishing techniques* *Site Visit/ Case study/Market Survey*	2
4.5	Wall cladding- stone cladding, tile cladding, and metal cladding. Stucco finish.	1

CO Assessment Sample Questions	
PART A	
CO1	1. Explain Polymerization.
CO2	2. Write a short note on parquet flooring.
CO3	3. Write short notes on Deep foundation.
CO4	4. What are the objectives of Modular coordination?
PART B	
CO1	(a) Discuss in detail the different types of Polymers and its applications. (b) Discuss the advantages and disadvantages of using plastic in building construction.
CO2	(a) Explain the different types & properties of tiles used in flooring. Elaborate the selection criteria & methods of fixing various types of tiles. (b) Briefly explain the general character and construction process of traditional flooring.

PARTC	
CO3	(a) Draw the construction details of the isolated footing as per the following data: length of the footing = 180cm, width of the footing = 180cm, Thickness of the footing = 20cm, Column size = 25cm x 25cm, Depth of the footing is 120cm. Also provide 5cm PCC and 8cm brick soling beneath the footing Drawing should have the reinforcement details of the slab and beams shown. Assume all other dimensions and neatly mention the parts.
CO4	(b) Design and draw the details for a prefabricated structure of a bus waiting shelter in a space of 4.6m X 2.0 m. The construction should be of prefabricated members to be assembled on site. All the services and details have to be shown in the plan not less than 1: 50 Scale. Specify materials, and joineries of various geometries in details drawn to scale not less than 1:10

23ARC605	BUILDING SERVICES – IV (ACOUSTICS)	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to develop a basic understanding of the principles of architectural acoustics, the way we hear and perceive sound both indoors and outdoors, the appropriate criteria for listening environment and acoustical privacy, and the architectural decisions of layout and material selection in design. Students will be able to apply in architectural design and prepare layout and details.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Examine sound generation, propagation and human perception required. (Understand)
CO 2	Analyze the behavior of sound in enclosed spaces for architectural acoustical design. (Analyzing)
CO 3	Explore noise reduction measures for acoustical design of spaces. (Understand, Analyzing)
CO 4	Understand and analyse reverberation time and sound reinforcement systems in spaces. (Understand, Analyzing)
CO 5	Explore the design principles and appraise the planning schemes for noise control through planning and design of built spaces (Understand)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓											✓
CO 2	✓	✓	✓	✓			✓					✓
CO 3	✓			✓		✓	✓		✓			✓
CO 4	✓											✓
CO 5	✓	✓	✓	✓		✓						✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L- T]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	5 Questions, one from each module and each question carries 4 marks Marks: (4x5 =20 marks)	Part B has 10 questions with 2 questions from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I: Introduction to Architectural acoustics

The nature of sound - propagation of sound-velocity, frequency and wavelength of sound. Sound pressure - Sound intensity and loudness- Decibel and Phons - The human ear and hearing characteristics - Instruments and equipment

MODULE II: Room Acoustics

Behaviour of sound in enclosed spaces. Sound Absorption. Sound absorption coefficient, Sound absorbing materials, Porous materials, Panel materials, Resonators. Space absorbers - variable absorbers.

Design considerations for good acoustical design such as shape, size, occupancy, purpose, geometry etc. Acoustical defects such as echo, creep etc., and their remedies. Experiment: Measuring sound level

MODULE III: Effect of noise on human beings

Noise sources - air borne and structure borne- Methods of preventing air borne and structure borne noises. Sound transmission - Noise criteria –NC curve - Transmission loss - permissible noise levels for different types of spaces. Material types for hollow and composite wall construction, floors and ceilings.

MODULE IV: Reverberation time and Sound Reinforcement Systems

Calculation of reverberation time - Sabine's formula. Acoustical defects in the enclosed spaces.

Characteristics and components of a good sound reinforcement system, public address system. Study and understanding of sound system equipment available in market, manufactured by various brands such as amplifiers, microphones, speakers etc.

MODULE V: Design Principles and Planning of spaces

Different acoustical defects in auditoriums and their solutions, acoustical correction design and modification techniques.

Regulations for noise control – Town Planning and Regional Planning considerations – landscaping, campus planning and building design.

Reference books

1. Cavanaugh, Hoboken, Architectural acoustics : Principles and practice,: Wiley & sons, 2010.
2. Design for Good Acoustics and Noise Control, Macmillan Education, 1988.
3. Ducan Templation, Acoustics in the built environment, Oxford ; Boston : Architectural Press, 1997.
4. J. Flynn, J. A. Kremers, A. W. Segil, G. Steffy, Architectural Interior Systems, Lighting, Acoustics, Air Conditioning, Van Nostrand Reinhold, 1992.
5. Kinsler and Fry, Hoboken, Fundamental of acoustics, N J : Wiley, 2000
6. Knudson and Harris, Acoustical Designing to Architecture, 'American Institute of Physics for the Acoustical Society of America, 1978
7. M. D. Egan, Architectural Acoustics, Mc Grawhill Inc., 1988.
8. M. D. Egan, Concepts in Architectural Acoustics, 1972.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1[3 hours]	
1.1	Introduction to Architectural acoustics The nature of sound - propagation of sound-velocity, frequency and wavelength of sound.	1
1.2	Sound pressure - Sound intensity and loudness, Decibel and Phons	1
1.3	The human ear and hearing characteristics - Instruments and equipment	1

MODULE II [9 hours]		
2.1	Room Acoustics	1
2.2	Behaviour of sound in enclosed spaces	2
2.3	Sound Absorption. Sound absorption coefficient	1
2.4	Sound absorbing materials, Porous materials, Panel materials, Resonators. Space absorbers - variable absorbers	2
2.5	Experiment: Measurement of sound level using sound level meter	1
2.6	Design considerations for good acoustical design such as shape, size, occupancy, purpose, geometry etc.	1
2.7	Acoustical defects such as echo, creep etc., and their remedies.	1
MODULE III [7 hours]		
3.1	Noise sources - air borne and structure borne	1
3.2	Methods of preventing air borne and structure borne noises	1
3.3a	Sound transmission - Noise criteria –NC curve	1
3.3b	Sound transmission - Noise criteria –NC curve	1
3.4	Transmission loss - permissible noise levels for different types of spaces	1
3.5	Effect of noise on human beings	1
3.6	Material types for hollow and composite wall construction, floors and ceilings.	1
MODULE IV [8 hours]		
4.1	Calculation of reverberation time - Sabine's formula	3
4.2	Acoustical defects in the enclosed spaces	3
4.3	Characteristics and components of a good sound reinforcement system, public address system.	1
4.4	Study and understanding of sound system equipment available in market, manufactured by various brands such as amplifiers, microphones, speakers etc.	1
MODULE V [12 hours]		
5.1	Design Principles of Auditorium	1
5.2	Different acoustical defects in auditoriums and their solutions	3
5.3	Acoustical correction design and modification techniques	3
5.4	Reduction of noise by Town Planning and regional planning consideration - landscaping, campus planning	3
5.5	Planning for noise control in building design	2

CO Assessment Sample Questions	
1	1. Explain the hearing characteristics of human ear with the help of a cross section. 2. Explain how a sound level meter works. 3. What are the factors affecting velocity of sound?
2	1. Explain different materials used for sound absorption in a room. 2. Performances of sound absorbing materials differ with modes of fixing them. Analyze with examples. 3. Differentiate between space absorbers and variable absorbers.
3	1. What is meant by reverberation time? How is it calculated using sabine's formula? 2. Explain the various acoustical defects in enclosed spaces and their remedial methods. 3. A lecture room has 18 m x 10 m x 5 m. The absorption coefficient of the materials used for walls is 0.30, ceiling is 0.05 and floor is 0.10 respectively at middle frequencies. The absorption coefficient of other materials is 12.3 m^2 sabine. 1) Calculate the reverberation time of the room with no acoustic treatment. 2) What will be the RT if 50% of the ceiling surface along the perimeter is treated with acoustic material with absorption coefficient of 0.85 at middle frequencies?
4	1. Write short note on NC Curve. 2. What is air borne and structure borne noise? 3. Discuss with the help of sketches the methods to prevent air borne noise transmission?
5	1. How does the volume of an auditorium affect its acoustical design? 2. Write short note on sound shadow. 3. Explain the acoustical planning of an auditorium. 4. Design exercise - Site selection and planning, shape, size, occupancy and seating arrangements, treatment of interior surfaces, desired reverberation time, and amplification systems. The exercise's output would be in the form of a plan, section, construction details, and calculation sheets. 5. With respect to your Design project, list down the strategies for noise control that have been followed in the site planning level – include your drawings and explain.

23ACC606	THEORY OF STRUCTURES - VI	L	T	P	S	C	Year of Introduction
		2	1	0	2	3	2023

Course Objectives:

This course provides fundamental concepts of commonly practiced structural systems. The course provides students with an understanding of structural behaviour and design concepts of industrial steel buildings, flat slab, grid / coffered floor systems, masonry structures, prestressed concrete elements along with seismic design philosophies. After the completion of the course the student will be able to design masonry structures, and steel structures, incorporating seismic design philosophies.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to:

CO1	Summarize the structural behavior/concept of commonly practiced structural systems such as industrial steel buildings, flat slabs, grid or coffered floor systems, and prestressed concrete. (Understanding)
CO2	Explain the structural behavior of masonry structural elements such as pillars, walls, retaining walls and foundations. (Understand)
CO3	Design masonry structural elements such as pillars, walls, retaining walls and foundations following Indian standards. (Apply)
CO4	Explain the structural behavior and EQ resistant design provisions of framed and masonry structures. (Understand)

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	-	-	-	-	-	-	-	-	-	-
CO2	✓	✓	-	-	-	-	-	-	-	-	-	-
CO3	✓	✓	✓	-	-	-	-	-	-	-	-	-
CO4	✓	✓	-	-	-	-	-	-	-	-	-	-
CO5	✓	✓	-	-	-	-	-	-	-	-	-	-

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Ma
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	**60**
	Total Marks: 20	Total Marks: 40	Total Marks: 6

SYLLABUS

MODULE I (STEEL STRUCTURES)

Industrial steel building - Introduction - Building configuration and components - load and load combination as per IS 875 - Portal frame - analysis only (design not required) Flat slab - components - proportioning of component as per IS 456 - Structural behaviour - concept only Grid or coffered floor systems - Different configuration - Design as per IS code approximate method

MODULE II (MASONRY PILLARS AND WALLS)

Introduction to brick masonry pillars and walls - Mechanical behaviour of masonry assemblages under different gravity loads - working stress and limit state approaches to analysis and design of unreinforced, reinforced, confined masonry structures for gravity loads (Theory only) - Design of unreinforced brick masonry pillars and walls (WSM) using IS 1905: 1987

MODULE III (UNREINFORCED MASONRY STRUCTURES)

Design of unreinforced masonry retaining walls – lateral earth pressure – stability of retaining walls.
Design of unreinforced masonry foundation – types of foundation –loads acting on the foundation

MODULE IV (SEISMIC DESIGN PHILOSOPHIES)

Seismic design philosophies - Stiffness, strength, ductility damping, center of mass, center of rigidity, torsion. Strong column- weak beam concept Earthquake resistant design of framed structures based on IS 1893- Reinforcement detailing –beams, columns, beam column joints, openings as per IS920. Behaviour of Masonry building during earthquakes. Earthquake resistant design provisions in masonry structures.

MODULE V (PRESTRESSED CONCRETE)

Introduction to Prestressed concrete – Principles of prestressing- Introduction to

pretensioned and post tensioned beams and slabs (concept only)-Analysis of rectangular prestressed beams at transfer beams at transfer and at service-Losses in prestress (theory only).

Text books

1. Dayarathnam, P. Brick and reinforced brick structures, Oxford and IBH Publishing Co. Ptvt. Ltd.
2. Arya, Masonry and timber structures including earthquake resistant design, Nem Chand & Bros, Roorkee
3. Harbhajan Singh, Design of Masonry and Timber structures, Abhishek Publications, Chandigarh.
4. Pankaj Agrawal, Manish Shrikhande, Earthquake Resistant Design of Structures, PHI learning Pvt. Ltd
5. Shashikant K. Duggal, Earthquake Resistant Design of Structures, Oxford P CVR Murty,
6. "Earthquake Tips", National Information Centre of Earthquake
7. R E Klingner 2010 Masonry structural design, Mc GrawHill Companies, Inc. New York
8. M Tomazevic 1999 Earthquake-resistant design of masonry buildings, Series on Innovation in Structures and Construction, Vol. 1, Imperial College Press, London
9. MJN Priestley and T Paulay 1997 Seismic design and assessment of reinforced concrete and masonry buildings, John Wiley and Sons.
10. RG Drysdale, AA Hamid, LR Baker 1994 Masonry Structures: Behaviour and design, Prentice Hall, New Jersey, USA.
11. AW Hendry 1981 Structural Brickwork, The Macmillan Press Ltd. Publications

Reference books

1. IS 1905: 1987 Structural use of unreinforced masonry - code of practice, Bureau of Indian Standards, New Delhi
2. IS 4326: 1993, Earthquake resistant design and construction of buildings - code of practice, Bureau of Indian Standards, New Delhi
3. IS 13920: 1993 Ductile detailing of reinforced concrete structures subjected to seismic forces - code of practice, Bureau of Indian Standards, New Delhi
4. IS 1343: 2012 Prestressed concrete - code of practice, Bureau of Indian Standards, New Delhi
5. National Building Code of India 2016 Vol.1, Part 6 Section 4 Structural Design - Masonry
6. Engineering, www.nicee.org/EQtips.php
7. NPTEL course on Design of Masonry Structures, by Prof. Arun Menon, IIT Madras, https://nptel.ac.in/courses/105106197

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours(36)
	MODULE 1 (8 Hours)	
1.1	Industrial steel building-Introduction	1
1.2	Building configuration and its components with load and load combination	1
1.3	Portal frame -Analysis	1
1.4	Portal frame -Analysis	1

1.5	Flat slab components proportioning of component as per IS 456 - Structural behaviour-concept only	1
1.6	Flat slab components proportioning of component as per IS 456 - Structural behaviour-concept only	1
1.7	Grid or coffered floor systems-Different configuration-Design as per IS code approximate method	1
1.8	Grid or coffered floor systems-Different configuration-Design as per IS code approximate method	1
MODULE II (8Hours)		
2.1	Introduction to brick masonry pillars and walls	1
2.2	Mechanical behaviour of masonry assemblages under different gravity loads-working stress	1
2.3	Mechanical behaviour of masonry assemblages under different gravity loads-limit state approaches	1
2.4	Design of unreinforced, reinforced, confined masonry structures for gravity loads (Theory only)	1
2.5	Design of unreinforced brick masonry pillars (WSM)using IS 1905:1987	1
2.6	Design of unreinforced brick masonry pillars (WSM)using IS 1905:1987	1
2.7	Design of unreinforced brick masonry walls (WSM)using IS 1905:1987	1
2.8	Design of unreinforced brick masonry walls (WSM)using IS 1905:1987	1
MODULE III (7 Hours)		
3.1	Design of unreinforced masonry retaining walls-lateral earth pressure	1
3.2	Design of unreinforced masonry retaining walls-lateral earth pressure	1
3.3	Stability of retaining walls	1
3.4	Design of unreinforced masonry foundation	1
3.5	Design of unreinforced masonry foundation	1
3.6	Types of foundation	1
3.7	Loads acting on foundation	1
MODULE IV (7 Hours)		
4.1	Seismic design philosophies-stiffness strength, ductility, damping	1
4.2	Seismic design philosophies-center of mass, center of rigidity, torsion, strong column-weak beam concept	1
4.3	Earth quake resistant design of framed structures based on IS 1893	1

4.4	Reinforcement detailing-beams as per IS13920	1
4.5	Reinforcement detailing-columns, beam column joints, openings as per IS13920	1
4.6	Behaviour of masonry building during Earth quakes	1
4.7	Earth quake resistant provisions in masonry structures	1
MODULE V (6 Hours)		
5.1	Introduction to prestressed concrete	1
5.2	Principles of prestressing	1
5.3	Introduction to pretensioned beams and slabs (concept only)	1
5.4	Introduction to post tensioned beams and slabs (concept only)	1
5.5	Analysis of rectangular prestressed beams at transfer (theory only)	1
5.6	Service-losses in prestress (theory only)	1

CO Assessment Sample Questions	
CO1	Explain panel, column strip, middle strip of a flat slab.
CO2	Explain the stability criteria for the design of retaining wall.
CO3	Design a load bearing wall using conventional bricks in CM (1:6) to carry an axial load of 130 KN/m. Height of wall is 3m and its length between cross walls is 4m.
CO4	Explain the behaviour of masonry structures during earth quake. Also explain the remedies to prevent damage of masonry structures during earth quake.

SEMESTER 6
ELECTIVE 2

23ARE607.1	SUSTAINABLE ARCHITECTURE	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course introduces the students to the importance of sustainability and provides them the basic knowledge about sustainable design practices.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Comprehend concepts of sustainability in architecture
CO2	Summarize sustainable planning principles and environmental impact assessment methods
CO3	Demonstrate choice of building materials and technology in buildings to promote sustainability
CO 4	Explain how to conserve resources

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓						✓					
CO2	✓						✓					
CO3	✓						✓					
CO 4	✓						✓					

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply				
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 4 X 10 = 40	

SYLLABUS

MODULE I: Concepts of Sustainability

Introduction to sustainability, principles of sustainability in architecture, energy efficient architecture, green architecture.
Brundtland Commission Report (1983), Rio Declaration (1992), Kyoto Protocol (1997), Sustainable development goals (SDGs); Global warming and climate change - energy use, Non-renewable and renewable resources and sustainability, Integration of renewable energy sources in architecture

MODULE II: Sustainable Planning Practices and Environmental Impact Assessment

Sustainable site planning – site preservation - topography vegetation, natural drains, soil erosion
Tools and methodologies for assessing environmental impact
Life cycle assessment in architectural design
Ecological footprint, carbon footprint analysis and reduction strategies

MODULE III: Sustainable building materials and technologies

Building materials – embodied energy, reusing and recycling of building materials.
Selection criteria for sustainable materials
Innovative building materials and their environmental impact
Net zero energy buildings, Green rating – rating systems – LEED, TERI GRIHA, BREEAM etc.

MODULE IV: Resource Conservation

Water conservation – global water scenario, water efficient design principles, rainwater harvesting

Water recycling – water treatment, biological treatment plants, and greywater recycling; strategies for water conservation in buildings - Water efficient plumbing fixtures, water efficient landscaping, xeriscaping

Waste Management – pollution of air water and land; design for recyclability; waste reduction techniques; upcycling and repurposing in architecture

MODULE V: Case Studies and best practices

Case studies of sustainable architectural projects and architectural structures,

Case studies of green rated buildings, lessons from iconic sustainable buildings

References:

1. Amartya Sen, *Development as Freedom*, Oxford University Press, 2001.
2. Baker, Nick and Steemers, *Koen, Energy and Environment in Architecture E& FN*, Spon. London 1999.
3. Bansal Naveendra K., Hauser Gerd and Minke Gernot, *Passive Buildings Designs: Handbook of Natural Climatic Control Elsevier Science*, Amsterdam 1997.
4. Givoni B. Man, *Climate and Architecture Elsevier*, Amsterdam, 1986.
5. Goulding, John, R, Lewis, Owen J and Steemers, Theo C. *Energy in Architecture* Bastford Ltd., London, 1986.
6. Nicholas Stern *The Economics of Climate Change*, Cambridge University Press, 2007.
7. Rees, W.E. *Our Ecological footprint: Reducing Human Impact on Earth*, Routledge, 2007.
8. Rogers, Jalal & Boyd, *An Introduction to Sustainable Development*, Earthscan, 2008
9. Schumacher E. F., *Small is Beautiful: Economics as if People Mottered*, Random House, 2011.
10. TERI *Sustainable Building Design Manual Vol 1 & 2*, TERI, New Delhi, 2004.
11. *The United Nations Eorth summit: Agendo 21*, UN, 1993.
12. Watson Donald, *Climatic Design: Energy Efficient Building Principles &Practices*, Mc Graw Hill Book Company, New York, 1983.
13. World Commission on Environment and Development, *Our Common Future* Oxford University Press, 1987.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. ofHours [36 hours]
MODULE 1 [7 hours]		
1.1	Introduction to sustainable architecture. Introduction to sustainability, principles of sustainability in architecture, Sustainable development goals (SDGs)	2
1.2	Global warming and climate change	1
1.3	Energy use, Non-renewable and renewable resources and sustainability	2
1.4	Integration of renewable energy sources in architecture	1
1.5	Brundtland Commission Report (1983), Rio Declaration (1992), Kyoto Protocol (1997)	1
MODULE II [7 hours]		
2.1	Sustainable site planning – site preservation, preserving existing features like topography vegetation, natural drains, soil erosion.	1
2.2	Sustainable building practices	1
2.3	Environmental Impact assessment	1
2.4	Tools and methodologies for assessing environmental impact	1
2.5	Life cycle assessment in architectural design	1
2.6	Ecological footprint and analysis	1
2.7	Carbon footprint analysis and reduction strategies	1
MODULEIII [4 hours]		
3.1	Building materials – embodied energy, reusing and recycling of building materials.	1
3.2	Selection criteria for sustainable materials Innovative building materials and their environmental impact	1
3.3	Net zero energy buildings,	1
3.4	Green rating – rating systems – LEED, TERI GRIHA, BREEAM etc.	1
MODULEIV [6 hours]		

4.1	Water conservation – global water scenario, ground water depletion, water efficient design principles, Rainwater harvesting	1
4.2	Water recycling – water treatment, biological treatment plants, and greywater recycling;	1
4.3	Strategies for water conservation in buildings - Water efficient plumbing fixtures, water efficient landscaping, xeriscaping	1
4.4	Waste Management – pollution of air, water and land;	1
4.5	Design for recyclability; waste reduction techniques;	1
4.6	Solid waste management - upcycling and repurposing in architecture	1
MODULE IV [12 hours]		
5.1	Case studies of sustainable architectural projects and architectural structures	4
5.2	Case studies -Architectural structures – sustainable design principles	4
5.2	Case studies of green rated buildings, lessons from iconic sustainable buildings	4

CO Assessment Sample Questions	
1	Explain how energy use leads to global warming and climate change. Discuss the SDGs.
2	What is heat island effect? How can heat island effect be reduced with design and site planning? Discuss ecological footprint and how can it be assessed for a particular area?
3	Discuss some innovative ways in which materials can be used in buildings sustainably.
4	Explain rainwater harvesting? Why is rainwater harvesting important in buildings? Discuss some waste reduction techniques in the built environment. Suggest different strategies to make a newly designed building energy efficient.

23ARE607.2	ERGONOMICS IN PRODUCT DESIGN	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course introduces the students to product design and the process followed in achieving the final product which involves the various steps from iteration to mock ups to model making.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Identify the design thinking process for creating a product.
CO2	Comprehend the principles of ergonomics and identify its application in products.
CO3	Comprehend the product design aspects in the built environment.
CO 4	Translate product ideas into reality by creating prototypes.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓				✓	✓	✓
CO2	✓	✓				✓				✓	✓	✓
CO3	✓	✓				✓				✓	✓	✓
CO 4	✓	✓				✓			✓	✓	✓	✓

Assessment Pattern

Bloom'sCategory	Continuous Assessment Tools			End Semester Examination
	Test 1	Test2/ Portfolio/ Presentation	Other tools	
Remember				
Understand	✓	✓	✓	✓
Apply		✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate	✓	✓	✓	✓
Create		✓	✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test 2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	**60**
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS

MODULE I

Introduction to Design Thinking
Introduce the concept of design thinking and its relevance in various disciplines. Discuss the stages of the design thinking process: empathize, define, ideate, prototype, test. Highlight the importance of user-centered design.
Explore techniques for generating ideas and encouraging creative thinking.
Examine case studies that showcase successful products developed through design thinking.

MODULE II

Introduction to ergonomics
Define ergonomics and its role in design. Understanding the scope of ergonomics. Historical development of ergonomics and its application in product design. Key principles of ergonomics and their relevance to product design.
Cognitive ergonomics and task analysis. Explore the role of cognitive ergonomics in product design. Discuss task analysis and how it influences the ergonomic design process.

MODULE III

Humanizing design
Sensory ergonomics: Designing for the human senses in the built environment. Introduce anthropometry and biomechanics as foundational principles of ergonomics in relation to safety, comfort, ease of use, productivity/performance, and aesthetics. Showcase examples of products that excel in ergonomic design. Designing workspaces for optimal human performance and comfort. Ergonomic considerations in office furniture, lighting, and technology. Understanding the principles of universal design through products for inclusivity and accessibility in the built environment.

MODULE IV

Prototyping in Product Design
Importance of prototyping. Highlight the significance of prototyping in refining and improving designs. Discuss various types of prototypes and their applications. Explore material selection for prototypes and introduce rapid prototyping techniques.

MODULE V

Project: Simple Product Design
Generation of themes, product brief and presentation. The student must conceptualize a product and through the various stages of development reach a design for the product. Students present their final projects incorporating design thinking and ergonomic principles. It must be presented as a working or non- working prototype in a 1:1 scale (exceptions as decided by the faculty).

Reference books

1. "Ergonomics for Beginners: A Quick Reference Guide" by Jan Dul and Bernard Weerdmeester
2. "Ergonomics: How to Design for Ease and Efficiency" by Karl H.E. Kroemer, Henrike Kroemer, and Katrin E. Kroemer-Elbert
3. Dr. Debkumar Chakraborty, Indian Anthropometric Dimensions for Ergonomic design Practice - (for Indian body dimensions).
4. "Human Factors in Simple and Complex Systems" by Robert W. Proctor and Trisha Van Zandt
5. Koos Eissen and Roselien Steur, Drawing Techniques for Product Designers.
6. Richard Morris, Fundamentals of Product Design.
7. The Design of Everyday Things by Don Norman

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. ofHours [36 hours]
	MODULE 1 [8 hours]	
1.1	Introduce the concept of design thinking and its relevance in various disciplines.	1
1.2	Discuss the stages of the design thinking process: empathize, define, ideate, prototype, test.	2
1.3	Highlight the importance of user-centered design.	1
1.4	Explore techniques for generating ideas and encouraging creative thinking.	1
1.5	Examine case studies that showcase successful products developed through design thinking.	3
	MODULE II [7 hours]	
2.1	Introduction to ergonomics: Define ergonomics and its role in design.	1

2.2	Understanding the scope of ergonomics.	1
2.3	Historical development of ergonomics and its application in product design.	1
2.4	Key principles of ergonomics and their relevance to product design.	1
2.5	Cognitive ergonomics and task analysis.	1
2.6	Explore the role of cognitive ergonomics in product design.	1
2.7	Discuss task analysis and how it influences the ergonomic design process.	1
MODULE III [7 hours]		
3.1	Humanizing design Sensory ergonomics: Designing for the human senses in the built environment.	1
3.2	Introduce anthropometry and biomechanics as foundational principles of ergonomics in relation to safety, comfort, ease of use, productivity/performance, and aesthetics.	2
3.3	Designing workspaces for optimal human performance and comfort.	2
3.4	Ergonomic considerations in office furniture, lighting, and technology.	1
3.5	Understanding the principles of universal design through products for inclusivity and accessibility in the built environment.	1
MODULE IV [6 hours]		
4.1	Prototyping in Product Design: Importance of prototyping.	1
4.2	Highlight the significance of prototyping in refining and improving designs.	2
4.3	Discuss various types of prototypes and their applications.	1
4.4	Explore material selection for prototypes and introduce rapid prototyping techniques.	2
MODULE V [8 hours]		
5.1	**Project: Simple Product Design** Generation of themes, product brief and presentation. The student must conceptualize a product and through the various stages of development reach a design for the product.	4
5.2	**Project: Simple Product Design** Students present their final projects incorporating design thinking and ergonomic principles. It must be presented as a working or non- working prototype in a 1:1 scale (exceptions	4

	as decided by the faculty).	

CO Assessment Sample Questions	
CO 1	1) Explain the key stages of the design thinking process and how they contribute to the creation of a product? 2) Provide an example of a real-world application where the design thinking process was successfully used to develop a product.
CO 2	1) What are the fundamental principles of ergonomics, and how do they impact the design of products? 2) Provide an example of a product where ergonomic principles were effectively applied, leading to improved usability and user satisfaction.
CO 3	1) Explain how product design principles extend to the built environment. Provide examples of how the design of physical spaces can impact user experience. 2) Discuss the interplay between product design and the overall built environment, highlighting key considerations.
CO 4	1) Describe the importance of prototyping in the product design process. How does it contribute to refining and improving the final product? 2) Explain using case study the significance of creating a prototype influenced the final design and functionality of a product

23ARE607.3	GLASS TECHNOLOGIES IN ARCHITECTURE	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to have basic knowledge on glass as a building material. The students will get an overview of modern concepts of glass envelopes, its use in green design, as well as design considerations for improving the building performance using glass.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Comprehend the importance and role of Glass in Modern Architecture. (Understand)
CO2	Identify and understand the different types of glass and their applications. [Remember, Understand]
CO3	Comprehend the role of glass in fire safety considerations. (Understand)
CO 4	Comprehend the structural stability of Glass and fixtures. (Understand, Apply)

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓	✓	✓	✓		✓		✓
CO2	✓	✓	✓		✓	✓				✓		✓
CO3	✓	✓	✓		✓	✓	✓					✓
CO 4	✓	✓	✓		✓	✓	✓			✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I: Evolution & importance of Glass in Modern Architecture

Historical Evolution, innovations in glass technology and role of glass in modernist architectural movement. Manufacturing & properties of glass. Applications of glass in buildings (façade, interior applications) - Coating Technology: Importance & Necessity.

MODULE II: Processing

Concepts on Tempering, heat strengthening, DGU, laminates, ceramic fritting, Different types of glass: mirror, lacquered, fire resistant & modern glass with different applications

MODULE III: Glass & Human safety Compliances

Importance, scope and safety standards. Role of glass in fire safety considerations: Class E,EI & EW Need for Green Buildings: Energy efficient buildings Glass for segments – Hospitals, Green Homes, Airports, Offices & other buildings – Glass for Interiors and various applications Creative use, innovations and modern trends.

MODULE IV: Introduction to National Building Code of India (Part-6) and Benefits of going Green with glass

Thickness analysis - Relationship between wind pressure and glass thickness - Design considerations of glazing systems. Factors of energy efficient material selection – performance parameters – Energy codes and Green rating: ECBC, IGBC, GRIHA

MODULE V: Industrial Visit / Case studies

Documentation of different types of glass and its application and preparation of report		
Text books 1 Hugh Dutton, Peter Rice, Structural Glass 2 Joseph S, Amstock's Glass in Construction, McGraw Hill, 1997 3 Mic Patterson, Structural Glass Facades and Enclosures 4 Thomas Herzog, "Facade Construction Manual" Birkhauser, 2004 5 William Allen, Envelope Design for Buildings		
Reference books 13. FOSG Architectural Guide 14. Michael Wigginton, Glass in Architecture 15. National Building Code of India 2016		
COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. ofHours [36 hours]
MODULE 1 [7 hours]		
1.1	Evolution & importance of Glass in Modern Architecture	1
1.2	Historical Evolution, innovations in glass technology and role of glass in modernist architectural movement	1
1.3	Manufacturing of Glass	1
1.4	Properties of Glass	1
1.5	Applications of Glass in buildings (façade, interior applications) -	1
1.6	Coating Technology: Importance & Necessity.	1
1.7	Coating Technology: different types of glass	1
MODULE II [7 hours]		
2.1	Processing: Concepts on Tempering	1
2.2	Concepts on heat strengthening	1
2.3	DGU, laminates, ceramic fritting	1
2.4	Application of different types of processed glass	1
2.5	Different types of Glass: mirror, lacquered, with different applications	1
2.6	Different types of Glass: fire resistant with different applications	1
2.7	Different types of Glass: modern glass with different applications	1
MODULE III [7 hours]		
3.1	Glass & Human safety Compliances – importance, scope and safety standards	1

3.2	Glass & Human safety Compliances – importance, scope and safety standards	1
3.3	Role of glass in Fire Safety: Class E,EI & EW	1
3.4	Glass for segments – Hospitals, Green Homes,	1
3.5	Glass for segments – Airports, Offices & other buildings	1
3.6	Glass for Interiors and various applications	1
3.7	Cases -Glass for Interiors and various applications	1
MODULE IV [10 hours]		
4.1	Introduction to National Building Code of India (Part -6)	1
4.2	Thickness analysis	1
4.3	Relationship between wind pressure and glass thickness	1
4.6	Design considerations of glazing systems	1
4.7	Different types of glazing systems	1
4.8	Applications of different glazing systems	1
4.9	Benefits of going Green with glass	1
4.10	Energy efficient glasses	1
4.12	Performance parameters	1
4.14	Energy codes and Green rating: ECBC, IGBC, GRIHA Application of glass in buildings of green rating	1
MODULE V [5 hours]		
5.1	Case studies of buildings with use of different types of glass	4
5.2	Documentation and preparation of report	1
CO Assessment Sample Questions		
1	1. What are the fundamental properties of glass that make it a versatile material in architecture? 2. Discuss the advantages and challenges of using glass for building façades. 3. Discuss how coatings contribute to energy efficiency, UV protection, and durability.	
2	1. Discuss the advantages and disadvantages of using laminated glass in architectural applications. 2. Explain the construction and composition of a double-glazing Unit. How does the air or gas filled space between glass layers contribute to its performance? 3. Explain the concept of ceramic fritting on glass. How does it contribute to solar control and aesthetics in architectural applications?	
3	1. Explain the classifications of fire-resistant glass (Class E, El, EW) and their applications in enhancing fire safety in buildings. Give examples of situation where each class is most appropriate.	

	2. How does glass contribute to the healing environment in healthcare facilities? 3. Give examples of iconic buildings where glass is used innovatively, and how these designs impact the overall aesthetics of the structures.
4	1. What are the key sections covered in Part -6 of the National Building Code of India, and why are they important for architects and builders? 2. How does the thickness analysis of glass impact safety and performance in architectural applications? 3. Discuss the design considerations architects must take into account when selecting glazing systems for buildings. How do factors like location, climate and architectural design influence these choices? 4. Identify and explain the performance parameters considered for selecting energy – efficient materials. How do these parameters contribute to the overall energy performance of a building? 5. Compare and contrast the objectives and criteria of energy codes with green building rating systems. How do these standards influence material selection and building design practices?
	1. With the help of a case study, explain how glass technologies were used to address specific environmental or functional challenges. 2. Analyze a specific architectural project that features glass technologies. What were the design considerations and outcomes?

23ARE607.4	INDUSTRIAL ARCHITECTURE	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The basic objective is to impart knowledge on special considerations to be taken while designing industrial buildings and estates.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Identify the scope and importance of Industrial Architecture
CO2	Comprehend the planning and design considerations for industrial parks and buildings
CO3	Develop the Ability to Plan and design industrial buildings ensuring safety and healthy work environments.
CO4	Develop the ability to critically analyze and evaluate the emerging technologies and innovations in Industrial Architecture

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											✓
CO2	✓		✓			✓	✓					
CO3	✓		✓			✓	✓					
CO4					✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test 2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 4X10= 40 marks	

SYLLABUS

MODULE I

Introduction to Industrial Architecture
Introduction to Industrial Architecture - Definition and Scope of Industrial Architecture, Historical development of industrial architecture. Codes , Standards and regulations relevant to the industrial projects, Government Schemes and Initiatives for Industrial Area Development

Emerging technologies and Innovations in Industrial Architecture
Emerging technologies in Industrial Architecture, Adaptive reuse of industrial spaces

MODULE II

Planning considerations for industrial parks
Planning considerations for industrial parks – Locating industrial parks, Site selection, site planning, Layout and patterns of industrial parks

Design considerations for Industrial Buildings
Design considerations for Industrial Buildings – Flexibility, Adaptability, Functional Efficiency, Circulation, Systematic Plant Layout, fire safety.

MODULE III

Structural systems and Building Materials
Structural system - Concrete and steel structures, Pre-engineered Buildings, Integration of structure and services, Materials and finishes for roofs, walls and floors of Industrial Buildings

MODULE IV

Working Environment for industrial workers
Working Environment for industrial workers - Work space design, ergonomics, material and color selection, Illumination, Noise and vibration control, Natural ventilation, temperature and humidity, Visual environment and landscaping, Sanitation and rest facilities, Recreational Spaces, Safety and Security systems – Standard requirements for alarms, warning, hazard mitigation systems

MODULE V

Case Studies
Case Studies that adopted innovative design strategies for industrial complexes
Industrial Visit and Building Documentation
Industrial visit and Building Documentation, preparation of report.

Reference books

1. IS 3483-1963: Code of practice for noise reduction in industrial Buildings
2. IS 6665-1972: Code of practice for industrial Lighting
3. IS 3103-1975; Code of practice for industrial ventilation
4. Adam J., Hausmann K., and Juttner F., Industrial Buildings: A Design Manual
5. Drury J. Factories _ Planning, Design and Modernisation
6. National building Code of India

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
MODULE 1 [8 hours]		
1.1	Introduction to Industrial Architecture - Definition and Scope of Industrial Architecture	1
1.2	Historical development of industrial architecture	2
1.3	Codes, Standards and regulations relevant to the industrial projects	2
1.4	Government Schemes and Initiatives for Industrial Area Development	1
1.5	Emerging technologies in Industrial Architecture	1
1.6	Adaptive reuse of industrial spaces	1
MODULE II [7 hours]		
2.1	Planning considerations for industrial parks – Locating industrial parks, Site selection	1
2.2	Site Planning of Industrial Parks	1
2.3	Layout and patterns of industrial parks	1

2.4	Design considerations for Industrial Buildings – Flexibility, Adaptability, Functional Efficiency	1
2.5	Circulation in Industrial Building	1
2.6	Systematic Plant Layout	1
2.7	Fire safety in Industrial Buildings	1
MODULE III [7 hours]		
3.1	Structural System - Concrete structures	1
3.2	Structural System - Steel structures	1
3.3	Pre-engineered Buildings	1
3.4	Integration of structure and services	2
3.5	Materials and finishes for roofs, walls and floors	2
MODULE IV [7 hours]		
4.1	Working Environment for industrial workers - Work space design	1
4.2	Ergonomics	1
4.3	Material and color selection, Illumination, Noise and vibration control	1
4.4	Natural ventilation, temperature and humidity	1
4.5	Visual environment and landscaping	1
4.6	Sanitation and rest facilities, Recreational Spaces	1
4.7	Standard requirements for alarms, warning, hazard mitigation systems	1
MODULE V [7 hours]		
5.1	Case Studies that adopted innovative design strategies for industrial complexes	4
5.2	Industrial visit and Building Documentation, preparation of report.	3
CO Assessment Sample Questions		
1	1. Explain the impact of the Industrial Revolution in the development of Industrial Architecture.	

	2. Elaborate on the scope of Industrial Architecture and its role in shaping the modern Industrial Landscape. 3. What are the challenges and opportunities associated with adaptive reuse of industrial spaces?
2	1. What are the factors that determine the optimal location of industrial parks? 2. Discuss the role of building materials and layouts in minimizing the fire risks of industrial buildings
3	1. Discuss the role of hazard mitigation systems in preventing and responding to emergencies in industrial facilities 2. Explore examples of innovative work space designs that enhance collaboration and communication among industrial workers.
4	1. Examine a case study where an industrial complex achieved energy efficient design and reduce environmental impact

SEMESTER 7

23ARP701	Internship or Practical Training	L	T	P	S	C	Year of Introduction
		0	0	0	0	12	2023

Preamble:

The training aims to familiarize students with the various works and procedures of an architectural project from design to execution, including client discussions, obtaining building permits, preparing working drawings and estimates, the tendering process, explaining the drawings on site, coordinating the construction with contractors and workers, talking with other consultants, the completion procedure, etc. It aims to introduce students to the practical aspects of architectural practice and to acquire a range of experiences such as teamwork, site visits, office management and administration, presentation preparation, meeting deadlines, handling personal management concerns, and the significance of soft skills, such as professionalism and punctuality. The students are expected to acquire a sense of responsibility to take advantage of the opportunities they are given during the training phase and prepare for their career in the architectural profession.

Prerequisite: Nil.

Course Outcomes: After the completion of the course, the student will be able to

CO 1	Engage, evaluate, and examine architectural knowledge and apply in architectural practice.
CO 2	Organize, plan, create, and integrate the various threads of an architect's work for successful project completion.
CO 3	Acquaint themselves with various work procedures, and tools of the architecture profession through a methodological understanding of the live projects they are involved with.
CO 4	Appreciate the professional growth opportunities enhanced by interactions between employers and employees, subcontractors, vendors, clients, and other stakeholders.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	✓							✓	✓
CO 2	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓					✓	✓	✓
CO 4	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	End Semester Viva Examination
Remember	✓
Understand	✓
Apply	✓
Analyse	✓
Evaluate	✓
Create	✓

Total Marks	ESE (Marks)	ESE
100	100	Viva

End Semester Examination [ESE] Pattern

PATTERN		ESE Marks
PATTERN	Portfolio submission including the following ● Training report – details of work illustrated with sketches, prints, and other documents associated with projects on which they have worked both in the office and on-site, with the seal of the office. ● A work diary of the specified training period. ● Originals of monthly work reports. ● Certificate of completion of training (no of days to be mentioned) on the office's official letterhead with the Chief Architect's signature. Viva voce examination	100

1. Conditions of Eligibility

As per the B. Arch. Curriculum students shall undergo one semester of practical training immediately after completing the 6th semester B.Arch. Examinations. Only those students who have passed the sixth-semester Architectural Design Jury shall be eligible to undergo practical training. The duration of training shall be a minimum of 100 working days.

2. Selection of Firm for Practical Training

The training shall be under an architect registered with the COA, possessing an experience of a minimum of five years and approved by the Department of Architecture of the teaching institution.

The candidate shall select the Architect / Architectural firm / Govt. organization / Public sector undertaking for practical training with the approval of the Department of Architecture of the teaching institution in advance before the commencement of the 6th semester University examination. The Architect under whom the practical training is done shall not be a regular/permanent faculty of the Department of Architecture of the teaching institution, or an immediate relative of the student.

Students can also select internationally recognized Architects practicing outside India, with the approval of the Department of Architecture of the teaching Institution.

Any change in the firm in which the student does their practical training shall be done with due permission of the Department of Architecture.

3. Type of work to be carried out during the training period

The students are expected to gain exposure to the following aspects:

- Involvement in the Design Process
- Site visit and Site Supervision
- Preparation of drawings for getting building permissions, working drawings, service drawings, etc.
- Preparation of estimates, specifications, contract documents, and tender

documents
- Discussions with clients and other consultants

4. Joining Report, Monthly work report

The joining report should be sent to the Department of Architecture of the teaching institution within ten days after joining the firm for practical training.

The format of the monthly work report shall be decided by the Department of Architecture of the teaching institution. Students must send copies of the monthly report of the work done as part of training in the format prescribed. The monthly work report should reach the department within one week after the completion of each month. The report shall be duly signed by the Principal Architect or by the concerned Architect supervising the work.

5. Evaluation of Practical Training

As per the B. Arch curriculum, students shall undergo practical training for one semester, i.e., in the seventh semester of the B. Arch program.
The duration of practical training shall be a minimum of 100 working days. Only those who have completed the practical training successfully will be permitted to register for the 8th semester of the B. Arch degree course.

Those students who fail to obtain 50% marks must repeat the practical training.

CO Assessment criteria

CO1	Evaluate the involvement in the Design Process • Clarity of the main concepts and principles of the design work submitted • Awareness of technical detailing of the submitted work portfolio. • Review of design discussion with other designers involved in the project • Understanding of the purpose of drawings prepared.
CO2	• Awareness of all the roles played by the architects and being able to list them. • Being able to list out the role of the supervising Architect in the concerned project.
CO3	• Review of site visit and site supervision • Review of the various construction procedures on the site explained by suitable photographs. • Skills in using software applications in a professional context
CO 4	• Written or verbal review of interactions between employers and employees, subcontractors, vendors, clients and other stakeholders. • Awareness of the process and people involved with preparation of drawings for getting building permissions, working drawings, service drawings, estimates, specifications, contract documents, and tender documents • Review of client discussions in the projects involved with suitable journal entries

23ARP702	Critical Analysis, Material Study/ Market Survey	L	T	P	S	C	Year of Introduction
		0	0	0	0	3	2023

Preamble:

Critical study of an architectural project will enable the students to build a comprehensive vocabulary of evaluating and analyzing a specific architectural project, emphasizing the design thought process, growth, and achievements over time.

Materials are the answer to a well-functioning building because only high-quality materials can achieve a good design. The materials used have a significant impact on the construction quality. The choice of building materials determines the building's overall resilience, character, and durability. Analyzing some of the materials used as a part of the projects being done in interning firms will give a perspective on design implications on stability, cost, upkeep, and aesthetics. A market study on construction materials and techniques will give a solid footing to complex design that students will be with design projects in the higher semesters after the internship.

Prerequisite: Nil.

Course Outcomes: After the completion of the course, the student will be able to

CO 1	Create connections between various conceptual and methodological stances in architectural projects.
CO 2	Comprehend, evaluate, and consolidate the contextual and social integration, spatial arrangement, and technical detailing of an architectural undertaking.
CO 3	Evaluate and explore new materials, technologies, building practices, and construction technologies.
CO 4	Infer aesthetic, mechanical, structural, and sustainable properties, application and challenges of materials, and construction techniques of building materials.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	✓		✓	✓			✓	✓	✓
CO 2	✓	✓		✓		✓	✓			✓	✓	✓
CO 3	✓	✓	✓	✓		✓	✓			✓	✓	✓
CO 4	✓	✓	✓	✓		✓	✓			✓	✓	✓

Assessment Pattern

Bloom's Category	End Semester Viva Examination
Remember	✓
Understand	✓
Apply	✓
Analyse	✓
Evaluate	✓
Create	✓

Total Marks	ESE (Marks)	
50	50	Viva

End Semester Examination [ESE] Pattern

PATTERN		ESE Marks
PATTERN	Submissions ● Critical appraisal report and presentation. ● Material study /Market survey report and presentation Viva voce examination	50

1. Critical appraisal of an architectural project

The students must choose an existing, functioning architectural project covering complex planning and design aspects with broad contextual and environmental implications. Choosing a project completed by the architectural firm they are interning with is suggested to get comprehensive access to the design conceptualization of the architects and other designers involved, the construction process, and post-occupancy review opportunities.

Students are required to follow a study procedure that describes the expectations and possible catalysts for the project's initiation, the path (steps taken, obstacles faced, facilitators), the solution itself (data, technology involved), the lessons learned, the results (expenses and advantages), and post occupancy analysis. Students should be using the process of researching a project and documenting through writings, sketches, drawings and photos.

The critical appraisal should be done based on but not restricted to the following outline:

1. **The design and conceptualization process**
   What were the design objectives, description of the context when the project was first encountered, particular issues that needed to be resolved, the limitations that needed to be considered, and the design resolutions in terms of forms, materials, and technology?

2. **Primary data of the project**
   Students should visit the completed project in the actual setting and determine the opportunity or design problem resolved. The conclusion should include but not restricted to the following:

   i. **Location**
   Geographical location, adjacent land Use, accessibility

   ii. **Facilities accommodated**
   Functions, the spatial relations between the functions, their size and proportion, and circulation within the site — both pedestrian and vehicular should be studied.

   iii. Spatial analysis
   The organization of spaces, how spaces interact, lighting, ventilation, and comfort should be studied along with circulation and linkage diagrams to evaluate access and barrier friendliness.

   iv. Materials and technology:
   Materials used in construction; the construction technology used.

v. **Building services or systems;**
Analyze the space requirements and configurations of service systems like HVAC, fire and safety, water supply, etc.

3. **Post-occupancy evaluation of the building should include**
   i. **Perception of the user group and stakeholders**
   ii. **Functioning and maintenance of the buildings:** In terms of comfort, lighting, ventilation, acoustics, services, serviceability, operational management, environment and sustainability, energy consumption, water consumption, and Carbon outputs.
   iii. **Adaptability and durability**

The study should be submitted in a structured and organized presentation, with sketches, photographs, and other relevant study documents.

2. Material Study/ Market Survey

Students must select at least three different materials or construction technology that represent uniqueness and innovativeness from an architectural perspective.

Broad aspects to cover may include the materials' properties when choosing materials for architectural considerations, including a review of durability, energy efficiency, maintenance, cost, availability, sustainability, climate, quality, brand, criteria for product selection, and installation techniques.

Post-construction evaluation of the material should include a review of;

i. The context (the context of use, physical context, cultural context)
ii. Material performance (physical and sensorial aspects)
iii. The experience of users (perception, association, emotions)

The study should be submitted in a structured and organized presentation, with sketches, photographs, and other relevant study documents.

CO Assessment sample methods	
CO1	Submission of critical appraisal report and viva Evaluate the design and conceptualization process
CO2	Submission of critical appraisal report and viva Primary data of the project Post-occupancy evaluation of the building
CO3	Submission of Material Study/ Market Survey Presentation of durability, energy efficiency, maintenance, cost, availability, sustainability, climate, quality, brand, criteria for product selection, and installation techniques.
CO4	Submission of Material Study/ Market Survey Presentation on post-construction evaluation of the material in terms of the context (the context of use, physical context, cultural context), material performance (physical and sensorial aspects), the experience of users (perception, association, emotions).

SEMESTER 8

23ARD801	ARCHITECTURAL DESIGN VI	L	T	P	S	C	Year of Introduction
		0	0	10	10	10	2023

Preamble:

The course is structured so that students will be able to design a large campus for a specific purpose for a large population of multiple groups of users. It also seeks to comprehend and produce a design process and a design solution to a campus design problem. It includes study of principles of a campus design, organic order, participation, incremental growth, pattern diagnosis, campuses in India and abroad, planning process, site analysis, the building program, campus master plan, landscape design, road networking, parking, design of open spaces etc. related to campus design.

Projects may include: Hospital, Educational institutions, sports facility buildings, housing projects, hotel and hospitality projects etc.

Course Outcomes: After the completion of the course the student will be able to

CO1	Summarize technical data regarding site, building bye laws, space standards, building services and other architectural design criteria and analyze them for designing campus planning projects.
CO2	Analyze architectural design cases for designing campus planning projects based on different parameters to prepare well defined inferences.
CO3	Apply the knowledge acquired through live and literature data (site, data collection, case studies etc.) in devising complex space planning solutions.
CO4	Design campus planning projects and prepare presentation drawings with necessary architectural details.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO3	✓	✓	✓	✓				✓	✓			
CO4	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools	End Semester Examination (Jury)
	Reviews	
Remember	✓	✓
Understand	✓	✓
Apply	✓	✓
Analyse	✓	✓
Evaluate	✓	✓
Create	✓	✓

Other Assessment tools: Reviews of Data collected, Site study and analysis, user group study and analysis, Concept development and design evolution, Intermediate Presentation Reviews, sketching, Drawings, Documentation, Photography, Expert

Review and interaction with Architects, drawing preparation and design presentations with models

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Studio [P]	Total Marks
		Project 1	
	10	90	**100**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
200	100	100	—

SYLLABUS

MODULE I

Project Introduction, Program definition.
Study/presentation of campus planning principles.
Design methodology through analysis of user needs, regulations, context, site, and environmental factors.

MODULE II

Case studies of campus planning to study integration of services of institutional building services with site services, campus master planning with focus on movement pattern, parking, housing, amenities, functional requirements and other context-specific services required.

MODULE III

Preparation of master plan focusing on architectural language, composition, functionality, groups of buildings and exterior spaces, services, typology of future buildings on campus. Design emphasis on detailing of spatial layout, site-planning and services, etc.

MODULE IV

Preparation of detailed architectural drawings of all buildings in the campus
Preparation of physical design models.

Reference books

1. Time-saver Standards for Building Types. (1980). United Kingdom: McGraw-Hill.
2. Neufert, E., Jones, V. (1988). Architects' Data. United Kingdom: Wiley.
3. Guptill, A. L. (1997). Rendering in Pen and Ink: The Classic Book on Pen and Ink Techniques for Artists, Illustrators, Architects, and Designers. United States: Clarkson Potter/Ten Speed.
4. Ching, F. D. K. (2012). Architecture: Form, Space, and Order. Germany: Wiley.
5. Jonathan Coulson, Paul Roberts, Isabelle Taylor: University Planning and Architecture: The Search for Perfection (2010)

	6. Mitchell WJ, 'Imagining MIT: Designing a campus for the 21st century', MIT Press, 2007 7. Richard P. Dober, Campus Architecture: Building in the Groves of Academe, 1996. 8. Scott Van Dyke, Form, Line to Design, Publisher-Van Nostrand Reinhold, 1990.	
No.		No. of Hours [120 hours]
MODULE 1 [20 hours]		
1.1	Introduction to project, Introduction to the site, Case study selection, topics related to the campus/ site planning principles, detailed reports and presentations.	10
1.2	Presentation of Literature study on - campus planning principles, building rules, Services, spatial design standards, etc.	10
MODULE II [40 hours]		
2.1	Case studies Presentation	10
2.2	Site Analysis and zoning	10
2.3	Preparation of bubble diagram or proximity chart or serial vision sketches etc. Concept development	10
2.4	Concept development- based on Master plan level, site responsiveness, form development, user responsiveness, or any other relevant aspects.	10
MODULE III [20 hours]		
3.1	Preparation of master plan with Block Model: (Focusing on axis, orientation, grouping and massing of buildings, architectural language, composition, functionality, and exterior spaces, services, typology of future buildings on campus, transition spaces, etc.)	10
3.2	Preparation of detailed master plan with site layout plan with landscape, parking, circulation spaces, built and outdoor recreational activity areas, services, etc.	10
MODULE IV [40 hours]		
4.1	Preparation of prefinal architectural drawings for the space identified (neatly composed in A0 or A1 sheets)	20
4.2	Preparation of detailed architectural drawings (neatly composed in A0 or A1 sheets) and	10

4.3	Physical model in a suitable scale	10

CO Assessment Sample Questions	
CO1	2) Data regarding site, building bye laws, space standards, user needs, regulations, context, and environmental factors. building services and other architectural design criteria and analyze them for designing campus planning projects.
CO2	3) Case study for Campus master planning with focus on movement pattern, parking, housing, amenities, functional requirements 4) Case study of campus planning to study integration of services of institutional building services with site services,
CO3	3) Preparation of master plan with focus on movement pattern, parking, housing, amenities, functional requirements and other context-specific services required. 4) Detailing of spatial layout, site-planning and services, etc.
CO4	3) Presentation of detailed architectural drawings 4) Model

23ARS802	URBAN DESIGN	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

The course "Urban Design" aims to provide architecture students with a fundamental understanding of urban design and its significance in shaping cities. Urban design involves the arrangement and design of buildings, public spaces, transport systems, services, and amenities. It is the process of giving form, shape, and character to groups of buildings, whole neighborhoods, and the city. Urban design impacts many different disciplines including planning, development, architecture, landscape architecture, and engineering. Through a multidisciplinary approach, this course will explore the principles, strategies, and practices involved in urban design.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Define the relevance of urban design as a discipline and identify various terminologies related to urban design.
CO 2	Examine the urban form and morphology of historic urban spaces in the World and in the Indian context.
CO 3	Analyse the urban design theories, concepts, techniques, and various dimensions of urban scape.
CO 4	Interpret various urban issues and correlate various urban design processes and design interventions.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓			✓			✓	✓			
CO 2	✓	✓						✓	✓			
CO 3	✓	✓	✓									
CO 4	✓	✓	✓		✓			✓	✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply		✓		✓
Analyse	✓	✓		✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	5 questions with one question from each module, with 4 marks for each question. Answer all questions. Marks: (5x4 = 20 marks)	10 questions with two questions from each module, of which the student should answer any one question from each module. Each question carries 8 marks. One or two questions can have subdivisions. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [5x8 = 40 marks]	

SYLLABUS

MODULE I

Introduction to Urban Design and Terminology
Definition of urban design and its evolution as a discipline, relationship between architecture, urban design and urban planning, scope and objectives of urban design and relevance of urban design in the contemporary development scenario Urban Design Terminologies & its definition.

MODULE II

Introduction to urban form and cities
Broad understanding of urban forms and spaces at various spatial scales through examples from historic cities.
World context:-Urbanism of river valley civilizations. Morphology of prehistoric cities – Greek, Rome, Medieval towns, Renaissance place making, industrialization and urbanization led transformation of urban spaces, concepts of new urbanism.

Indian context:-.temple towns, Mughal cities, colonial, modern and post-

modern influences in the Indian urban context.

MODULE III

Urban Design Concepts and Theories

Concepts: Place and space, Urban Spaces - Characteristics and various typologies

Theory: Basic theories in urban design: Figure and Ground Theory, Place Theory and Linkage Theory.

Theories in urban space design and principles of urban spatial organization: (Kevin Lynch, Gordon Cullen, Christopher Alexander, Jane Jacobs, William Whyte, John Lang, Jan Gehl)

MODULE IV

Urban Design Process

Methods and Techniques to understand various urban design layers

Data sources and collection methods: - Secondary sources (literature, publications, government database etc) and primary sources (survey, observation, interviews, experiment)

Survey techniques: - Historical Analysis, Townscape Analysis, Perceptual structure , Permeability Study, Visual analysis

Mapping techniques- Heat maps, Dot density maps, mental maps, activity maps, figure ground maps.

Analysis tools – SWOT analysis, Sieve mapping and STEEP analysis, Ped shed Analysis.

Understand and interpret urban issues (Issues in place making and identity, morphology, sprawl, generic form, incoherence, private and public realm, heritage conservation, effects of real estate, transportation and zoning)

MODULE V

Urban design Implementation

Introduction to urban design implementation: understanding different types and procedures of urban design interventions and their scale.

Project Formulation and project implementation: Vision statement, aim, objectives, design framework, policies and guidelines, master plan, built form and project implementation methods. Probable projects might include urban in-fills, urban catalysts, transit, and pedestrian and community infrastructure as modes for urban revitalization, conservation guidelines, and form- based code manuals for contextual transformation, cultural landscape and place making proposals.

Reference books:

1. Alexander, Christopher; Neis, Hajo; Anninou, Artemis; King, Ingrid F. A new theory of Urban Design, Oxford University Press, NY, 1987
2. Carmona, M., Heath, T., Oc, T., and Tiesdell, S., Public Places Urban Spaces: The Dimensions of Urban Design, Oxford Architectural Press, 2010
3. A. Paul D Spreiregen, Urban Design: The Architecture of Towns and Cities, MCGraw -Hill Book Company, 1965.

4. R. Trancik, Finding Lost Space: Theories of Urban Design, John Wiley & Sons, Inc., 1986.
5. Bacon, Edmund N. Design of Cities, Viking Press, NY, 1967
6. Correa, Charles, The New Landscape: Urbanization in the Third World, Guildford Angleterre: Butterworth Architecture, 1989
7. Cullen, Gorden, The Concise Townscape, Architectural Press, Princeton, 1961
8. Hillier, Bill and Julienne, Hanson, The Social Logic of Space, Cambridge University Press, UK, 2014
9. Larice Michael and Macdonald, Elizabeth, The Urban Design Reader, Routledge, NY 2013
10. Lynch, Kevin Image of the City, Cambridge MIT Press, MA, 1960 Moughtin, C., Cuesta, R., Sarris, C., and Signoretta, P., Urban Design: Methods and Techniques, Oxford Architectural Press, 2003
11. Rossi, Aldo and Eisenman, Peter, The Architecture of the City, Cambridge MIT Press, MA, 1982
12. Sitte, Camillo The Art of Building Cities: City Building According to Artistic Fundamentals, Reinhold Publishing Corporation, 1945
13. Spreiregen, Paul D. Urban Design, The Architecture of Towns and Cities, McGraw Hill Publishers, NY, 1965
14. Time Saver Standards, Urban Design, Tata McGraw Hill Education Private limited, New Delhi, 2011
15. Trancik, Roger Finding lost Spaces: Theories of Urban Design, John Wiley & Sons, 1986
16. Whyte, William Hollingsworth The Social Life of Small Urban Spaces, Project for Public Spaces, NY, 2001
17. The Death and Life of Great American Cities, Jane Jacobs, 1961, Random House, New York City
18. Cities for People, Jan Gehl, 2010, Island Press
19. Life Between Buildings: Using Public Space, Jan Gehl, 2006, Danish Architectural Press
20. Urban Design: Method And Techniques, Cliff Moughtin, Rafael Cuesta, Christine Sarris and Paola Signoretta, 1999
21. Urban Design, A Typology of Procedures and Products by Jon Lang, Routledge

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1[3 hours]		
1.1	Definition of urban design and its evolution as a discipline, relationship between architecture, urban design and urban planning.	1
1.2	Scope and objectives of urban design and relevance of urban design in the contemporary development scenario	1
1.3	Urban Design Terminologies & its definition.	1

MODULE II (9 hours]		
2.1	Broad understanding of urban forms and spaces at various spatial scales through examples from historic cities	1
2.2	Urbanism of river valley civilizations	
2.3	Morphology of historic urban spaces: Greek, Rome,	1
2.4	Morphology of historic urban spaces: Medieval towns, Renaissance place making, industrialization and urbanization led transformation of urban spaces	2
2.5	Concepts of new urbanism	1
2.6	Indian traditional cities and their urban form: temple towns, Mughal cities, colonial, modern and post-modern influences in the Indian urban context.	2
2.7	Indian traditional cities and their urban form: colonial, modern and post-modern influences in the Indian urban context.	1
MODULE III [8 hours]		
3.1	Concepts: Place and space	1
3.2	Urban Spaces - Characteristics and various typologies.	1
3.3	Theory: Basic theories in urban design: Figure and Ground Theory, Place Theory and Linkage Theory.	2
3.4	Theories in urban space design and principles of urban spatial organization: (Kevin Lynch, Gordon Cullen, Christopher Alexander)	2
3.5	Principles of urban spatial organization: Jane Jacobs, William Whyte, John Lang	2
MODULE IV [9 hours]		
4.1	Methods and Techniques to understand various urban design layers	1
4.2	**Data sources and collection methods: -** Secondary sources (literature, publications, government database etc) and primary sources (survey, observation, interviews, experiment)	1
4.3	**Survey techniques: -** Historical Analysis, Townscape Analysis, Perceptual structure, Permeability Study, Visual analysis	1
4.4	**Mapping techniques**- Heat maps, Dot density maps, mental maps, activity maps, figure ground maps.	2
4.5	**Analysis tools** – SWOT analysis, Sieve mapping and STEEP analysis, Ped shed Analysis.	2
4.6	Understand and interpret urban issues in place making and identity, morphology, sprawl, generic form, incoherence,	2

	private and public realm	
MODULE V [7 hours]		
5.1	**Introduction to urban design implementation**: understanding different types and procedures of urban design interventions and their scale.	2
5.2	**Project Formulation and project implementation:** Vision statement, aim, objectives, design framework, policies and guidelines, master plan, built form and project implementation methods	2
5.3	Probable projects might include urban in-fills, urban catalysts, transit, and pedestrian and community infrastructure as modes for urban revitalization, conservation guidelines, and form- based code manuals for contextual transformation, cultural landscape and place making proposals.	3

CO Assessment Sample Questions	
CO1	1. Terminologies related to urban design – discuss the concept with examples
CO2	1. Morphology of a place – example from the world 2. Morphology of a place – example from India
CO3	1. Analyse the urban theories with relevant examples from around the world
CO4	1. Identify urban issues in a given area 2. Identify suitable strategies and optimal interventions for the area

23ARS803	HOUSING	L	T	S	P	C	Year of Introduction
		3	0	0	0	3	2023

Preamble:

It aims to sensitize students about the fundamentals of housing, housing conditions and housing shortage. It helps them recognize issues related to slums and affordable housing for the poor. It is also intended to help interpret housing development norms.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Comprehend the concept of housing and development.
CO 2	Identify the different typologies of housing, and comprehend the concept of housing density and the importance of norms and standards.
CO 3	Analyse housing issues and slum formation, and discuss the application of policies and strategies.
CO 4	Comprehend the various housing programmes, schemes and projects and the housing finance mechanism.
CO 5	Analyse environmental impact due to the prevalent housing practices

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓		✓		✓	✓	✓	✓	✓			✓
CO 2	✓		✓		✓	✓	✓	✓	✓			✓
CO 3	✓		✓		✓	✓	✓	✓	✓			✓
CO 4	✓		✓		✓	✓	✓	✓	✓			✓
CO 5	✓		✓		✓	✓	✓	✓	✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓		✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate			✓	
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**

100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A contains 5 questions with 1 question from each module, and having 4 marks for each question. Students should answer all the questions. Marks: (5X4 =20 marks)	Part B contains 10 questions with 2 questions from each module, of which the student should answer any one. Each question carries 8 marks. One or two questions can have subdivisions. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: 40	

SYLLABUS

MODULE I: Housing and Settlement patterns

Importance of Housing in socio-cultural & Economic Development.
Magnitude of Housing Problem - at Global level, National level & State level.
Ekistics- settlement patterns and town planning
Housing stock - Quantitative & Qualitative Housing shortage in Urban and Rural settlements

MODULE II: Housing Typology and development norms

Characteristics of Housing in different regions and their typology - detached housing, row housing, cluster housing, apartments etc.
Housing density- net density & gross density. Neighborhood planning

MODULE III: Slums, Housing Programmes, Schemes and Projects

Slums- causes and characteristics of slums; statistics and magnitude of the problem, Policies & Strategies for Slum improvement.
Nature and types of Housing Development Programmes in India- Initiatives taken for Housing in the Post-independence era.
Housing the poor - Introduction to Affordable housing and Inclusive housing. Incremental housing, Core housing, Site and services, Self-help housing.
Case study of a low-income/ affordable housing project.

MODULE IV: Housing Finance, Policies and Agencies for Housing development

Importance and characteristics of housing finance. Formal and Informal systems of finance. Financing Agencies at global, national, and state level.
Objectives and role of Agencies like HUDCO, NHB, NBO, TCPO, BMTPC, State Housing Boards, Cooperatives, NGOs and other agencies in housing. Role of Private sector in Housing.

MODULE V: Land Economics and Environmental impact of housing practices

Land economics, concept, types of land holding and tenure, factors affecting demand and supply of housing, Theory of location and growth pole theory, Land acquisition Act 2013, Land development – land pooling and sharing
Importance of Energy Efficiency, Selection of Materials and Techniques, Cost Effectiveness and Disaster Resilience through relevant Case studies.

Further Reading

- International declarations and goals- IYSH, Habitat Agenda, MDGs and SDGs, New Urban Agenda.
- Development norms and standards for services, and amenities, regulations, laws on contemporary practices for housing and habitat development - KMBR, NBC, URDPFI etc.
- Housing Schemes & Programmes at National and State level - IAY, IHSDP, RAY, PMAY.
- National Housing policy, National Urban Housing & Habitat Policy, National Rural Housing & Habitat Policy.

Reference books

1. Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, 2015
2. Joseph De Chiasa, Julius Panero, Martin Zelnik,'Time Saver Standards for Housing and Residential Development 2017
3. National Building Code of India, 2005
4. Kerala Municipality Building Rules, 2019
5. Kerala Panchayat Building Rules, 2019
6. National Building Organization, Slums in India-A Statistical Compendium, 2011
7. A.K.Jain 'Urban Housing and Slums',2009
8. Amos Rapaport, 'House Form and Culture', 1969
9. K. Thomas Poulose, Innovative Approaches to Housing for the Poor,1988
10. Arthur Gallion, Urban Pattern,1953
11. M.Pratap Rao, 'Urban Planning:Theory and Practice', 2005
12. Paul Sprieregen, Architecture of Town and Cities,1965
13. Gunter Pfeifer, Per Brauneck, 'Courtyard Houses: A Housing Typology', 2007
14. Shelter,Hudco Publication
15. Yojana, A Development Monthly
16. ITPI Journals

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Importance of Housing in socio-cultural & economic development. Magnitude of Housing Problem - at Global level, National level & State level.	2
1.2	Settlement patterns and town planning concepts, Ekistics	2
1.2	Housing stock - Quantitative & Qualitative Housing shortage in Urban and Rural settlements.	1

1.3	International declarations and goals- IYSH, Habitat Agenda, MDGs and SDGs, New Urban Agenda.	1
MODULE II [6 hours]		
2.1	Characteristics of Housing in different regions and their typology -detached housing, row housing, cluster housing, apartments etc.	1
2.2	Housing density- net density & gross density,	1
2.3	Neighborhood planning	1
2.4	Importance of standards, regulations, laws on contemporary practices for housing and habitat development - KMBR, NBC, URDPFI etc.	3
MODULE III [8 hours]		
3.1	Housing challenges due to Urbanization and cause of slums	1
3.2	Slums- characteristics and magnitude of the problem, Policies & Strategies for Slum improvement.	1
3.3	Nature and types of Housing Development Programmes in India- Initiatives taken for Housing in the Post-independence era.	1
3.4	Housing Schemes & Programmes at National and State level - IAY, IHSDP, RAY, PMAY.	3
3.5	Housing the poor- Introduction to Affordable housing and Inclusive housing. Incremental housing, Core housing, Site and services, Self-help housing.	1
3.6	Case study of a low-income/ affordable housing project	1
MODULE IV [7 hours]		
4.1	Importance and characteristics of housing finance. Formal and Informal systems of finance.	1
4.2	Financing Agencies at global, national and state level	1
4.3	Objectives and role of Agencies like HUDCO, NHB, NBO, TCPO, BMTPC, State Housing Boards, Cooperatives, NGOs and other agencies in housing. Role of Private sector in Housing.	1
4.4	Objectives and role of Agencies like HUDCO, NHB, NBO, TCPO, BMTPC, State Housing Boards, Cooperatives, NGOs and other agencies in housing. Role of Private sector in Housing.	1
4.5	National Housing policy, National Urban Housing & Habitat Policy, National Rural Housing & Habitat Policy,	3
MODULE V [9 hours]		
5.1	Land economics- concept; Theory of location and growth pole theory	1

5.2	Types of land holding and tenure, factors affecting demand and supply of housing,	1
5.3	Land acquisition Act 2013, Land development – land pooling and sharing	1
5.4	Need for Sustainable building Practices. Importance of Energy Efficiency,	1
5.5	Selection of Materials and Techniques, Cost Effectiveness	1
5.6	Disaster Resilience	1
5.7	Relevant Case studies for sustainable practice	3

CO Assessment Sample Questions	
CO1	1. Differentiate between Quantitative and Qualitative housing shortage. 2. Discuss the importance of housing in socio-cultural and economic development.
CO2	1. Explain the characteristics of row housing. 2. What is the importance of housing density? Explain the difference between net density and gross density. 3. Discuss neighborhood planning
CO3	1. Compare the concepts of core housing and incremental housing. 2. Define slums and their characteristics. Explain their causes and effects on the urban environment.
CO4	1. Explain 'National Urban Housing and Habitat Policy'. 2. Explain the role of private sector in housing with the help of an example.
CO5	1. Discuss the practices of land economics and land pooling for development. 2. With a suitable case study explain the planning strategies that can be adopted for an energy efficient housing development.

23ARP806	PROFESSIONAL PRACTICE	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

The course Professional Practice is structured to enable the students to have an understanding of what is expected of an architect by the client and by the society, architect's duties in the areas of valuation, arbitration etc. The student is also required to have an understanding of the tendering and contracting processes, architectural competitions and laws and regulations relating to the profession, in order to help him/ her set up practice.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Identify and interpret standards & norms of profession to develop practice and office management.
CO 2	Analyse Tenders, and Contracts and related issues
CO 3	Comprehend the various laws and procedures of Arbitration, Valuation & Easement.
CO 4	Apply the professional regulations and ethics in Architecture and allied fields when setting up Architecture office or working in other countries

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓		✓	✓	✓	✓		✓	✓
CO2	✓					✓			✓	✓	✓	
CO3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO4	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓	✓	✓
Apply				
Analyse		✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	5 questions with one question from each module, with 4 marks for each question. Answer all questions. Marks: (5x4 = 20 marks)	5 questions with two questions from each module, of which the student should answer any one question from each module. Each question carries 8 marks. Marks: (5x8 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I:

LEGALITIES OF PROFESSION AND MORALS & ETHICS OF PRACTICE:

Architects Act ”72, Council of Architecture, Functions and Powers, Architects Regulations, Standard terms for comprehensive architectural services including urban design and Conservation works, Architects’ responsibility towards society and environment

Guidelines for architectural competitions. Professional Ethics.

IIA- Functions and Powers, Registration for membership.

MODULE II

TENDER AND CONTRACT

Tenders: Types of tenders, Tender Notice, Inviting, Work order, Tender document, Tender acceptance, Tender for demolition work, Earnest money deposit, Security deposit, Retention amount.

Contract: General principles, Types of Contracts, Discharge of contract, Contract Document, Contract drawings, Contract sum, Bills, Duties & Liabilities of Contractor, Architect and Employer under the contract, Administration of contracts, Determination of Contracts, Certificate of Payments.

MODULE III

BUILDING PERMITS AND RELATED LAWS

Building permits- procedures involved in obtaining permit to build/ renovate or repair/ extend building.

Related bye laws, Environmental clearances, Wetland Acts, CRZ rules, Lawsrelating to building on hilly areas.

MODULE IV

ARBITRATION, VALUATION & EASEMENT:

Arbitration-Principles, Indian Arbitration act, Powers & Duties of Arbitrators, Revoking Authority, Umpire, and Award

Valuation: Purpose, Value, Factors affecting value, Value classification, Classification of Ownership, Valuation reports, Methods of valuation.

Easement: Definition, Various types, essential conditions for enjoyment of Easements

MODULE V

ARCHITECTURAL PRACTICE AND MANAGEMENT OF OFFICE:

Professional organizations in Architecture & allied fields like planning, landscape, structural, environmental, building services etc.

Setting up architectural practice: salaried appointments, public sector, private sector jobs, procedure of operation in government organization.

Pre-requisite for Indian architects to work in other countries & vice versa.

Reference books

1. "Professional Practice": Roshan H Namavathi
2. "Hand Book of Professional Documents": COA Publication
3. "Professional Practice": K.G.Krishnamurthy, S.V. Ravindra
4. Harold K, Cyril, "Essentials of Management" -1979 Tata Mc Graw Hill
5. "Theory of Practices of Valuation" -- Namavathi Roshan
6. Architects Reference Manual- "Workshops professional practice for Architects" by IIA Kerala Chapter and Trivandrum Centre, November 1996.3

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1[6 hours]	
1.1	Architects Act '72-Council of Architecture, Functions and Powers, Architects Regulations	1
1.2	Standard terms for comprehensive architectural services	1
1.3	Standard terms for comprehensive architectural services for UD and Conservation works.	1
1.4	Guidelines for architectural competitions. Professional Ethics, Architect's responsibility	2
1.5	IIA- Functions and Powers, Registration for membership.	1

MODULE II [8 hours]		
2.1	Tenders: Tender Notice, Inviting, Work order, Tender document, Tender acceptance, Earnest money deposit, Security deposit, Retention amount.	1
2.2	Types of tenders, Tender for demolition work	2
2.3	Contract: General principles, Discharge of contract	1
2.4	Contract: Types of Contracts	1
2.5	Contract: Contract Document, Contract drawings, Contract sum, Bills	1
2.6	Contract: Duties & Liabilities of Contractor, Architect and Employer under the contract,	1
2.7	Administration of contracts, Determination of Contracts, Certificate of Payments.	1
MODULE III [7 hours]		
3.1	Building permits- procedures involved in obtaining permit to build/ renovate or repair/ extend building.	2
3.2	Related bye laws, Environmental clearances, Wetland Acts, CRZ rules, Laws relating to building on hilly areas.	3
3.3	Architects' responsibility towards society and environment and necessity of abiding with rules for sustainable building.	2
MODULE IV [7 hours]		
4.1	Arbitration-Principles, Indian Arbitration act,	1
4.2	Powers & Duties of Arbitrators, Revoking Authority	1
4.3	Arbitration- Different situations, umpire and award	1
4.4	Valuation: Purpose, Value, Factors affecting value	1
4.5	Value classification, Classification of Ownership	1
4.6	Valuation reports, Methods of valuation.	1
4.7	Easement: Definition, Various types, essential conditions for enjoyment of Easements, Valuation for Easements.	1
MODULE V [6 hours]		

5.1	Professional organizations in Architecture & allied fields like planning, landscape, structural, environmental, building services etc.	2
5.2	Setting up architectural practice: salaried appointments, public sector, private sector jobs, procedure of operation in government organization	1
5.3	Interaction with a practicing architect	1
5.4	Pre-requisite for Indian architects to work in other countries & vice versa	2

CO Assessment Sample Questions	
CO1	1. Architects' Act 1972 2. Council of Architecture 3. IIA – Powers and functions 4. Building Byelaws
CO2	3. Discuss a tender document 4. Discuss a contract document
CO3	1. Discuss arbitration with respect to situations where either contractor, client or architect is seemingly at fault.
CO4	3. Discuss architect's responsibility in office, as a professional and entrepreneur.

23ARP807	RESEARCH METHODOLOGY	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:
This course, Architectural Research Methodology, serves to guide students through the intricate process of inquiry, discovery, and the creation of meaningful spaces. It aims to familiarize students with a diverse array of research methods in Architecture to instill an appreciation for their practical applications in the field and provide an understanding of key concepts involved in identifying research problems, conducting literature reviews, performing analyses, interpreting results, and selecting suitable methodologies. It will cultivate an awareness of the ethical considerations integral to conducting applied research in architecture, preparing research proposals and reports.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Develop an understanding of research methods and its significant applications in addressing diverse architectural challenges.
CO2	Acquire proficiency in a range of research strategies employed in architectural research, including qualitative, quantitative, and mixed methods approaches.
CO3	Demonstrate an awareness of the ethical considerations and responsibilities involved in architectural research.
CO4	Examine various techniques for collecting and analyzing architectural data, including surveys, interviews, observations, and archival research.
CO5	Effectively communicate research findings through research proposals and reports.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										✓
CO2	✓	✓										✓
CO3	✓	✓						✓				
CO4	✓	✓			✓				✓			
CO5	✓	✓			✓					✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply	✓	✓		✓
Analyse		✓		✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	Part A shall have a total of 5 questions, 1 question from each module. Each question carries 4 marks. Marks: (4x5 =20 marks)	Part B shall have a total of 10 questions; 2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 subdivisions. Each question carries 8 marks. Marks: (5x8 = 40 marks)	60

SYLLABUS

MODULE I

Introduction to Research

Aims and Characteristics of research; Criteria of good research; Research paradigms; Basic types of research; Role of researcher; Ethics in research, Identification of Peer reviewed journals in databases; Impact factor, Plagiarism detection and elimination, AI in research writing

MODULE II

Research Process

Identification of research problem, Literature review, framing of research question/hypothesis, scope and limitations of research, Research design; Data collection; Data analysis; Arriving at conclusions; Presentation of findings.

MODULE III

Data collection

Sources of data :, Types of Data; Data collection methods; Sampling for data collection, Types of sampling, Data analysis : Qualitative and Quantitative methods of analysis;

Data Documentation and Analysis: Understanding the nature of data collected and methods of analysis suitable for that data (graphical / numerical / descriptive). Converting data into numerical form for data analysis.Interview Techniques: Questionnaires /Face to face Interviews / Internet survey. Designing a Questionnaire / Interview schedule. Visual Techniques: Observations (participant / nonparticipant / direct), activity mapping, accession/erosion trace observations, cognitive maps, etc.

Introduction to the simple statistical methods of analysing numerical data and statistical softwares.

MODULE IV

Research writing
Identification of relevant journals through database search, using data management tools like mendeley, zoteroetc for research writing, Differentreferencing styles; APA, MLA, Chicago, etc. Citation: Cross citation, intext citation, reference list, Preparation and structure of Research report: Introduction; Method section, Result, and Discussion. Preparation of abstract, Language and tone of research writing.

MODULE V

Architectural seminar proposal
Project: Preparation and Structure of the Research Proposal for an architecture dissertation, including Introduction, Literature Review, Proposed Methodology, Expected Results/Outcomes, and Deadlines.

Reference books

1. Hennink, M., Hutter, I., Bailey, A. (2020). Qualitative Research Methods. United Kingdom: SAGE Publications.
2. Dawson, Catherine, 2002, Practical Research Methods, New Delhi, UBS Publishers' Distributors.
3. Groat L and Wang D, 2002, Architectural research methods, John Wiley & Sons Ltd.
4. Knight A and Ruddock L, 2008, Advanced research methods in the built environment, Wiley Blackwell publishers
5. Kothari, C.R.,1985, Research Methodology- Methods and Techniques, New Delhi.
6. Wiley Eastern Limited. Kumar, Ranjit, 2005, Research Methodology-A Step by-Step Guide for Beginners, (2nd.ed.), Singapore, Pearson Education.
7. Lucas R, 2016, Research methods for Architecture, Lawrence King Publishing.
8. Sanoff H, 2016, Visual research methods in design, New York, Routledge Publications.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
MODULE 1 [6 hours]		

1.1	Aims and Characteristics of research; Criteria of good research; Research paradigms; Basic types of research; Role of researcher;	2
1.2	Ethics in research, Identification of Peer reviewed journals in databases; Impact factor, Plagiarism detection and elimination, AI in research writing.	4
MODULE II [8 hours]		
2.1	Identification of research problem, Literature review, Framing of research question/hypothesis, scope and limitations of research,	4
2.2	Research design; Data collection; Data analysis; Arriving at conclusions; Presentation of findings.	4
MODULE III [8 hours]		
3.1	Sources of data:, Types of Data; Data collection methods; Sampling for data collection, Types of sampling, Data analysis : Qualitative and Quantitative methods of analysis;	2
3.2	Data Documentation and Analysis: Understanding the nature of data collected and methods of analysis suitable for that data (graphical / numerical / descriptive). Converting data into numerical form for data analysis.	2
3.3	Interview Techniques: Questionnaires /Face to face Interviews / Internet survey. Designing a Questionnaire / Interview schedule. Visual Techniques: Observations (participant / nonparticipant / direct), activity mapping, accession/erosion trace observations, cognitive maps, etc.	2
3.4	Introduction to the simple statistical methods of analysing numerical data and statistical softwares.	2
MODULE IV [8 hours]		
4.1	Identification of relevant journals through database search, using data management tools like mendeley, zoteroetc for research writing, Different referencing styles; APA, MLA, Chicago, etc. Citation: Cross citation, intext citation, reference list,	4
4.2	Preparation and structure of Research report: Introduction; Method section, Result, and Discussion. Preparation of abstract, Language and tone of research writing.	4
MODULE V [6 hours]		

5.1	Project: Preparation and Structure of the Research Proposal for an architecture dissertation, including Introduction, Literature Review, Proposed Methodology, Expected Results/Outcomes, and Deadlines.	6

CO Assessment Sample Questions	
CO1	1. Criteria of good research 4. Types of research
CO2	1. What are the ethical considerations in research? Elaborate.
CO3	1.Discuss the different research strategies and with an example illustrate how a particular strategy would be useful.
CO4	1. Discuss the different survey techniques and its appropriateness.
CO5	1.Structure of a research report 2. Quality criteria for research

SEMESTER 8
ELECTIVE 3

ELECTIVE 3 (23ARE804) ADVANCED TECHNOLOGY

23ARE804.1	LONG SPAN STRUCTURES	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to understand basic concepts of design, analysis, and construction methodologies for long span structures and their impact on production of complex buildings. It explores the principles behind creating structures that span large distances while maintaining structural integrity and functionality.

Prerequisite: Nil.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Comprehend various structural systems used in the design of long span structures.
CO 2	Analyse Pre-engineered buildings and large span roofs such as shell roof, folded plate roof
CO 3	Comprehend the influence of materials, loads on the design details of cylindrical shell roof, geodesic domes
CO 4	Comprehend the concept of space frames, Tensile structures and Pneumatic structures.
CO 5	Explore case studies of long span structures to be sensitized with its application in architectural projects

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		✓	✓	✓			✓				✓	
CO 2		✓		✓			✓				✓	
CO 3		✓	✓	✓							✓	
CO 4		✓	✓	✓			✓				✓	
CO 5		✓	✓	✓			✓				✓	

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember				
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse				
Evaluate				
Create				

Assessment tools: Case studies of long span structures, analysis of material usage, design details and inferences

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L- T]**			Total Marks
		Assignment	**Test-1**	**Test-2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I: Introduction to long span structures

Definition and significance, Historical perspective and evolution, Applications in architecture and civil engineering
Introduction to trusses
Construction of Steel trusses for various spans, rigid truss, saw tooth truss with lattice girders, roof lighting, aluminum sheet and profiled MS sheet cladding and roof fixing details.

MODULE II: Introduction to pre-engineered metal buildings

Detailing of a Pre-engineered building: Roof fixing details with aluminum sheet and profiled MS sheet cladding

Introduction to large span roofs: Shell roof, vaults, folded plate, geodesic domes,

space frame, tensile structures, pneumatic structures. Detailing of cylindrical and hyperbolic paraboloid shell roof, folded plate roof and geodesic domes: Principles and methods of construction including form-work, techniques and reinforcement details.

MODULE III: Materials used and design of long span structures

Materials in long span structures, design of trusses, roofs and domes

MODULE IV: Space frames and pneumatic structures

Principles, basic concepts, detailing of space frames and methods of construction with case study.

Detailing of Tensile and pneumatic structures, principles, basic concepts and methods of construction with case study.

MODULE V: Case studies

Case studies of trusses, shell roofs, folded plate roofs, domes to discuss application of long span structures in architectural projects.

Reference books

1. Emitt & Gorse (2006), "Barry's Advanced Construction of Buildings", Second Edition, Wiley India Pvt. Ltd.
2. Francis, D.K, (2008), "Building Construction Illustrated", Fourth Edition, Wiley India Pvt. Ltd.
3. Mackay, J.K. (2015), "Building Construction", Fourth Edition, Pearson India.
4. Roy Chudley (2014), "Construction Technology" Second Edition, Pearson India.
5. Barry R. (1999) - Volume 3 & 4, "The Construction of Buildings", Fourth Edition, East-West Press Pvt Ltd., New Delhi.
6. Lyons Arthur (2014), "Materials for Architects and Builders", Fifth Edition: 2014, Routledge.
7. Varghese P.C. (2015), "Building Materials", Second Edition, PHI Learning Pvt. Ltd.
8. Wilkinson, C. (2013). Supersheds: The architecture of long-span, large-volume buildings. Butterworth-Heinemann.
9. Nolan, G. (1994). The forgotten long span timber structures of Australia (Doctoral dissertation, University of Tasmania).

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1[8 hours]	
1.1	Definition and significance, Historical perspective and evolution of long span structures	1
1.2	Significance, Historical perspective and evolution - Cases	1
1.3	Applications in architecture - examples	1
1.4	Applications in civil engineering -examples	1

1.5	Construction of Steel trusses for various spans	1
1.6	Construction of rigid truss, saw tooth truss with lattice girders	1
1.7	Roof lighting, aluminum sheet cladding and roof fixing details.	1
1.8	Roof lighting, profiled MS sheet cladding and roof fixing details.	1
	MODULE II [8 hours]	
2.1	Detailing of a Pre-engineered building: Roof fixing details with sheet cladding - case	1
2.2	Introduction to large span roofs: Shell roofs	1
2.3	Introduction to large span roofs: vaults, folded plate, geodesic domes, space frame.	1
2.4	Introduction to large span roofs: Tensile structures, pneumatic structures.	1
2.5	Detailing of cylindrical and hyperbolic paraboloid shell roof, folded plate roof and geodesic domes:	1
2.6	Detailing of folded plate roof and geodesic domes:	1
2.7	Principles and methods of construction including form-work, techniques	1
2.8	Principles and methods of construction including reinforcement details - case	1
	MODULE III [6 hours]	
3.1	Materials in long span structures- trusses	1
3.2	Materials in long span structures – vaults, domes	1
3.3	Materials in long span structures – use of brick, steel and other material	1
3.4	Design aspects of trusses	1
3.5	Design considerations forshell structures	1
3.6	Design considerations for domes.	1
	MODULE IV [4 hours]	
4.1	Principles, basic concepts, detailing of space frames with case study.	1
4.2	Detailing of space frames and methods of construction with case study.	1

4.3	Detailing of Tensile and pneumatic structures, principles, basic concepts	1
4.4	Tensile and pneumatic structures - basic concepts and methods of construction with case study.	1
MODULE V[10 hours]		
5.1	Case studies of trusses to discuss application of long span structures in architectural projects.	2
5.2	Case studies of shell roofs to discuss application of long span structures in architectural projects.	2
5.3	Case studies folded plate roofs to discuss application of long span structures in architectural projects.	2
5.4	Case studies of domes to discuss application of long span structures in architectural projects.	2
5.5	Examples from historical buildings to compare with contemporary buildings of similar nature	2

CO Assessment Sample Questions	
1	Briefly explain construction of steel trusses for various spans.
2	Explain components, and principles of shell roof, vaults, folded plate roof.
3	Briefly explain Materials in long span structures.
4	Write short notes on cylindrical shell roof and Geodesic domes.
5	Explain briefly methods of construction of space frames with examples.

23ARE804.2	MODULAR COORDINATION	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to understand the importance and applications of modular coordination in building construction. It makes students aware of standardization of building units and components, which impacts building efficiency, economics and management, modular systems and prefabricated elements, mass production, standardization and assembly.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO 1	Understand modular coordination and apply the concept in design and construction of built form. [Understand level]
CO 2	Comprehend drawings for buildings designed with building components and sizes using modular coordination. [Understand level]
CO 3	To understand and apply the various elements of buildings, modular grid, its applications and planning approaches. [Understand level, Apply level]
CO 4	To understand the structural and architectural components and finishes. [Understand level]
CO 5	To analyze and understand the case studies in terms of their planning approaches. [Analyze level, Understand level]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓						✓					✓
CO 2	✓											✓
CO 3	✓				✓							✓
CO 4	✓								✓			✓
CO 5	✓				✓		✓		✓			✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓		✓	
Evaluate			✓	
Create				

Assessment tools: Case studies of application of modular components in buildings, different modular components available in the market

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio /Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I : Introduction to Modular systems

Introduction to concepts of Modular Coordination. Objectives of Modular coordination & definition of Basic Module, Modular controlling dimensions, Planning Modules and preferred Multi-modules, Building Reference system, zones, controlling reference system, component reference system

MODULE II : Graphic convention

Building component and its sizes, Nominal size vis-à-vis Actual size, Planning & placing of components. Annotations for Modular Drafting practice IMG recommendations on choice of multi-modules & BIS (NBC) recommendation on choice of modules for various building components, Dimensioning Lines, Zones and Spaces, Grid references

MODULE III : Modular Grids and Planning

Application: Modular Grids, Various elements of buildings that could be modular

walls, roofs, doors and windows and partitions. Various materials used in modular architecture. Pre-stressed and post tensioned modular systems. Basic management policies in modular co-ordination, Planning Approaches, Vertical Planning and Hierarchy of Planning

MODULE IV : Components and Finishes

Structural Components, Architectural Components, Finishes

MODULE V: Case studies of buildings

Case studies of buildings using the concept of modular coordination
Examples - D B S Square- Office Building, HDB Sembawang N3C6 – Public Housing Block, Tanglin View – Private Residential Block.

Reference books

1. W. Minich, J. Pekala, Modular Coordination in Industrial Building: Standard Regulations; Preliminary Scheme; ISO/TC 59
2. National Building Code of India, 1983
3. Nagarajan R.; Standards in Building
4. Building Construction Authority (BCA) ; Modular Coordination

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
MODULE 1 [4 hours]		
Introduction to Modular systems		
1.1	Introduction to concepts of Modular Coordination. Objectives of Modular coordination	1
1.2	Definition of Basic Module, Modular controlling dimensions	1
1.3	Planning Modules and preferred Multi-modules	1
1.4	Building Reference system, zones, controlling reference system, component reference system	1
MODULE II [4 hours]		
Graphic convention		
2.1	Building components and its sizes	1
2.2	Nominal size vis-à-vis Actual size, Planning & placing of components.	1
2.3	Annotations for Modular Drafting practice IMG recommendations on choice of multi-modules & BIS (NBC) recommendation on choice of modules for various building components.	1
2.4	Dimensioning Lines, Zones and Spaces, Grid references	1

MODULE III 9 hours]		
Modular Grids and Planning		
3.1	Applications, Modular Grids	1
3.2	Basic management policies in modular co-ordination	1
3.3	Elements of buildings: modular walls, and roofs,	1
3.4	Elements of buildings: doors and windows and partitions, Various materials used in modular architecture.	1
3.5	Pre-stressed and post tensioned modular systems.	1
3.6	Planning Approaches – application in buildings	1
3.7	Vertical Planning and Hierarchy of Planning - examples	1
3.8	Cases to discuss each	2
MODULE IV [8 hours]		
Components and Finishes		
4.1	Components and Finishes with respect to modular coordination	1
4.2	Structural Components – walls	1
4.3	Structural Components - roofs	1
4.4	Architectural Components – products – walls, floors	1
4.5	Architectural Components – products -roofs, doors, windows	1
4.6	Finishes – application	1
4.7	Discuss with relevant examples	2
MODULE V [11 hours]		
Case studies of buildings designed based on modular coordination concepts.		
5.1	Examples – D B S Square- Office Building	1
5.2	HDB Sembawang N3C6 – Public Housing Block	1
5.3	Tanglin View – Private Residential Block.	1
5.4	Cases to discuss application	4
5.4	Relevant cases with market survey	4

CO ASSESSMENT SAMPLE QUESTIONS	
1	1. What is modular coordination in the context of architecture and construction?

	2. Explain the key principles and objectives of modular coordination.
2	1. How does standardization contribute to the implementation of modular coordination?
3	1. How can modular coordination influence the design process of building elements and components?
4	1. How do material finishes contribute to the aesthetic appeal of modular buildings? 2. Discuss challenges and considerations in achieving consistent finishes in modular construction.
5	1. Analyze a construction project that successfully implemented modular coordination, highlighting the benefits achieved.

23ARE804.3	EARTHQUAKE-RESISTANT BUILDINGS	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to understand the behavior of different types of building in an earthquake. The course tries to lay a foundation for a general understanding of earthquake resistant building design for various kinds of construction.

Prerequisite: Nil.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Understand the cause of earthquakes and the behavior of buildings during an earthquake
CO 2	Understand Indian seismic codes and practices
CO 3	Comprehend behavior of different building materials in earthquake.
CO 4	Apply understanding in the design of buildings for earthquake resistance.
CO 5	Comprehend earthquake resistant methods and techniques in old & new buildings.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		✓			✓						✓	
CO 2	✓	✓										
CO 3		✓					✓				✓	
CO 4		✓			✓							
CO 5		✓							✓	✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember				
Understand	✓	✓	✓	✓
Apply				
Analyse	✓	✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I: Earthquakes and its causes

Causes of earthquake, different types of earthquake waves: P-waves, S-waves; basic terminologies of earthquake: plate tectonics, focus, epicenter, fault line, magnitude of earthquake, intensity, epicenter distance; working of seismograph, Seismic zones of India, seismic effects on structures, effects of architectural features on buildings, twisting of buildings, Seismic design philosophy for buildings, ductility and flexibility of buildings as solution to earthquake effects, Indian seismic codes and practices

MODULE II: Impact of earthquake on buildings of different materials

Behaviour of brick and stone masonry building in earthquake, importance of simple structural configuration for masonry buildings, necessity of horizontal bands, necessity of vertical bands and cornerstones in masonry buildings; Effect of

earthquake on RC buildings, behaviour of beams in earthquake, behaviour of columns in earthquake-beam column joints, column footing joints, importance of structural ductility, localized failure in RC structures

MODULE III: Design of buildings for earthquake resistance

Factors affecting earthquake loading: Mass, Natural period, Damping, Ductility. Seismic Design Code Provisions: Basic terms used in seismic codes and their meanings, horizontal design seismic coefficient, base shear of building and vertical distribution of loads. Building Configuration: scale of building- size in horizontal plane- size in vertical plane- Building proportions- Symmetry of building (Torsion), Re-entrant corners, Redundancy, irregularities in building, Horizontal plane, Vertical plane (Soft storey, short column, 20% discontinuous walls).

MODULE IV: Earthquake resistant methods and techniques for modern buildings

Vulnerability of open ground storey building, effect on short column during earthquake, role of shear wall, techniques to reduce earthquake effects, base isolators

MODULE V: Seismic retrofitting of old and new buildings

Causes of distress in buildings, Damage assessment of buildings, types and classifications of damages, various tools and techniques for damage assessment, Condition assessment of Buildings, Methodology of condition assessment, Detailed Investigations required for assessment, Partially Destructive tests, Soil Profiles at the site, Seismic retrofitting of old and new buildings, various techniques, materials, components and methods

Reference Books

1. IS:1893 – Indian Standard Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
2. IS:13935 – Repair and Seismic Strengthening of Buildings – Guidelines, 1993
3. IS:4326 – Earthquake Resistant Design and Construction of Buildings – Code of Practice, 1993
4. IS:13828 – Improving Earthquake Resistance of Low Strength Masonry Buildings, 1993
5. IS:13827 - Improving Earthquake Resistance of Earthen Buildings, 1993
6. IS:13920 – Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Force, 1993
7. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006
8. Seismic design of reinforced concrete and masonry buildings by T. Paulay and M.J.N. Priestley, John Wiley & Sons, 1991.
9. Ambrose, J; Vergun, D: Simplifed building design for wind and Earthquake forces, JohnWiley, New York, USA

10. Arnold, C; Reitherman, R: Building configuration and Seismic design, 1982, John Wiley, Newyork USA
11. Bolt, B.A: Earthquakes, Fourth edition, 1999, W H Freeman, San Francisco, USA
12. Dowrick, D.J: Earthquake resistant design for Engineers and Architects, 1987, Second edition, John Wiley, New York, USA
13. Hugo Bachmann: Seismic conceptual design of buildings- Basic principle for engineers, architects, building owners and authorities; Swiss Federal Office for Water and Geology and Agency for Development and Cooperation, Switzerland.
14. Lagario, H.J: Earthquakes: An architect's guide for non-structural seismic hazards, John Wiley and sons, New York, USA.
15. Murty, C.V.R: Earth quake tips, National information centre for Earthquake Engineering, IITK, Kanpur.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1 [6 hours]	
1.1	Causes of earthquake, different types of earthquake waves: P-waves, S-waves	1
1.2	Basic terminologies of earthquake: plate tectonics, focus, epicenter, fault line, magnitude of earthquake, intensity, epicenter distance	1
1.3	Working of seismograph, Seismic zones of India	1
1.4	Seismic effects on structure, effects of architectural features on buildings, twisting of buildings, Seismic design philosophy for Buildings, ductility and flexibility of buildings as solution to earthquake affects	1
1.5	Twisting of buildings, Seismic design philosophy for Buildings, ductility and flexibility of buildings as solution to earthquake affects	1
1.6	Indian seismic codes and practices	1

MODULE II [6 hours]		
2.1	Behaviour of brick and stone masonry building in earthquake	2
2.2	Importance of simple structural configuration for masonry building, necessity of horizontal bands, necessity of vertical bands and cornerstones in masonry buildings – for brick and stone	2
2.3	Effect of earthquake on RC buildings, behaviour of beams in earthquake, behaviour of columns in earthquake-	1
2.4	Effect of earthquake on RC buildings -beam column joints, column footing joints, importance of structural ductility, localized failure in RC structures	1
MODULE III [7 hours]		
3.1	Factors affecting earthquake loading: Mass, Natural period, Damping, Ductility.	1
3.2	Seismic Design Code Provisions: Basic terms used in seismic codes and their meanings, horizontal design seismic coefficient, base shear of building and vertical distribution of loads.	1
3.3	Building Configuration: scale of building- size in horizontal plane-size in vertical plane	1
3.4	Building proportions- Symmetry of building (Torsion), Re-entrant corners, Redundancy, irregularities in building,	1
3.5	Impact: Horizontal plane, Vertical plane (Soft storey, short column, 20% discontinuous walls).	1
3.6	Cases to discuss impact of earthquake on buildings	2
MODULE IV [7 hours]		
4.1	Vulnerability of open ground storey building	1
4.2	Effect on short column during earthquake	1
4.3	Role of shear wall, techniques to reduce earthquake effects, base isolators	1
4.4	Seismic retrofitting of old and new buildings	1
4.5	Causes of distress in buildings,	1

4.6	Damage assessment of buildings, types and classification of damages, various tools and techniques for damage assessment	1
4.7	Examples to discuss damage and retrofitting	1
	MODULE V: Case studies(10 hours)	
5.1	Case study -Damage assessment of buildings, Condition assessment of Buildings, soil profile at the site	3
5.2	Case study for Seismic retrofitting of old and new buildings - techniques, materials, components and methods	4
5.3	Cases - Techniques to reduce earthquake effects	3
CO Assessment Sample Questions		
1	Explain Seismic design philosophy for Buildings.	
2	What is the necessity of horizontal bands, vertical bands and cornerstones in masonry buildings?	
3	What are the Factors affecting earthquake loading in buildings?	
4	Explain the techniques to reduce earthquake effects on buildings.	
5	Explain Seismic retrofitting of old and new buildings - techniques, materials, components and methods used.	

23ARE804.4	CONSTRUCTION MECHANIZATION	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course provides an overview of the principles, technologies, and equipment used in construction mechanization. Topics include heavy equipment operation, safety, maintenance, and the application of various machines and mechanized processes in construction projects.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO 1	Remember and understand type and capacity of construction equipment that can be used for a particular job on site
CO 2	Understand the mechanization in manufacturing
CO 3	Understand the mechanization in concrete production and placement
CO 4	Apply the mechanization through construction methods. Analyse the methods of drilling and blasting

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓									
CO 2	✓	✓	✓		✓							
CO 3	✓	✓	✓		✓							
CO 4	✓	✓	✓		✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse		✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Introduction to mechanization

Definition; advantages and limitations of mechanization; Indian scenario and Global scenario, mechanization in building construction

MODULE II

Mechanization in Substructure construction

Mechanization in construction methods: Drilling, Blasting and Tunneling Equipments; construction equipments, Equipment cost; Machine Power, Dozers, scrapers, Excavators, finishing equipment, Trucks and Hauling equipment, Hoisting equipment, Draglines, Clamshells and cranes. Robotics and future possibilities in mechanization; underground construction equipments and methods – foundations

Case – application in underwater construction, underpinning, shifting of structure, basements

MODULE III

Mechanization in Superstructure construction

Mechanization in rebar fabrication, Mechanization in concrete production, mixers and placement; Mechanization in construction: formwork and scaffolding; Mechanization in glass fixing, assembling and cleaning. Wood compressing machines, planers etc

Case: Construction of buildings with design enhanced by digital architecture – varied forms, tall structures

MODULE IV

Environmental issues in mechanization.
Equipment maintenance, emissions and fuel consumption. Alternative fuels and advanced technology in mechanized construction.

MODULE V

Case study/market study in mechanization
Case studies to discuss the mechanization concepts in India and globally

Reference books

1. Mahesh Varma ;(2009). Construction Equipment and its Planning and Applications; Metropolitan Book Co.Pvt.Ltd. New Delhi. India.
2. Sharma S.C ;(1991). Construction Machinery and Equipment in India. Khanna Publication.
3. Sharma S.C. (1988). Construction Equipment and Management; Khanna Publishers; Delhi
4. Peurifoy R L, (2014). Construction Planning; Equipment and Methods; Mc Graw Hill
5. James F Russell, (2012). Construction Equipment, Prentice Hall.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Introduction to mechanization.	1
1.2	Understanding the concept of mechanization - equipments	1
1.3	Understanding the concept of mechanization – technological advancement	1
1.4	Concept of mechanization - substructure 1	1
1.5	Concept of mechanization - superstructure	1
1.6	Concept of mechanization in roofing	1
MODULE II [8 hours]		
2.1	Mechanization in excavation, earth moving	1

2.2	Mechanization in building under water	1
2.3	Mechanization in underpinning and moving structures	1
2.4	Mechanization in demolition	1
2.5	Construction equipment available in the market and their uses.	1
2.6	Mechanization in foundation structure construction	1
2.7	Mechanization in construction of underground structures	1
2.8	Mechanization in underground construction 2	1
MODULE III [6 hours]		
3.1	Mechanization in concrete formwork	1
3.2	Mechanization in concrete production	1
3.3	Mechanization in glass fixing and cleaning	1
3.4	Mechanization in wood work and carpentry 1	1
3.5	Mechanization in related areas	1
3.6	Mechanization in roof construction.	1
MODULE IV [8 hours]		
4.1	Environmental issues in mechanization	1
4.2	Environmental issues in mechanization - cases	1
4.3	Construction equipment, procedures	1
4.4	Construction equipment, procedures - cases	1
4.5	Advanced technology in mechanization 1	1
4.6	Sustainable technology in mechanization 2	1
4.7	Mechanization in all allied fields.	1

4.8	Mechanization in all allied fields- cases	1
MODULE V [8 hours]		
5.1	Case study - foundation	1
5.2	Case study - superstructure	1
5.3	Case study - roofing	1
5.4	Case study - finishing	1
5.5	Case study - robotics and future technology	1
5.6	Case study – application of mechanization– cost and time efficiency in a finished product or process	1

CO ASSESSMENT SAMPLE QUESTIONS	
1	What factors should be considered when selecting construction equipment for a specific construction project?
2	What are the advantages and disadvantages of integrating mechanization into manufacturing operations?
3	Explain the potential challenges and safety considerations associated with mechanized concrete handling.
4	Describe the key steps involved in the drilling and blasting process and the equipment used.

23ARE804.5	APPROPRIATE BUILDING TECHNOLOGY	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The Appropriate Building Technology course explores the use of construction materials, techniques, and design principles that are well-suited to the local environment, culture, and socioeconomic conditions while considering sustainability and minimizing environmental impact. It often emphasizes using readily available, affordable, and ecologically friendly materials and construction methods. The course aims to give exposure to the concepts of appropriate building technology and services suitable in Indian context, its applicability in both rural and urban applications.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Understand sustainable and appropriate building technology, focusing on materials, construction techniques, and design principles.
CO2	Gain understanding on how to minimize environmental impact and promote efficiency and resilience.
CO3	Recognize the significance of construction that are well-suited with the local environment, culture, and socioeconomic conditions
CO 4	Enrich the conventional knowledge with alternative material and construction techniques.
CO5	Analyze the strength of appropriate technology and its significant contributions in Indian context.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓		✓		✓				✓		✓
CO2		✓		✓		✓	✓			✓		✓
CO3		✓		✓		✓	✓			✓		✓
CO 4		✓		✓		✓				✓		✓
CO5		✓		✓		✓				✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply			✓	✓
Analyse	✓	✓		✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**TotalMarks**
		Assignment	**Test-1**	**Test-2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Introduction to Appropriate Building Technology

Definition and significance of appropriate building technology; key principles of sustainability in construction; role of technology in addressing global and local challenges.

MODULE II

Sustainable building materials and building design principles

Sustainable building materials (wood, bamboo, recycled materials; concept of embodied energy and life cycle analysis; relevant case studies -material selection criteria; building design principles like passive solar design, natural ventilation and daylighting, design for energy efficiency, bioclimatic architecture etc. through

relevant case studies.

MODULE III

Energy efficient building systems and efficient water management

HVAC systems for energy efficiency, lighting and control systems, renewable energy integration (solar, wind) and energy-efficient appliances and fixtures. Rainwater harvesting, grey water recycling, water-efficient fixtures and sustainable landscaping and irrigation. Live case studies on modern and traditional practices followed in Indian context.

MODULE IV

Sustainable Building Codes and Regulations

Rules and regulations for sustainable practices; Local and international building codes, Sustainable certifications (LEED, BREEAM, etc.), Green building standards and certifications; Various regulatory challenges and incentives

MODULE V

Case studies

Case studies on passive solar design, energy efficiency, bioclimatic architecture; modern and traditional practices for energy and water conservation; case studies and documentation on certified green buildings.

Reference books

1. "Sustainable Construction: Green Building Design and Delivery" by Charles J.Kibert
2. "Building Green: A Complete How-To Guide to Alternative Building Methods" by Clarke Snell and Tim Callahan
3. "Eco-efficient Construction and Building Materials: Life Cycle Assessment (LCA), Eco-Labelling, and Case Studies" by Fernando Pacheco-Torgal and Said Jalali
4. "Resilient Sustainable Communities: A Comprehensive Action Plan for Towns, Cities, and Regions" by Stephen J. Coyle
5. "Bamboo Architecture: Design for the Future" by Oscar Hidalgo Lopez and Pilar Borrás
6. "Contemporary Indian Architecture: After the Masters" by Gita Mehta and Robert Powell
7. "Sustainable Building Design Manual: Volume 2" by TERI (The Energy and Resources Institute)

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Definition of appropriate building technology	1

1.2	Significance of appropriate building technology	1
1.3	Key principles of sustainability in construction	1
1.4	Sustainability in construction - cases	1
1.5	Role of technology in addressing global challenges.	1
1.6	Role of technology in addressing local challenges.	1
MODULE II [8 hours]		
2.1	Sustainable building materials (wood, bamboo).	1
2.2	Sustainable building materials (recycled materials).	1
2.3	Establish material selection criteria suitable to each context.	1
2.4	Understand the concept of embodied energy	1
2.5	Life cycle analysis.	1
2.6	Building design principles like passive solar design, natural ventilation and daylighting	1
2.7	Design for energy efficiency	1
2.8	Bioclimatic architecture	1
MODULE III [8 hours]		
3.1	HVAC systems for energy efficiency	1
3.2	HVAC systems for lighting and control systems	1
3.3	Renewable energy integration (solar, wind)	1
3.4	Energy-efficient appliances and fixtures.	1
3.5	Rainwater harvesting	1
3.6	Grey water recycling	1
3.7	Water-efficient fixtures	1
3.8	Sustainable landscaping and irrigation.	1
MODULE IV [6 hours]		
4.1	Local building codes – practice in different regions	1
4.2	International building codes	1

4.3	Sustainable certifications (LEED, BREEAM, etc.)	1
4.4	Green building standards and certifications.	1
4.5	Various regulatory challenges	1
4.6	Incentives for sustainable construction	1
MODULE V [8 hours]		
5.1	Case studies on passive solar design	2
5.2	Case studies on bioclimatic architecture.	2
5.3	Case studies on modern and traditional practices for energy and water conservation.	2
5.4	Case studies and documentation on certified green buildings.	2

CO Assessment Sample Questions	
1	How do life cycle assessments contribute to the selection of sustainable building materials, and why is it important to consider the entire life cycle of a material?
2	In what ways can water efficiency be integrated into building design and construction, and what are the potential benefits for both the environment and long-term operational costs?
3	In what ways can buildings be designed to harmonize with the natural landscape, considering factors such as climate, topography, and local ecosystems?
4	Explain the potential benefits and challenges of using recycled andupcycled materials in construction, and how they contribute to sustainability?
5	How do international building standards, such as LEED or BREEAM influence sustainable construction practices?

SEMESTER 8
ELECTIVE 4

ELECTIVE 4 (23ARE805) – ARCHITECTURAL SPECIALISATION

23ARE805.1	TRAFFIC AND TRANSPORTATION PLANNING	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course aims at imparting knowledge on understanding of urban transportation problems, setting clear goals and objectives to serve as guiding factors in the planning process, identification of the causal factors influencing the demand for urban travel and development of relationship between the factors and the travel demand. The course provides adequate exposure to basic understanding of transportation planning and management in urban areas, travel demand forecasting, traffic survey, road infrastructure etc.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Comprehend the evolution of transport system and current scenario of transportation in India
CO 2	Understand the basic requirements of road design and factors affecting the capacity and level of service
CO 3	Understand the relevance of traffic and transportation studies in preparation of comprehensive mobility plans
CO 4	Acquire the knowledge of components of transport planning and the relevance of transportation planning in ensuring sustainable development

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										✓
CO 2	✓	✓	✓		✓							
CO 3	✓	✓	✓		✓							
CO 4	✓	✓			✓	✓	✓					✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply	✓	✓		✓
Analyze		✓		✓
Evaluate				
Create				

Assessment tools: Case studies of transportation system, traffic issues and measures adopted in major cities

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [4x10 = 40 marks]	

SYLLABUS

MODULE I

Transport System and its Development

Introduction - Definition and scope of traffic and transportation planning, Importance in urban planning and architecture; Characteristics of Indian traffic - various modes of transport, design and operational characteristics; Nature of traffic problems - Congestion and its causes, Pollution and environmental impact, Safety concerns in urban traffic.

MODULE II

Road Classification, Parking, and Road Design Concepts

Classification of roads - Urban and rural road hierarchy, Functional classification; Parking as a component of urban design - Types of parking - On-street, Off-street,

Parallel, Perpendicular, Angled, Automated etc.; Universal Design and Accessibility in Parking Facilities; Geometric Design of Roads - Road Cross-sections, Types of Intersections - Signalized, Unsignalized, Roundabouts, Grade separated; Concept of PCU and level of service. Traffic controls - Traffic signs, Signals and Road markings; Purpose and Function of Bus Bays; Traffic Safety - Factors affecting road safety,

MODULE III

Traffic Survey and Studies

Study area definition; Sampling methods - Random sampling vs. stratified sampling; Survey types - Traffic volume count survey, Origin and destination survey, Speed and delay survey, Parking and accidents surveys, Public transport survey, Pedestrian survey; Survey Administration Techniques - Interviews, Questionnaires, etc; Photographic techniques in traffic surveys.

MODULE IV

Transportation Planning process

Introduction to transport planning process, Systems approach to transportation planning, Introduction to four-step modeling - Trip generation, trip distribution, modal split, and trip assignment; Land use-transportation interaction; Concept of accessibility and connectivity; Planning for Pedestrian and Bicycle Safety; Design considerations for traffic calming measures, Transit Oriented Development; Computer application in Traffic and Transportation Planning.

MODULE V

Case studies- safe and sustainable transportation

Case studies - Sustainable transportation in cities - Public transport and Mass transport operation characteristics; Intermodal transport systems; Integration of environmental considerations in road design

Reference books

1. “Introduction to transport planning” by Michael J Bruton.
2. "Sustainable Transportation: Problems and Solutions" by William R. Black
3. “Principal of Urban transport system planning” by Hutchinson.
4. “Traffic and Transportation planning and engineering” by L R Kadiyali.
5. “Public Transport Planning and Management” by Ashish Verma and T V Ramanayya.
6. “Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlement” UN-Habitat, Routledge, 2013.
7. “Better Towns with less traffic” OECD.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36 hours]
MODULE 1[8 hours]		
1.1	Introduction - Definition and scope of traffic and transportation planning	1
1.2	Scope of traffic and transportation planning, Importance in urban planning and architecture	1
1.3	Characteristics of Indian traffic - various modes of transport	1
1.4	Characteristics of Indian traffic - various modes of transport, design and operational characteristics	1
1.5	Characteristics of Indian traffic - design and operational characteristics	1
1.6	Nature of traffic problems - Congestion and its causes	1
1.7	Pollution and environmental impact Safety concerns in urban traffic.	1
1.8	Safety concerns in urban traffic.	1
MODULE II [8 hours]		
2.1	Classification of roads - Urban and rural road hierarchy, Functional classification	1
2.2	Classification of roads - Functional classification	1
2.3	Parking as a component of urban design - Types of parking - On-street, Off-street, Parallel, Perpendicular, Angled, Automated etc.	1
2.4	Parking as a component of urban design - Universal Design and Accessibility in Parking Facilities	1
2.5	Geometric Design of Roads - Road Cross-sections	1
2.6	Types of Intersections - Signalized, Unsignalized, Roundabouts, Grade separated; Concept of PCU and level of service	1
2.7	Concept of PCU and level of service	1

2.8	Traffic controls - Traffic signs, Signals and Road markings; Purpose and Function of Bus Bays, Traffic Safety - Factors affecting road safety	1
MODULE III [6 hours]		
3.1	Study area definition; Sampling methods - Random sampling vs. stratified sampling	1
3.2	Study area definition; Sampling methods - Random sampling vs. stratified sampling	1
3.3	Survey types - Traffic volume count survey, Origin and destination survey,	1
3.4	Survey types - Speed and delay survey, Parking and accidents surveys, Public transport survey, Pedestrian survey	1
3.5	Survey Administration Techniques - Interviews, Questionnaires, etc	1
3.6	Photographic techniques in traffic surveys	1
MODULE IV [8 hours]		
4.1	Introduction to transport planning process, Systems approach to transportation planning,	1
4.2	Introduction to four-step modeling - Trip generation, trip distribution, modal split, and trip assignment	1
4.3	Land use-transportation interaction	1
4.4	Land use-transportation interaction; Concept of accessibility and connectivity	1
4.5	Planning for Pedestrian and Bicycle Safety	1
4.6	Design considerations for traffic calming measures	1
4.7	Transit Oriented Development	1
4.8	Computer application in Traffic and Transportation Planning.	1
MODULE V [6 hours]		
5.1	Case studies - Sustainable transportation - Public transport and Mass transport operation characteristics	2

5.2	Case studies - Intermodal transport systems	2
5.3	Case studies - Integration of environmental considerations in road design	2

CO Assessment Sample Questions	
CO 1	1) Describe the characteristics of Indian traffic and the various modes of transportation in India. 2) What is the nature of traffic problems predominately faced in India? 3) Describe some of the safety concerns linked with urban traffic in India.
CO 2	1) What are the different types of intersections and how do these vary from each other? 2) Explain the purpose and function of Bus bays. 3) What are the types of parking provided? Illustrate their differences.
CO 3	1) What are the various surveys done in transportation studies? Briefly explain each. 2) Describe some survey administration techniques. 3) What is the difference between random sampling and stratified sampling? 4) Explain land use transportation interaction with examples.
CO 4	1) How can sustainability be achieved in the transportation sector? 2) What are intermodal transport systems? 3) How can environmental considerations be incorporated into road design?

23ARE805.2	ARCHITECTURAL CONSERVATION	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The Architectural conservation course explores the architectural conservation theory, its evolution and philosophy through learning history of the conservation movement. It analyzes the intrinsic and extrinsic values of architectural heritage. The course also aims to make aware of good and bad practices in architectural conservation scenario.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Comprehend architectural heritage and the need for conservation
CO 2	Develop an overview of the theoretical aspects and practical implications of architectural conservation.
CO 3	Comprehend global practices, standards and the connected legislations for sensitizing and undertaking conservation projects
CO 4	Summarize the good practices and procedures for Architectural conservation.
CO5	Summarize the various causes of deterioration of heritage buildings

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓		✓				✓		✓
CO 2	✓	✓		✓		✓				✓		✓
CO 3	✓	✓		✓		✓				✓		✓
CO 4	✓	✓		✓		✓				✓		✓
CO5	✓	✓		✓		✓				✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply			✓	✓
Analyse	✓	✓		✓
Evaluate			✓	✓
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	40

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULEI

Introduction to Architectural Conservation – Understanding Heritage. Types of Heritage; Definitions: Cultural heritage, Natural heritage, Built heritage - Ancient Monument. Architectural Conservation - Definition, Need, Objectives and Scope, Ethics of conservation, Significance, values in conservation and Value Assessment.

MODULE II

Conservation movement in Europe- Contributions of John Ruskin & William Morris- Romantic and scientific conservation. Formation of SPAB. Conservation practice. Agencies involved and their role in conservation - ICCROM, ICOMOS, UNESCO, ASI, State departments of Archaeology, Town Planning departments, State Art and Heritage Commission & INTACH. Charters such as Athens charter for the Restoration of Historic Monuments (1931), International Charter for the Conservation and Restoration of Monuments and Sites (Venice Charter 1964),Historic Gardens (Florence Charter 1981), NARA charter (1994), ICOMOS Charter

MODULEIII

Principles for the analysis, conservation and structural restoration of architectural heritage; World Heritage Sites, Selection criteria, Case Studies, Endangered heritage and sites, Listing of heritage- documentation of historic structures- preparation of inventory - assessing architectural character and conservation values, grading etc. Technique of Conservation - Preparatory procedures

for conservation. Building material and structural conservation – timber, lime, stone and laterite. Preparation of Inventories, Initial inspections, Documentation - Research, Analysis and recording. Interpretation and Presentation of Historic Sites and heritage tourism, Asian Heritage Management Tools for spreading heritage awareness.

MODULEIV

Building Deterioration - Causes of decay in materials and structure – Climatic causes – Thermal movements, rain, frost, snow, moisture, wind. Botanical, biological and micro biological causes; Natural disasters – Fire, earthquakes, flood, lightning. Manmade causes – Wars, pollution, vibration, vandalism and Neglect. Seven Degrees of intervention - Prevention of deterioration, Preservation, Consolidation, Restoration, Rehabilitation, Reproduction, Reconstruction. Guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies

MODULEV

Case study: Techniques of Conservation - Building materials and structural conservation – timber, lime, stone and laterite.
Examples of Heritage building conservation.
Interpretation and Presentation of Historic Sites and heritage tourism;
Adaptive re-use of historic structures- Case studies

Reference books

1. Ashurst, J. and Dimes, F.G. Conservation of Building and Decorative Stone, Butterworth- Heinemann, London. -1990.
2. Asian Heritage Management - Contexts, Concerns, and Prospects, 1st Edition, Edited by Kapila D. Silva, Neel Kamal Chapagain, Routledge Contemporary Asia Series, Taylor & Francis Group New York, USA, 2013
3. Bernard M. Fielden- 'Conservation of Historic Buildings' –, Architectural Press, 2003
4. ICOMOS, Earthen Architecture: The conservation of brick and earth structures. A handbook.(1993)
5. Jukka Jokilehto, Butterworth - Heinemann – 'A History of Architectural Conservation' -,1999
6. Poul Beckmann and Robert Bowles – 'Structural Aspects Of Building Conservation', Elsevier Butterworth-Heinemann, 2004
7. Repair and Maintenance of stone, Practical Building Conservation Vol.1. to V by John Nicola Ashurst.
8. Seven Lamps of Architecture – John Ruskin

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. ofHours [36 hours]
MODULE 1 [6 hours]		
1.1	Introduction to Architectural Conservation – Understanding Heritage	1
1.2	Architectural Conservation - Definition, Need, Objectives and Scope	1
1.3	Types of Heritage; Definitions: Cultural heritage, Natural heritage, Built heritage - Ancient Monument	1
1.4	Various methods for defining Heritage	1
1.5	Ethics of Conservation, its significance and values	1
1.6	Values in conservation and Value Assessment.	1
MODULE I I[6 hours]		
2.1	Conservation movement in Europe- Contributions of John Ruskin & William Morris- Romantic and scientific conservation.	1
2.2	Various international Agencies involved and the role of each one in conservation- ICCROM, ICOMOS, UNESCO	1
2.3	Agencies involved and the role of each one in conservation- ASI, State departments of Archaeology, Town Planning departments, State Art and Heritage Commission & INTACH	1
2.4	The agencies involved in Heritage conservation in Indian context and their contribution	1
2.5	Charters such as Athens charter for the Restoration of Historic Monuments (1931), International Charter for the Conservation and Restoration of Monuments and Sites (Venice Charter 1964),Historic Gardens (Florence Charter 1981), NARA charter (1994), ICOMOS Charter - Guidelines	1
2.6	Conservation practice in India and globally	1
MODULE III [8 hours]		
3.1	Principles for the analysis, conservation and structural restoration of architectural heritage	1
3.2	World Heritage Sites, Selection criteria, Case Studies, Endangered heritage and sites	1
3.3	Listing of heritage- documentation of historic structures- preparation of inventory	1
3.4	Methods used for listing, documentation	1

3.3	Assessing architectural character and conservation values, grading etc.	1		
3.4	Technique of Conservation - Preparatory procedures for conservation.	1		
3.5	Building material and structural conservation – timber, lime, stone and laterite.	1		
3.6	Preparation of Inventories, Initial inspections, Documentation - Research, Analysis and recording.	1		
3.7	Interpretation and Presentation of Historic Sites and heritage tourism	1		
3.8	Asian Heritage Management Tools for spreading heritage awareness	1		
MODULE IV [8 hours]				
4.1	The causes of deterioration and decay in materials and structure of heritage buildings	1		
4.2	Climatic causes of deterioration and decay in materials and structure of heritage buildings	1		
4.3	Botanical, biological and micro biological causes of deterioration and decay in materials and structure of heritage buildings	1		
4.4	Natural disasters – Fire, earthquakes, flood, lightning	1		1
4.5	Manmade causes – Wars, pollution, vibration, vandalism and Neglect	1		
4.6	Methods of prevention of deterioration and decay	1		
4.7	The various degrees of interventions	1		
4.8	Guidelines for preservation, rehabilitation and adaptive re-use of historic structures	1		
MODULE V [8 hours]				
5.1	Case study: Technique of Conservation - Building material and structural conservation – timber, lime, stone and laterite.	4		
5.2	Examples of Heritage building conservation. Interpretation and Presentation of Historic Sites and heritage tourism	2		
5.3	Adaptive re-use of historic structures- Case studies	2		
CO Assessment sample Questions				
1	1. Define cultural heritage and provide examples of tangible and intangible cultural heritage. 2. Discuss the challenges associated with the conservation of natural heritage. 3. Explain the ethical considerations in architectural conservation			

2	1. How did Ruskin's ideas influence the perception of architectural and cultural heritage? 2. Discuss the roles and functions of State Art and Heritage Commissions in heritage conservation. 3. Explore the contributions of INTACH (Indian National Trust for Art and Cultural Heritage) in promoting heritage conservation in India
3	1. Discuss how the Florence Charter addresses the unique challenges of preserving historic landscapes. 2. Outline the criteria used for the selection of World Heritage Sites. 3. Discuss the significance of heritage listing for the conservation of cultural assets
4	1. Explain the preparatory procedures undertaken before initiating a conservation project 2. Discuss the importance of documentation in understanding the existing condition of a historic site 3. Discuss the potential benefits and challenges of heritage tourism for conservation efforts
5	1. Explain the impact of thermal movements, rain, frost, snow, moisture, and wind on building materials. 2. Discuss the principles that guide decision-making in preserving the original fabric of a building. 3. Analyze the impact of rehabilitation on the functionality and significance of the building. 4. Discuss factors that contribute to the endangerment of cultural heritage. 5. Explore a case where a historic building has been put to adaptive re-use for a new purpose.

23ARE805.3	URBAN PLANNING	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course introduces the students to the origin and evolution of human settlements and the factors responsible for these developments. The course also introduces students to various planning theories and concepts, and to the process of urbanization. Further the students are introduced to the planning process including plan formulation and implementation mechanisms in India. The course also provides a holistic and multidisciplinary perspective about Urban Planning.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Understand the origin and evolution of human settlements and factors responsible for the same
CO 2	Analyse the urban characteristics in the city
CO 3	Comprehend and discuss the planning theories and concepts in the process of urbanization
CO 4	Analyse the planning process, plan formulation and implementation mechanisms in India

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		✓		✓		✓	✓					✓
CO 2		✓				✓	✓					✓
CO 3		✓		✓		✓	✓					✓
CO 4		✓				✓	✓				✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply			✓	
Analyse	✓	✓		✓
Evaluate		✓		✓
Create				

Assessment tools – Casestudies to discuss urbanization and urban planning concepts

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Introduction to urban and regional planning

The process of urbanization and its impact on environment; Need for planned development; Planning in ancient & medieval period: Mesopotamia, Greece and Rome, Walled cities of Medieval age- Carcassone in France; Renaissance cities - Florence, Industrial cities- Manchester. Reconstruction of medieval cities-Paris; Town planning in ancient& medieval India: Indus valley period -Mohenjo-Daro, Vedic principles of town planning, Medieval cities - Shajahanabad and Jaipur.

MODULE II

Urban planning Terminology

Definition of urban area, CBD, nodes, peri-urban areas, conurbation, sprawl, and ribbon development; Classification of Urban areas: Town, city, metropolis, megalopolis, and their interdependence. Census classification of towns in India.

MODULE III

Planning Theories

Early models of Urban structure: Concentric ring model, Sector model, Multiple nuclei model; Contributions by Ebenezer Howard, Lewis Mumford, Patrick Geddes, Clarence Stein, Clarence Perry, C. A. Doxiadis and Le Corbusier to town; Current Planning trends: New Urbanism, Transit Oriented Development, Inclusive cities, Sustainable cities, Resilient cities and Smart cities.

MODULE IV

Planning Process, Legislation and Implementation in India

Urbanization in India. Contents of Perspective plan, Regional Plan, Development plan, Local area plan etc. and their interrelationships; Process of plan preparation, Surveys for plan preparation, Major forms of land use regulation and control in India, Origin and evolution of planning legislation in India, Salient Acts like Environment Protection Act, Coastal Regulation Zone Notification, 73rd and 74th Constitutional Amendment Act; Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act 2013, Kerala Town &Country planning Act 2016 etc.

MODULE V

Case studies – Urban planning process

Case studies to discuss the urban planning concepts in cities in India and globally

Reference books

1. John Ratcliffe, 1984,' An Introduction to Town and Country Planning'
2. Arthur B.Gallion, 1986, 'The Urban Pattern: City planning and design'
3. Lewis Keeble, 1969, 'Principles and Practice of Town and Country Planning'
4. Kevin Lynch, 1960, 'Image of the city'
5. A.E.J Morris, 1972, 'History of Urban Form from Pre-history to Renaissance'
6. C.A.Doxiadis, 1968, 'Ekistics: An Introduction to the Science of Human Settlements'
7. Peter Hall & Ulrich Pfeiffer, 2000, 'Urban Future 21: A Global Agenda for 21st Century Cities'
8. Ramachandran R, 1998, 'Urbanization and urban systems in India'
9. Amiya Kumar Das, 2007, 'Urban Planning in India'
10. Kulsreshtha, 2012, 'Urban and Regional Planning in India: A handbook for professionals'
11. Ministry of Urban Affairs, Govt. of lndia, 'Urban and Regional Development Plan Formulation and Implementation Guidelines -2014'.
12. 'Reforms In Urban Planning Capacity in India', September 2021
13. Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century by Peter Geoffrey Hall
14. Traffic engineering and transport planning by Kadiyali

15. Town Planning by Rangwala
16. Fundamentals of Town Planning by G.K.Hiraskar

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
MODULE 1 [8 hours]		
1.1	The process of urbanization and its impact on environment. Need for planned development	1
1.2	Planning in ancient period: Mesopotamia, Greece and Rome	1
1.3	Planning in medieval period: Walled cities of Medieval age- Carcassone in France	1
1.4	Planning in Renaissance cities - Florence	1
1.5	Planning in Industrial cities- Manchester.	1
1.6	Reconstruction of medieval cities - Paris	1
1.7	Town planning in ancient & medieval India: Indus valley period - Mohenjo-Daro	1
1.8	Vedic principles of town planning, Medieval cities - Shajahanabad and Jaipur	1
MODULE II [5 hours]		
2.1	Definition of urban area, CBD, nodes, peri-urban areas	1
2.2	Definition of conurbation, sprawl, and ribbon development.	1
2.3	Classification of Urban areas: Town, city, metropolis, megalopolis	1
2.4	Classification of Urban areas: Town, city, metropolis, megalopolis, and their interdependence.	1
2.5	Census classification of towns in India	1
MODULE III [10 hours]		
3.1	Early models of Urban structure: Concentric ring model, Sector model	1
3.2	Early models of Urban structure: Multiple nuclei model	1

3.3	Contributions by Ebenezer Howard, Lewis Mumford	1
3.4	Contributions by Patrick Geddes, Clarence Stein, Clarence Perry	1
3.5	Contributions by C. A. Doxiadis and Le Corbusier	1
3.6	Contributions by Indian Urban Planners	1
3.7	Current Planning trends: New Urbanism, Transit Oriented Development	1
3.8	Current Planning trends: Inclusive cities, Sustainable cities	1
3.9	Current Planning trends: Resilient cities and Smart cities	1
3.10	Current Planning trends: Compact city development and shadow cities.	1
MODULE IV [7 hours]		
4.1	Urbanization in India. Contents of Perspective plan, Regional Plan, Development plan, Local area plan etc. and their interrelationships	1
4.2	Process of plan preparation, Surveys for plan preparation	1
4.3	Major forms of land use regulation and control in India	1
4.4	Origin and evolution of planning legislation in India, 73rd and 74th Constitutional Amendment Act	1
4.5	Environment Protection Act, Coastal Regulation Zone Notification	1
4.6	Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act 2013	1
4.7	Kerala Town & Country Planning Act 2016	1
MODULE V [6 hours]		
5.1	National Case study – Urban planning process	1
5.2	Ancient National Case study – Urban planning process to discuss transformation	1
5.3	International Case studies – Urban planning – different categories of cities	2
5.4	International Case studies – Urban planning – safe city, resilient city, global city, sponge city etc.	2
CO Assessment sample Questions		

CO 1	1) How did early humans choose their settlement locations, and what factors influenced their decisions? 2) Name some key factors that led to the growth of urban settlements during ancient civilizations. 3) How did geographical features like rivers and fertile land help in the establishment of early human settlements? 4) What impact did the industrial revolution have on the formation and development of cities?
CO 2	1) What are some prominent urban planning theories, and how have they influenced modern city planning? 2) How do zoning regulations contribute to urban planning, and what is their purpose in city development? 3) Can you explain the concept of sustainable urban development and its importance in contemporary urban planning? 4) Why is community participation considered a vital aspect of urban planning process?
CO 3	1) What are some notable urban planning projects in India, and what were their objectives? 2) What challenges do Indian cities face in implementing sustainable urban development plans, and what are some potential solutions?
CO 4	1) In what ways can a multidisciplinary approach address challenges related to urban poverty and housing affordability? 2) Describe the role of public participation and community engagement in ensuring that urban planning initiatives are holistic and inclusive.

23ARE805.4	HOSPITAL DESIGN	L	T	P	S	C	YearofIntroduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to study comprehensive and specialized services, amenities and infrastructure provisions in Hospital Systems and Services, to understand various issues related to design of Hospital Systems and healthcare buildings.

Prerequisite: Nil.

Course Outcomes: After the completion of the course the student will be able to

CO1	Comprehend the basic concepts related to hospital planning
CO2	Analyse the integrated services in hospital complex
CO 3	Comprehend the building byelaws and codes relevant to hospital design and health facilities
CO 4	Identify the design requirements for health facilities

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓	✓	✓					✓	
CO2		✓	✓	✓	✓	✓					✓	
CO3		✓	✓	✓	✓	✓					✓	
CO4		✓		✓	✓	✓					✓	

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember				
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate				
Create				

Assessment tools: Case studies of hospitals to understand the planning of a hospital complex and specialized services in the design of a hospital

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**

100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULEI: Hospital Basics

Introduction to hospital Spaces, functional flow, amenities and infrastructure provisions in hospital.

MODULEII: Hospitals - integrated systems

Hospitals - integrating systems and services such as water, sanitation, solid waste, bio-medical waste management, electricity / energy, telecommunication, parking, and site planning.

MODULEIII: Hospital Building byelaws and codes

Building byelaws, rules and code provisions for various types of hospitals; specialized and smart hospitals. Identification of various levels and its types, understand norms and standards, technical services for the various health facilities.

MODULEIV: Design considerations for health facilities

Design requirements for health facilities with focus on movement pattern, parking, functional requirements and understanding of services required. Design emphasis on detailing of areas like OT Complex, wards, diagnostic facilities, emergency services, trauma center etc.

MODULEV: Case studies of hospitals

Case studies of hospitals with its services, movement pattern, parking, functional requirements, Study of areas like OT Complex, wards, diagnostic facilities, emergency services, trauma center etc.

Reference books

1. Miller, R. L., & Swensson, E. S. (2002). *Hospital and healthcare facility design*. WW Norton & Company.
2. Burgun, J. A. (2008). Introduction to health care planning, design, and construction.
3. Facility Guidelines Institute. (2014). *Guidelines for design and construction of hospitals and outpatient facilities*. American hospital association. American society for healthcare engineering.
4. Yee, R. (2004). *Healthcare spaces* (No. 2). Visual Reference Publications.
5. Nickl-Weller, C., & Nickl, H. (2013). Hospital architecture.
6. Marcus, C. C., & Barnes, M. (Eds.). (1999). *Healing gardens: Therapeutic benefits and design recommendations* (Vol. 4). John Wiley & Sons.
7. Mazuch, R. (2017). Salutogenic and biophilic design as therapeutic approaches to sustainable architecture. *Architectural Design*, *87*(2), 42-47.
8. Peters, T. (Ed.). (2017). *Design for Health: Sustainable Approaches to Therapeutic Architecture*. John Wiley & Sons.
9. Guenther, R., & Vittori, G. (2008). *Sustainable healthcare architecture*. John Wiley & Sons.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Introduction to hospital Spaces	1
1.2	Introduction to hospital Space	1
1.3	Functional flow for hospital	1
1.4	Functional flow for hospital	1
1.5	Amenities and infrastructure provisions in hospital	1
1.6	Amenities and infrastructure provisions in hospital	1
MODULE II [7 hours]		
2.1	Hospitals - integrated systems and services such as water, sanitation.	1
2.2	Hospitals integrating systems and services such as water, sanitation	1
2.3	Hospitals integrating systems and services such as solid waste, bio-medical waste management.	1

2.4	Hospitals integrating systems and services such as solid waste, bio-medical waste management -case	1
2.5	Hospitals integrating systems and services such as electricity / energy, telecommunication.	1
2.6	Hospitals integrating systems and services such as parking	1
2.7	Hospitals integrating systems and services such as site planning.	1
	MODULE III [5 hours]	
3.1	Building byelaws, rules and code provisions for various types of hospitals	1
3.2	Building byelaws, rules and code provisions for various types of specialized hospitals	1
3.3	Building byelaws, rules and code provisions for various types of smart hospitals	1
3.4	Identification of various levels and its types, understand norms and standards, technical services for the various health facilities.	1
3.5	Identification of various levels and its types, understand norms and standards, technical services for the various health facilities.	1
	MODULE IV [7 hours]	
4.1	Design requirements for health facilities with focus on movement pattern, parking,	1
4.2	Design requirements for health facilities with functional requirements and understanding of services required.	1
4.3	Design emphasis on detailing of areas like OT Complex	1
4.4	Design emphasis on detailing of areas like wards	1
4.5	Design emphasis on detailing of areas like diagnostic facilities,	1
4.6	Design emphasis on detailing of areas like emergency services, trauma center etc.	1
4.7	Design requirements for health facilities – listing the functional requirements and understanding of services required.	1
	MODULE V [9 hours]	
5.1	Case studies of hospitals with its services, movement pattern, parking, functional requirements, Study of areas like OT Complex, wards, diagnostic facilities, emergency services, trauma center etc.	4
5.2	Case studies of specialized hospitals with its services	2
5.3	Case studies of different healing spaces	3

Co Assessment Sample Questions	
1	Briefly explain the functional flow that has to be followed in hospital design.
2	Explain Components of the various integrated systems in a hospital.
3	Write short notes on building bye laws that has to be followed while designing hospitals.
4	With a relevant example, discuss hospital design, services, movement pattern, parking, functional requirements
5	Discuss the design requirements for varied health facilities with focus on movement pattern, parking, functional requirements and understanding of services required. Design emphasis on detailing of areas like OT Complex, wards, diagnostic facilities, emergency services, trauma center etc.

23ARE805.5	CAMPUS PLANNING	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course is designed to provide an idea on the layout, organization, and development of physical environments within educational institutions, corporate campuses, and other large complexes.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO 1	Gain a comprehensive understanding of the principles and concepts related to campus planning, including conceptual development in a campus
CO 2	Acquire skills in master planning, enabling them to create long-term visions for campus development, considering factors like land use, circulation, and growth projections.
CO 3	Comprehend the complexities of campus planning and formulate functional requirements of spaces
CO 4	Formulate requirements of services for large campuses.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓									
CO 2	✓	✓	✓		✓							
CO 3	✓	✓	✓		✓							
CO 4	✓	✓	✓		✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply	✓	✓		✓
Analyse		✓		✓
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Introduction to campus planning

Introduction to key concepts in campus planning, types of campuses, elements in design, historical relevance and conceptual developments of campus

MODULE II

Institutional facilities

Design of various kinds of spaces required in campus – types of facilities, space allocation and utilization, safety and security, user experience, flexibility, community engagement, financial considerations

MODULE III

Institutional services

Types of services, location, accessibility etc. user centric services, safety and security, information technology services, health and wellness services, transportation services etc

Recreation activities

Types of facilities, multipurpose spaces, inclusive design, sports facilities, recreation for all seasons, maintenance, community engagement, programs and events.

MODULE IV

Master plan preparation and campus expansion

Site study and analysis, developing vision and goals, landuse and zoning, circulation, phasing and implementation. Monitoring and evaluation

MODULE V: Case studies

Case studies of campus designs to discuss all aspects studied

Reference books

1. Campus Planning" by Richard P. Dober
2. "Campus Master Planning: A Comprehensive Guide to Design and Implementation" by Jonathan M. Burch and James L. Minor
3. "Planning Academic and Research Library Buildings" by Philip D. Leighton and David C. Weber
4. "Campus Landscape: Functions, Forms, Features" by Gary Brown
5. "The Campus Guide: Planning and Design" by Richard P. Dober.
6. "Reinventing the University: A Radical Proposal for a Problem-Focused University" by Ben Wildavsky

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Introduction to campus planning	1
1.2	Understanding the concept of campus planning -cases	1
1.3	Exploring the types of campuses and elements in campus design	1
1.4	Exploring the types of campuses and elements in campus design-relevant cases	1
1.5	Historical relevance and conceptual developments	1
1.6	Cases to discuss campus plans	1
MODULE II [6 hours]		
2.1	Design considerations for various types of spaces that are relevant while planning a large campus	1
2.2	Design considerations for various types of spaces that are relevant while planning a large campus – relevant example	1

2.3	Zoning in campus planning	1
2.4	Flexibility of space and other key aspects to be considered while designing a campus space	1
2.5	Space allocation, user behaviour - considerations while planning a large campus	1
2.6	Community engagement, financial considerations - while planning a large campus	1
MODULE III [8 hours]		
3.1	Need and types of services while designing a campus area - location, accessibility etc. user centric services, safety and security, information technology services, health and wellness services, transportation services etc	1
3.2	Design of services - location, accessibility etc. user centric services, safety and security, information technology services, health and wellness services, transportation services etc	1
3.3	Importance of pedestrian services and connectivity while designing campus	1
3.4	Importance of cultural and social interaction spaces etc	1
3.5	Types of recreation facilities, multipurpose spaces, inclusive design, sports facilities, recreation for all seasons, maintenance, community engagement, programs and events.	1
3.6	Relevant example	3
MODULE IV [6 hours]		
4.1	**Master plan preparation** Site study and analysis	1
4.2	Need for master plan preparation for campuses, steps involved in planning process	1
4.3	Vision and goal formulation, growth projection, project phasing and implementation.	1
4.4	Future expansion possibilities in campus planning.	1

4.5	Relevance of monitoring changes and growth in the campus	1
4.6	Example to discuss master plan	1
MODULE V[10 hours]		
5.1	National/international case study to understand facilities and services	5
5.2	National/international case study to comprehend master plan techniques.	5

CO ASSESSMENT SAMPLE QUESTIONS	
1	Discuss the relationship between site analysis and the master planning phase of campus development.
2	What role does stakeholder engagement play in the creation of a successful master plan for a campus?
3	Discuss the balance between aesthetics and functionality in campus planning and the challenges it presents.
4	Discuss the integration of technology and sustainability in the design of campus services.

23ARE805.6	Tourism & Environment	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

This course investigates the relationship between tourism and natural environments. The course also aims to enable students to develop an understanding of the positive and negative impacts of tourism and the importance of sustainability.

Prerequisite: Nil.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Comprehend the concepts of tourism and its development. [Understand level]
CO 2	Comprehend the importance of infrastructure in tourism development for a specific context. [Understand level]Z
CO 3	Analyze the emerging issues of tourism in the environment. [Analyze level]
CO 4	Apply the theory and process of sustainable tourism destination planning and concepts of tourism marketing. [Apply level]
CO 5	Appraise the relationship between architecture and tourism to preserve the original essence of the place and its culture. [Evaluate level]

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓				✓	✓				✓	
CO 2	✓	✓				✓	✓				✓	
CO 3	✓	✓				✓	✓				✓	
CO 4	✓	✓				✓	✓				✓	
CO 5	✓	✓				✓	✓				✓	

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓		✓	✓
Understand	✓	✓	✓	✓
Apply		✓	✓	
Analyze	✓	✓	✓	✓
Evaluate		✓	✓	
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I: Introduction to Tourism

Defining Tourism- Tourism as an Industry, factors that impact the industry; Classification of tourism; Tourism products, Characteristics of Tourism products. A brief history of tourism. Nature and growth of tourism-Global, India, and Kerala. Tourism and development – interrelationships between travel systems, food and lodging systems, and tourist attractions. Government involvement, tourism policy, and organizations.

MODULE II: Tourism Environment and Society

Tourism and natural environment. Mass tourism and environment.Carrying capacity. Environmental issues and tourism. Impacts on ecosystems-Impacts on wildlife, coastal areas, hill stations, backwaters, eco-sensitive areas, heritage sites, etc. Tourism impacts- Resource evaluation, Economic effects, socio-cultural effects, Physical effects.

MODULE III: Sustainable Tourism Development and Tourism Infrastructure

Need for sustainable tourism development. Eco-tourism, Sustainable tourism Sustainable tourist resorts/hotels-design principles. Tourism marketing - concept, techniques, and strategies. Tourism marketing and destination development; Branding, Product Life Cycle & Its Various Stages. Tourism Infrastructure- Definition and Classification. Accommodations- needs and choices- Traditional /modern; Hill resorts, Seaside resorts, Lake Side resorts, Houseboats, conventional hotels, etc..

MODULE IV: Tourism Architecture

Architecture and its contribution to tourism. Types of Architectural Tourism. Tourism and Resort architecture in Kerala, India, International - Case studies (its architecture, socio-economic and environmental impacts); Architectural sites for heritage and culture tourism; Natural and manmade landscapes for tourism

MODULE V: Case studies

Case studies - Case studies on different types of tourism- Domestic tourism, outbound tourism, Business tourism, Adventure tourism, cultural tourism, medical tourism, rural tourism, responsible tourism, culinary tourism, etc.

Textbooks

1. P.N Seth: Successful tourism Management (Vol. 1 & 2), Sterling Publishers, New Delhi
2. A.K Bhatia: International Tourism Management, Sterling Publishers, A.K Bhatia: Tourism Development: Principles and Practices, Sterling Publishers
3. Glare A. Gunn, Tourism Planning-Basics, Concepts, Cases, Taylor & Francis, London, 1994.
4. Goeldner, J. R. & Brent Ritchie, Tourism: Principles, Practices, Philosophies, John Wiley & Sons, 2009
5. Manoj Sharma, Tourism Infrastructure Development: Sustainable Approach, Kanishka Publishers, New Delhi, 2010

Reference books

1. Holden, A. 2016. Environment and Tourism, Routledge, New York.
2. Alen A. Lew & Michael Hall – 'A companion to Tourism', Blackwell Publishing.
3. Martin Opperman & Kye-Sung Chon-'Tourism in developing countries'
4. Roy A Cook, Laura.J Yale. 'Tourism the Business of Travel '.
5. Stephen .J Page- 'Tourism Management, Managing for Change', Elselver Publishers- New Delhi.
6. Sunil Gupta- 'Tourism towards 21st century'.
7. Anu Rowe, John D. Smith- 'Travel and Tourism, Cambridge press'.
8. P.C. Sinha- 'Tourism Management'.
9. Puspinder S. Gill- 'Dynamics of Tourism', Anmol Publishing Pvt Ltd
10. Salah Wahab- 'Tourism development and growth'

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1 [8 hours]	
1.1	Defining Tourism- Tourism as an Industry, factors that impact the industry	1
1.2	Classification of tourism	1
1.3	Tourism products, Characteristics of Tourism products	1
1.4	A brief history of tourism	1
1.5	Nature and growth of tourism- Global, India, and Kerala	1
1.6	Tourism and development – interrelationships between travel systems, food and lodging systems	1
1.7	Tourist attractions	1
1.8	Government involvement, tourism policy, and organizations	1

MODULE II [6 hours]		
2.1	Tourism and natural environment	1
2.2	Mass tourism and environment, Carrying capacity	1
2.3	Environmental issues and tourism	1
2.4	Impacts on ecosystems-Impacts on wildlife, coastal areas, hill stations, backwaters, eco-sensitive areas heritage sites, etc.	1
2.5	Tourism impacts- Resource evaluation, Economic effects	1
2.6	Tourism impacts- Socio-cultural effects, Physical effects	1
MODULE III [6 hours]		
3.1	Need for sustainable tourism development. Eco-tourism, Sustainable tourism	1
3.2	Sustainable tourist resorts/hotels-design principles	1
3.3	Tourism marketing - concept, techniques, and strategies	
3.4	Tourism marketing and destination development; Branding, Product Life Cycle and its Various Stages.	1
3.5	Tourism Infrastructure- Definition and Classification.	1
3.6	Accommodations- needs and choices- Traditional /modern; Hill resorts, Seaside resorts, Lake Side resorts, Houseboats, conventional hotels, etc.	1
MODULE IV [7 hours]		
4.1	Architecture and its contribution to tourism.	1
4.2	Types of Architectural Tourism.	1
4.3	Tourism and Resort Architecture in Kerala- Case studies (its architecture, socio-economic and environmental impacts)	1
4.4	Tourism and Resort Architecture in India- Case studies (its architecture, socio-economic and environmental impacts)	1
4.5	Tourism and Resort architecture: International - Case studies (its architecture, socio-economic and environmental impacts)	1
4.6	Architectural sites for heritage and culture tourism	1
4.7	Natural and manmade landscapes for tourism	1
MODULE V [9 hours]		
5.1	Case studies- Domestic tourism	1
5.2	Case studies- outbound tourism	1
5.3	Case studies- Business tourism	1
5.4	Case studies- Adventure tourism	1
5.5	Case studies- cultural tourism	1
5.6	Case studies- medical tourism	1
5.7	Case studies- rural tourism	1
5.8	Case studies- responsible tourism	1

5.9	Case studies- culinary tourism	1
CO Assessment Questions		
1	1. Differentiate between travel and tourism. 2. Define 'tourism products', Explain with examples the characteristics of tourism products and their impact on the environment. 3. Explain how tourism as an industry can boost the economy of the country.	
2	1. What is meant by mass tourism? 2. What is carrying capacity? How can carrying capacity be measured and managed in tourist destinations? Explain with examples. 3. Explain the diverse impacts of tourism on the natural environment.	
3	1. Enlist any five tourism marketing strategies. 2. Define Ecotourism. How is it different from sustainable tourism? Substantiate with suitable case examples. 3. What is the role of branding and marketing in the tourism industry? Explain some of the business and marketing strategies used nowadays to attract and retain tourists. 4. Write a short note on the houseboat industry of Kerala. 5. Elaborate the need for accommodation in tourist destinations. What are the different types of accommodation, and how are they categorised?	
4	1. What are the different types of architectural tourism? 2. Explain the role of traditional architecture in promoting heritage tourism. Cite a suitable example. 3. Describe the dynamics of tourism and resort architecture in Kerala. How is it affecting the architectural scenario of Kerala? 4. Elaborate with suitable examples, the role of architecture in the tourism industry.	
5	1. Write short notes on domestic and outbound tourism 2. Briefly describe cultural tourism 3. What are the unique characteristics of business tourism? Explain with a case example. 4. Examine the key features and benefits of responsible tourism as a sustainable approach to tourism development. Substantiate with a case example.	

23ARE805.7	ARCHITECTURE OF SOUTH EAST ASIA	L	T	P	S	C	YearofIntroduction
		2	0	1	3	3	2023

Preamble:

The Architecture of Southeast Asia course explores the rich and diverse architectural heritage of the region. Through an interdisciplinary approach, students will examine historical, cultural, and environmental influences on the architecture of various Southeast Asian countries. The course aims to foster an appreciation for the region's unique architectural expressions and to understand the socio-cultural context in which they were created.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Demonstrate a comprehensive understanding of the historical, cultural, and geographical context of Southeast Asian architecture
CO2	Recognize the significance of vernacular and traditional building techniques in Southeast Asian communities
CO3	Gain insights into the role of religion in shaping Southeast Asian architecture
CO 4	Evaluate the urban development of Southeast Asian cities and the impact of colonial powers on the region's architecture.
CO5	Analyze sustainable design practices and green technologies in Southeast Asian architecture

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓		✓		✓				✓		✓
CO2		✓		✓		✓				✓		✓
CO3		✓		✓		✓				✓		✓
CO 4		✓		✓		✓				✓		✓
CO5		✓		✓		✓	✓			✓		✓

Assessment Pattern

Bloom'sCategory	ContinuousAssessmentTools			EndSemesterExamination
	Test1	Test2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply			✓	✓
Analyse	✓	✓		✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			TotalMarks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Introduction to Southeast Asian Architecture

Overview of Southeast Asia: Geography, climate, and cultural diversity. Historical development of architecture in the region; Diversity of architectural styles; Architecture of Angkor in Cambodia, Borobudur in Indonesia, and Ayutthaya in Thailand. Key influences and factors shaping Southeast Asian architecture.

MODULE II

Vernacular Architecture and Traditional Building Techniques

Study of traditional building techniques and materials. Case studies of vernacular architecture in different countries. Relationship between vernacular architecture and environmental considerations. Stilt houses, longhouses, and courtyard residences – sense of community and identity

MODULE III

Religious Architecture in Southeast Asia

Examination of Buddhist, Hindu, Islamic, and other religious architectural styles. Impact of religious beliefs on architectural form and function.

Temples, mosques, churches, and pagodas; Angkor Wat, mosques of Malaysia – architectural vocabulary, ornamentation, symbolism in religious structures; Cultural significance and religious practices

MODULE IV

Urban Development and Colonial Architecture

Exploration of European colonial architecture in Southeast Asia. Post-colonial architectural development and modernization. The impact of globalization on contemporary architectural styles. Transformation of Southeast Asian cities, Heritage Sites, adaptive reuse and preservation of historical architecture in contemporary settings, Evolution of cities like Singapore, Manila, and Yangon.

MODULE V

Case Studies

Case studies on Angkor, Cambodia; Borobudur, Indonesia; Ayutthaya, Thailand; Stilt houses, longhouses, and courtyard residences; religious architectural styles of South East Asia; Post-colonial architectural styles; Heritage sites and its preservation; Innovative design approaches in the region, use of renewable materials and green technologies

Reference books

1. "Architecture of Southeast Asia: Through Travelers' Eyes" by Roxana Waterson
2. "Southeast Asian Architecture: A Selection" by Robert Powell
3. "Traditional Buildings of Southeast Asia" by Robert Powell and Robert Stonor
4. "The Art and Architecture of Thailand: From Prehistoric Times through the Thirteenth Century" by Hiram W. Woodward Jr.
5. "Angkor: Cambodia's Wondrous Khmer Temples" by Dawn F. Rooney
6. "Indonesian Houses: Tradition and Transformation in Vernacular Architecture" by Elizabeth Brewster

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Geography, climate, and cultural diversity of Southeast Asia	1
1.2	Historical development of architecture in the region	1
1.3	Historical development of architecture in the region; Angkor in Cambodia.	1

1.4	Historical development of architecture in the region; Borobudur in Indonesia.	1
1.5	Historical development of architecture in the region; Ayutthaya in Thailand.	1
1.6	Key influences and factors shaping Southeast Asian architecture.	1
MODULE II [6 hours]		
2.1	Study of traditional building techniques and materials used in different regions	1
2.2	Analysis of vernacular architecture in rural and urban contexts	1
2.3	Case studies of vernacular architecture in different countries	1
2.4	Relationship between vernacular architecture and environmental considerations.	1
2.5	Stilt houses, and longhouses	1
2.6	Courtyard residences	1
MODULE III [6 hours]		
3.1	Examination of Buddhist, Hindu architectural styles.	1
3.2	Examination of Islamic, and other religious architectural styles.	1
3.3	Impact of religious beliefs on architectural form and function	1
3.4	Temples, mosques; Angkor Wat, mosques of Malaysia	1
3.5	Churches, and pagodas;architectural vocabulary, ornamentation, symbolism in religious structures	1
3.6	Cultural significance and religious practices associated with the structures	1
MODULE IV [10 hours]		
4.1	Exploration of European colonial architecture in Southeast Asia and influence of colonial powers on the region's architecture	1
4.2	Influence of colonial powers on the region's architecture	1
4.3	Post-colonial architectural development and modernization	1
4.4	Urban planning and development in Southeast Asian cities	1
4.5	The impact of globalization on contemporary architectural styles.	1

4.6	Study of contemporary architectural trends in Southeast Asia. Sustainable design principles and innovations in the region's architecture	1
4.7	Evolution of cities like Singapore, Manila, and Yangon.	1
4.8	Analysis of colonial-era buildings and their adaptive reuse in contemporary contexts	1
4.9	Heritage Sites and its preservation	1
4.10	Innovative design approaches in the region, use of renewable materials and green technologies	1
MODULE V [8 hours]		
5.1	Case studies on Angkor, Cambodia; Borobudur, Indonesia; Ayutthaya, Thailand	2
5.2	Case studies on Stilt houses, longhouses, and courtyard residences	2
5.3	Case studies on religious architectural styles of South east Asia	2
5.4	Case studies - Innovative design approaches in the region, use of renewable materials and green technologies	2

CO ASSESSMENT SAMPLE QUESTIONS	
1	How does the diverse geography and climate of Southeast Asia influence architectural design and construction methods? Provide examples of buildings that demonstrate a sensitivity to local climate conditions.
2	How have vernacular and traditional building techniques in Southeast Asia evolved over centuries, and what historical factors have influenced their development?
3	Explain the role of religious beliefs (Buddhism, Hinduism, Islam, etc.) in shaping the architectural styles of temples, mosques, and other religious structures in Southeast Asia. Provide specific examples.
4	Discuss the role of colonial powers in shaping the modernization and urbanization of Southeast Asian cities. How did colonial influences contribute to changes in city planning, infrastructure, and architecture?

23ARE805.8	SERVICES IN HIGH RISE BUILDINGS	L	T	S	P	C	Year of Introduction
		2	0	1	3	3	2023

Preamble: This course aims to provide students with a comprehensive understanding of the various building services and systems essential for high-rise buildings. It covers topics such as vertical transportation, HVAC (Heating, Ventilation, and Air Conditioning), plumbing, electrical systems, security and communication specific to tall structures. The course will enable students to accommodate the required services and service integration principles in their early design stages.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to:

CO1	Develop a comprehensive understanding of the fundamental design parameters and regulatory aspects specific to high-rise constructions.
CO2	Comprehend structural concepts and plan for effective integration of vertical mobility within tall structures.
CO3	Demonstrate essential knowledge and skills in the design of HVAC, plumbing, electrical systems, security and communication systems specific to high-rise constructions.
CO4	Apply design concepts and service integration principles acquired throughout the course in the design of high-rise buildings.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓						
CO2	✓	✓		✓								
CO3	✓	✓		✓								
CO4	✓	✓	✓	✓	✓		✓			✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply				
Analyze	✓	✓	✓	✓
Evaluate				
Create				

Assessment tools: Case studies for services in high rise buildings

	Attendance	Theory [L- T]	Total

Course Structure [L-T-S]		Assignment	Test-1	Test-2/ Portfolio/ Viva	Marks
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	
	Total Marks: 20	Total Marks: 40	Total marks: 60

SYLLABUS

MODULE I: Introduction to high-rise buildings and its planning

High-rise buildings and the logic of vertical density; zoning regulations and land use planning for vertical growth; classification of services and selection of services in buildings; sustainable concepts in tall building service design; service integration, building automation and intelligent building concepts.

Structural concepts - classification of structural systems for high-rise buildings; structural systems and load-bearing strategies for tall buildings; structural failures in high-rise buildings.

Circulation - Types of vertical circulation systems in high-rise buildings, design, planning of vertical circulation systems, zoning of floors in vertical circulation design for high-rise occupancies, Elevator trip design principles, Lobby and break out area planning criteria.

MODULE II: Ventilation and HVAC systems

Natural ventilation for sustainable high-rise buildings - strategies for maximizing natural ventilation in high-rise structures

Heating ventilation and air conditioning (HVAC) - principles of HVAC system design for high-rise buildings, planning and design criteria for efficient HVAC integration, Types of HVAC systems suited for tall structures, criteria for planning air-conditioning plants, load estimation in high-rise buildings, requirements of

ventilation in various occupancies as per available national codes.

MODULE III: Plumbing service and fire safety

Water supply - Types of plumbing systems, plumbing systems in high-rise buildings, plumbing system design, Pressure distribution system, Pipe sizing concepts, Resource efficiency in plumbing design.
Drainage systems - Types of drainage systems for high-rise buildings, Design basics for drainage and waste disposal systems, requirements of plumbing and drainage as per available national codes.

Fire safety services - General principles for designing fire safety systems in high-rise buildings, general requirements of fire resistance in buildings as per national building laws, zoning and planning criteria for fire safety and evacuation based on occupant loads, exit widths and travel distance, general components of fire detection and fire extinguishing systems for high-rise buildings, Fire resistance criteria for different building zones and construction elements, Fire lift, emergency and evacuation provisions, Requirements of fire safety measures as per available national codes.

MODULE IV: Lighting and electrical services, Security, surveillance, public address and communication systems.

Lighting - Planning of lighting zones and distribution of illumination, lighting quality, daylight integration, automation in lighting design, energy efficiency in lighting system design.
Electrical system - Electrical distribution system and its components, planning criteria for the electrical network for high-rise occupancies, earthing and lightning protection
Security surveillance and public address system - Components of security planning and perimeter protection, Access control planning and access surveillance, Components of closed-circuit surveillance system, CCTV placement and coverage strategies, biometric system and access automation, automation for enhanced security and efficiency in high-rise buildings, public address system, components of public address and communication in multi-occupancy vertical planning, communication lines, telephones and IT networks

MODULEV: Case studies

Relevant Case studies for Ventilation, HVAC systems, Plumbing service, fire safety, Lighting and electrical services, Security, surveillance, public address and communication systems services

Reference books

1. V. K. Jain, Designing and Installation of Services in High Rise Building Complexes, Khanna Publishers 2000.
2. Basem M.M., Mechanical and Electrical Services for High Rise Buildings: Handbook, 2014, CreateSpace.
3. Nigel Clark and Bill Price, Tall Buildings: A Strategic Design Guide, RIBA & BCO, 2016.
4. National Building Code of India 2016 (NBC 2016)
5. 2016 ASHRAE Handbook—HVAC Systems and Equipment
6. Walter T. Grondzik, Alison G. Kwok, 'Mechanical and Electrical equipment for buildings', John Wiley and sons Inc., N.Y.
7. A.K. Mittal, 'Electrical And Mechanical Services In High Rise Building: 5. 5.

Design And Estimation Manual: Including Green Buildings', CBS Publishers & Distributors
8. Adler R., Vertical Transportation for Buildings, American Elsevier Publishing Company, 1970, New York.
9. Huntington W. C., Building Construction, John Wiley, 1959, New York.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. ofHours [36 hours]
MODULE 1 [6 hours]		
1.1	High-rise buildings and the logic of vertical density, Zoning regulations and land use planning for vertical growth, objectives, relevance, and scope of services in high-rise buildings	1
1.2	Classification of services and selection of services in buildings, Sustainable concepts in tall building service design; Service integration	1
1.3	Building automation and intelligent building concepts	1
1.4	Classification of structural system for high-rise buildings, Structural systems and load-bearing strategies for tall buildings, Structural failures in high-rise buildings	1
1.5	Circulation planning - Types of vertical circulation systems in high-rise building design; Planning of vertical circulation system, Zoning of floors in vertical circulation design for high-rise occupancies	1
1.6	Elevator trip design principles, Lobby and break out area planning criteria.	1
MODULE II [6 hours]		
2.1	Natural ventilation for sustainable high-rise buildings, Strategies for maximizing natural ventilation in high-rise structures, and case studies	1
2.2	Heating ventilation and air conditioning (HVAC) - Principles of HVAC system design for high-rise buildings; design and criteria	1
2.3	Types of HVAC systems suited for tall structures	1
2.4	Criteria for planning air-conditioning plants, load estimation in high-rise buildings	1
2.5	Requirements of ventilation in various occupancies as per available national codes.	1
2.6	Relevant example to discuss load, components and distribution network	1
MODULE III [8 hours]		
3.1	Water supply - Types of plumbing systems, principles of	1

	plumbing system design	
3.2	Pressure distribution system, pipe sizing concepts, resource efficiency in plumbing design.	1
3.3	Drainage systems - Types of drainage systems for high-rise buildings, Design basics for drainage and waste disposal systems	1
3.4	Requirements of plumbing and drainage as per available national codes	1
3.5	Fire safety services - General principles for designing fire safety systems in high-rise buildings, fire resistance in buildings as per national building laws	1
3.6	Zoning and planning criteria for fire safety and evacuation based on occupant loads, exit widths and travel distance; Fire resistance criteria for different building zones and construction elements,	1
3.7	General components of fire detection and fire extinguishing systems for high-rise buildings	1
3.8	Fire lift, emergency and evacuation provisions, Requirements of fire safety measures as per available national codes	1
MODULE IV [8 hours]		
4.1	Lighting - Planning of lighting zones and distribution of illumination, Lighting quality, daylight integration	1
4.2	Automation in lighting design, Energy efficiency in lighting system design.	1
4.3	Electrical system - Electrical distribution system and its components, Planning criteria for the electrical network for high-rise occupancies	1
4.4	Earthing and lightning protection, Emergency exit and evacuation system	1
4.5	Security surveillance - Components of security planning and perimeter protection, Access control planning and access surveillance	1
4.6	Components of closed-circuit surveillance system; CCTV Placement and Coverage Strategies, Biometric system and access automation, Automation for Enhanced Security and Efficiency in High-Rise Buildings	1
4.7	Public address system, Components of public address and communication in multi-occupancy vertical planning, Communication lines, telephones and IT networks.	1
4.8	Relevant example to discuss electrical network and security systems	1
MODULE V [8 hours]		
5.1	Case studies for Ventilation, HVAC systems,	2

5.2	Case studies Plumbing service, fire safety	3
5.3	Case studies Lighting and electrical services, Security, surveillance, public address and communication systems services	3

CO Assessment Sample Questions	
CO 1	1) Discuss in detail the fundamental design parameters to be considered in structural integrity, safety, and functionality of the high-rise construction. 2) Elaborate on the key regulatory aspects and codes that govern high-rise constructions, highlighting their significance in achieving compliance and mitigating potential risks.
CO 2	1) Explain the fundamental structural concepts that are crucial for the design and construction of tall structures. 2) Discuss how considerations such as load distribution, material selection, and dynamic forces play a role in ensuring the structural stability and integrity of a high-rise building.
CO 3	1) Discuss the challenges unique to tall buildings and how your design addresses issues such as air distribution, energy efficiency, and climate control with suitable examples.
CO 4	1) Discuss how you would integrate technology to enhance building automation, energy management, and user experience. 2) Explain various smart building technologies with examples and explain their role in creating a technologically advanced and efficient high-rise environment.

23ARE805.9	ENERGY CONSCIOUS ARCHITECTURE	L	T	P	S	C	YearofIntroduction
		2	0	1	3	3	2023

Preamble:

The course "Energy conscious architecture" is designed to provide architecture students with a fundamental understanding of energy conscious and energy efficient buildings in architecture. In the face of a crisis of depleting resources the aim is to familiarize the student with passive design consideration for different climatic conditions and the use of Solar energy in buildings. Through a multidisciplinary approach, this course will explore the energy codes, principles, strategies, and practices involved in creating sustainable and energy efficient urban environment.

Prerequisite: Familiarity with energy codes, passive design considerations, and energy evaluation techniques. Basic knowledge of energy sources, climatic conditions, and the need of energy conscious architectural buildings in urban environment.

Course Outcomes: After the completion of the course the student will be able to

CO1	Understand the different sources of energy, global climatic conditions and suitable forms of architecture.
CO2	Understand the need for energy efficiency in architecture, familiarizing energy codes and analyzing climate based design strategies
CO3	Comprehend passive design considerations, the building envelope and importance of adopting various techniques in energy conservation.
CO 4	Comprehend energy evaluation techniques that prioritize energy saving opportunities.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓					✓					
CO2		✓	✓	✓	✓		✓	✓				
CO3		✓	✓	✓	✓		✓					
CO 4		✓	✓	✓	✓		✓					

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate				
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions with one question from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: [40 marks]	

SYLLABUS

MODULE I

Architecture and Energy

Solar System and Earth - Concept of conventional, non- conventional, renewable, non- renewable energy sources - Global Climates and Architecture in Historic Perspective - Contemporary Trends - Sustainability and Architecture-Energy consumption of buildings in India; Need of energy efficient building in India.

Building envelope components- wall, roof, floor, door, and window & skylight. Role of building envelope in design for Energy efficiency.

MODULE II

Energy Codes and climate based design strategies

LEED, GRIHA, NBC, Indian Energy scenario- Bureau of Energy Efficiency- ECBC rules- Kerala Energy scenario- Energy efficient buildings in Kerala context- Role of designing according to the climate- Passive, active and hybrid systems of thermal

comfort- Relation between climatically responsive buildings and Energy efficient buildings- Concept of human comfort- Factors influencing human comfort.

MODULE III

Solar energy and buildings

Solar geometry and built form – Various techniques of shading to reduce heat gain in tropical climate. Various methods of maximising exposure to solar radiation in cold & temperate climate. Heating & cooling loads – Energy conservation methods – Efficient day lighting.

Built environment- Passive Environmental control mechanisms- Factors influencing thermal comfort- Passive design of buildings- Design considerations for shelter in the tropics- Basic needs of shelter in different climates- Shelter for hot- dry, warm-humid, composite climates- Form, planning, layout, specification for walls and roofs, effects of special characteristics of site like water body, vegetation, etc- Orientation, openings and ventilation.

MODULE IV

Energy Assessment

Concept of embodied energy- Transportation energy- Life cycle energy- Total energy assessment in buildings- Energy Audit- Energy efficient lighting- Energy efficient active systems

MODULE V

Case studies and simulation/ modeling of spaces for energy efficiency

Reference books

1. Watson Donald, 'Climatic Design: Energy Efficient Building Principles & Practices", Mc Graw Hill Book company, New York, 1983.
2. Sophia and Stefan Behling, Solpower, the Evolution of Solar Architecture, Prestel, New York, 1996
3. Givonji B., "Man, Climate and Architecture", Elsevier, Amsterdam, 1986.
4. Bansal Naveendra K., Hauser Gerd and Minke Gernot, "Passive Buildings Designs: Handbook of Natural Climatic Control", Elsevier Science, Amsterdam 1997.
5. Baker Nick and Steemers Koen, "Energy and environment in Architecture", E & FN, Spon. London, 1999.
6. Annual Reports, Ministry of Non- Conventional Energy Sources, Government of India, New Delhi.
7. Energy Conservation Building Code 2017.
8. GRIHA V. 2019, Volume 1
9. Climatically Responsive Energy Efficient Architecture, PLEA/SPA, New Delhi – 1995.

10. Ms.Sudha, N.K.Bansal and M.A.S.Malik – Solar Passive Building – Pergamon Press.
11. Brown, G Z, Sun, Wind and Light: Architectural design strategies, John Wiley, 1985.
12. Energy Simulation in Building Design, by J. Clarke Computerized Building Energy Simulation Handbook, by Waltz and Waltz
13. Green Building Guidelines: Meeting the Demand for Low-Energy, Resource Efficient

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Solar System and Earth – Concept of conventional, non-conventional, renewable, non- renewable energy sources	1
1.2	Global Climates and Architecture in Historic Perspective	1
1.3	Contemporary Trends – Sustainability and Architecture	1
1.4	Energy consumption of buildings in India; Need of energy efficient building in India.	1
1.5	Building envelope components- wall, roof, floor, door, and window & skylight.	1
1.6	Role of building envelope in design for Energy efficiency.	1
MODULE II [5 hours]		
2.1	LEED, GRIHA, NBC, Indian Energy scenario- Bureau of Energy Efficiency- ECBC rules	1
2.2	Kerala Energy scenario- Energy efficient buildings in Kerala context.	1
2.3	Energy scenario- Energy efficient buildings globally with LEED ratings	1
2.4	Role of designing according to the climate- Passive, active and hybrid systems of thermal comfort.	1

2.5	Relation between climatically responsive buildings and Energy efficient buildings- Concept of human comfort- Factors influencing human comfort.	1
MODULE III [8 hours]		
3.1	Solar geometry and built form – Various techniques of shading to reduce heat gain in tropical climate.	1
3.2	Various methods of maximizing exposure to solar radiation in cold & temperate climate.	1
3.3	Heating & cooling loads – Energy conservation methods – Efficient day lighting.	1
3.4	Passive Environmental control mechanisms- Factors influencing thermal comfort- Passive design of buildings	1
3.5	Design considerations for shelter in the tropics- Basic needs of shelter in different climates- Shelter for hot- dry climate	1
3.6	Design considerations for shelter in the tropics- Basic needs of shelter in different climates- Shelter for warm- humid climate	1
3.7	Design considerations for shelter in the tropics- Basic needs of shelter in different climates- Shelter for composite climates	1
3.8	Form, planning, layout, specification for walls and roofs, effects of special characteristics of site like water body, vegetation, etc- Orientation, openings and ventilation.	1
MODULE IV [5 hours]		
4.1	Concept of embodied energy with respect to buildings – Transportation energy	1
4.2	Concept of embodied energy- Life cycle energy	1
4.3	Total energy assessment in buildings- Energy Audit	1
4.4	Energy efficient lighting	1
4.5	Energy efficient active systems	1
MODULE V [12 hours]		
5.1	Case study on strategies and practices of Sustainability in Indian Architecture with respect to energy conscious architecture	3

5.2	Case Study on the Impact of Building Envelope on Energy Efficiency in High-Rise Buildings	3
5.3	Case study on Energy efficient buildings in Kerala context.	2
5.4	Case study on Various techniques of shading to reduce heat gain in tropical climate. Case study on design considerations for shelter in the tropics	1
5.5	Case study on Passive design of buildings - its Form, planning, layout, specification for walls and roofs, effects of special characteristics of site like water body, vegetation, etc- Orientation, openings and ventilation	1
5.6	Case study on techniques used in total energy assessment in buildings	1
5.7	Modeling of a space for thermal comfort	1

CO ASSESSMENT SAMPLE QUESTIONS	
1	Discuss the conventional and non-conventional sources of energy. Illustrate various forms of architecture influenced by the climatic conditions and available sources of energy.
2	Identify strategies adopted in various parts of the world to cater to the energy conditions in buildings. Discuss with relevant examples.
3	Explain the passive methods of heat control in buildings. How does it influence the energy efficiency in a building?
4	Discuss the energy saving methods that can be adopted in buildings. Discuss the energy assessment methods in practice.

SEMESTER 9

23ARS901	ARCHITECTURAL DESIGN- VII	L	T	P	S	C	Year of Introduction
		0	0	12	12	12	2023

Preamble:

The course "Architectural Design VII" intends that the students learn design for public spaces through large scale architectural projects by examining the life and structure of the precinct, its historic, ecological, social, cultural, political and economic relevance with the city and develop the ability to bring together technically competent skills and knowledge to make meaningful and creative designs that address the varied urban problems faced by our cities. Studio exercises involve large public projects (public projects could be cultural complexes, trade/exhibition centres, large shopping malls, market places, crafts bazaars, transport hub, sports village, entertainment parks, townships, etc.).

The objective of the Course is to look at Urban design as 'large scale architecture', analyse the site-level issues and to generate probable design solutions and enable the student to look up the complexities and larger context of the precinct, read the subtle nuances of the fabric enabling the student to reach suitable conclusions, to design in the context. The student learns to generate probable design solutions integrating the larger ecological, sociocultural, political and economic dynamics of the urban landscape/precinct delineated/identified for the design intervention. The learning should effectively support designing large-scale projects in varied scales in the urban realm.

Prerequisite: Architectural Design VI

Course Outcomes: After the completion of the course the student will be able to

CO1	To enable the student to look up on the complexities and larger context of the precinct and read the subtle nuances of the fabric enabling the student to reach suitable conclusions to design in the context.
CO2	Analyse and identify the issues/ conflicts related to the urban context
CO3	To generate probable design solution integrating the larger ecological, sociocultural, political and economic dynamics of the urban landscape/precinct delineated / identified for the design intervention.
CO4	To encourage innovative and interdisciplinary solutions integrating socio spatial and cultural dimensions.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓	✓	✓	✓		✓	✓		✓
CO2	✓	✓		✓		✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓		✓	✓		
CO4	✓		✓			✓	✓	✓	✓	✓		

Assessment Pattern			
Bloom's Category	**Continuous Assessment Tools**		**End Semester Examination**
	Reviews	**Other tools**	
Remember	✓	✓	✓
Understand	✓	✓	✓
Apply	✓	✓	✓
Analyse	✓	✓	✓
Evaluate	✓	✓	✓
Create	✓	✓	✓

Assessment tools: Site study and analysis, urban issues and potentials, structure plan, detailed design

Mark Distribution of CIA

Course Structure [L-T-P]	**Attendance**	**Studio [P]**	**Total Marks**
		Project	
	10	90	**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**Jury (Marks)**	**ESE Duration**
200	100	100	Jury

End Semester Examination [ESE]:
ESE will be the portfolio evaluation by a panel of jury members.

SYLLABUS

MODULE I

Introduction of the public project:
City/precinct and primary studies at multiple scales (public projects could be cultural complexes, trade/exhibition centres, large shopping malls, market places, crafts bazaars, transport hub, sports village, entertainment parks, townships, etc.)

Preparation of Architectural design programme with area requirements after comparative analysis of case studies, building regulations & design standards.

MODULE II

Understanding the precinct:
Data collection through primary & secondary studies to understand the existing conditions in a precinct selected. Preparation of maps & study model for analysis of various dimensions of the city like history, culture. ecology, morphology, housing, infrastructure & transportation etc.

MODULE III

Site /Precinct level analysis and Vision
Identify potentials and issues of the precinct through SWOT Analysis, arriving at inferences, preparation of existing structure plan. Vision, goals & objectives for the precinct based on the studies done. Preparation of proposed structure plan with design interventions.

MODUL IV

Urban Design Scheme and Architectural Intervention
Preparation of Architectural design programme with area requirements after comparative analysis of case studies, building regulations & design standards. Architectural design: Conceptual design development. Preparation of building plans, sections, elevations, service details, 3D views, models etc.

Reference books:

1. BIS, Various Codes of Practice and National Building Code of India.
2. Kerala Municipal Building Rules
3. Watson, et. al, "Time Saver Standards for Urban Design", McGraw Hill
4. URDPFI Guidelines, Ministry of Urban Development, Government of India
5. Ian MC Harg "Design with Nature"
6. Steiner, "Planning and Urban Design Standards
7. Ghel, J "Life between Buildings"
8. Carmona et.al "Public Places, Urban Spaces: The Dimensions of Urban Design"
9. Moughtin et.al "Urban Design Methods and Techniques"
10. Tata McGraw Hill Education Private limited, "Time Saver Standards, Urban Design"

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [144 hours]
	MODULE I [18hours]	
1.1	City/precinct and primary studies at multiple scales (public projects could be cultural complexes, trade/exhibition centres, large shopping malls, market places, crafts bazaars, transport hub, sports village, entertainment parks, townships, etc.)	6
1.2	Preparation of Architectural design programme with area requirements after comparative analysis of case studies	6
1.3	Building regulations & design standards.	6
	MODULE II [30hours]	
2.1	Data collection through secondary studies to understand the existing conditions in a precinct selected.	6
2.2	Studyof various dimensions of the city like history, culture. ecology, morphology, housing, infrastructure & transportation etc.	6
2.3	Focus on analyzing the history, culture, and ecology of the precinct.	6
2.4	Site visit and data collection through primary studies to understand the existing conditions in a precinct selected	6

2.5	Mapping of data collection to understand the existing conditions in a precinct selected	6
MODULE III (24 hours]		
3.1	Perform site and precinct-level analysis.	6
3.2	Identify potentials and issues through SWOT Analysis.	6
3.3	Develop an existing structure plan.	6
3.5	Propose structure plans	6
MODULE IV [72 hours]		
4.1	Focus on conceptual design development.	12
4.2	Schematic Design	12
4.6	Create building plans, sections, elevations, service details, 3D views, and models.	24
4.7	Presentation drawing on Architectural Design proposals	24
CO Assessment Sample Questions/ Methods		
CO1	1. Mapping and documentation of Study Area (Secondary study) • Mapping of study area • Macro and micro study of the city • Conducting surveys for primary study • Understanding the city through secondary data. • Analysis of layers & convert mapping into sheets with supporting sketches 2. Mapping and documentation of Site Area (Primary study) • Mapping of Site area • Understanding the urban design layers through primary study • Conducting surveys for primary study • Analysis of layers & convert mapping into sheets with supporting sketches	
CO2	3. Analysis of the precinct study • SWOT Analysis • Issue mapping • Overlays • Existing Structure plan.	
CO3	4. Create Vision and Structure Plan • Vision, Objectives and Goals • Structure Plan with urban design interventions	
CO4	6. Architectural Scheme and Design • Case studies as best practices (Architectural design level) • Architectural designs of selected built structures • Detailing of micro-level design elements • Preparation of Presentation sheets.	

23ARP905	PROJECT MANAGEMENT	L	T	P	S	C	Year of Introduction
		3	0	0	3	3	2023

Preamble:

The course aims to provide the students with the knowledge and abilities necessary for project management, with a focus on construction project management, so they may learn how to manage projects while addressing organizational, technical, financial, human resource, safety, and quality concerns.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Showcase the procedure of project initiating phase. [Apply level]
CO 2	Demonstrate the use of project scheduling techniques. [Apply level]
CO 3	Show how to plan project's resources. [Applylevel]
CO 4	Discusssafety management in construction.[Understanding level]
CO 5	Illustrate modern tools and techniques in construction project management.[Apply level].

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	✓							✓	
CO 2	✓	✓	✓	✓							✓	
CO 3	✓											
CO 4	✓											
CO 5	✓				✓							

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze				
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L-T]			Total Marks
		Assignment	Test-1	Test-2	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	Part A contains 5 questions with 1 question from each module, having 4 marks for each question. Students should answer all the questions. Marks: (5x4 = 20 marks)	Part B contains 10 questions with 2 questions from each module, of which the student should answer any one. Each question carries 8 marks. One or two questions can have subdivisions. Marks: (5x8 = 40 marks)	60
	Total Marks: 20	Total Marks: 40	

SYLLABUS
MODULE I: Introduction to Project Management
Overview of project management, including its purpose, scope, and goals. Project stakeholders, project phases, project organization. Scientific approach to project management. The objectives and responsibilities of the construction management team and the construction managers. Summary of scheduling, monitoring, and controlling the phases of the project management cycle. Conducting feasibility assessments for projects.
MODULE II: Legal Aspects of Construction Contracts
Definition and types of construction contracts, their purpose, merits, and demerits. Essentials of an executable contract. Tendering and contract awarding procedures. Basics of Contract Law and other relevant acts. Alternate Dispute Resolution procedures being used in construction projects.
MODULE III: Planning and Scheduling Construction Projects
An overview of time management. Basics of Work breakdown structure (WBS). Introduction to construction scheduling techniques - Bar chart / Gantt chart, Critical Path Methods (CPM) - creation of network, network analysis, and findings. Fundamentals and application of PERT.
MODULE IV: Resource Management
An overview of the five resources for planning and scheduling. Allocation of resources – resource smoothing and levelling. Concept of materials management – planning and control of inventory. Planning of machinery for construction projects. Project cost and budget. Cost – benefit analysis of construction projects. Time – cost tradeoffs. Project Crashing or accelerating a project and its downstream effects. Safety management in construction projects.
MODULE V: Modern tools and methods
Computerization and its advantages. Integrated Project management information system. Project management software like Project Libre or Microsoft Project or similar and their use. Application of BIM in project management. Role of AI in project management. Digital twin and its application in project management. Students are

expected to do any one project management task using modern tools and methods under the guidance of experts from the industry.

Reference books

1. Harris, R. B. (1978). Precedence and Arrow Networking Techniques for Construction. John Wiley & Sons, INC.
2. Krishnamurthy, & Ravindra. (2017). Construction and Project Management (Second). CBS Publishers and Distributors Pvt Ltd.
3. Punmia, B., & Khandelwal, K. (2019). Project Planning and Control with PERT and CPM (Fourth). Trinity Press.
4. Singh, H. (2017). Construction Project Management (Second). Abhishek Publications.
5. Srinath, L. (2015). PERT and CPM Principles and Applications. (Third). Affiliated East-West Press Pvt Ltd.

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36 hours]
	MODULE 1[3 hours]	
1.1	Overview of project management, including its purpose, scope, and goals. Project stakeholders, project phases, project organization.	1
1.2	Scientific approach to project management. The objectives and responsibilities of the construction management team and the construction managers.	1
1.3	Summary of scheduling, monitoring, and controlling the phases of the project management cycle. Conducting feasibility assessments for projects.	1
	MODULE II [6 hours]	
2.1	Definition and types of construction contracts, their purpose, merits, and demerits.	1
2.2	Essentials of an executable contract.	1
2.3	Tendering and contract awarding procedures.	1
2.4	Tendering and contract awarding procedures.	1
2.5	Basics of Contract Law and other relevant acts.	1
2.6	Alternate Dispute Resolution procedures being used in construction projects.	1
	MODULE III [9 hours]	
3.1	An overview of time management. Introduction to Basics of Work breakdown structure (WBS). Learning exercise for creating WBS.	1

3.2	Introduction to construction scheduling techniques - Bar chart / Gantt chart. Exercise on creating a bar chart or Gantt chart.	1
3.3	Critical Path Methods (CPM) - creation of network using AOA diagramming method.	1
3.4	Exercise - network analysis, and findings.	1
3.5	Critical Path Methods (CPM) - creation of network using AON diagramming method.	1
3.6	Exercise - network analysis, and findings.	1
3.7	Fundamentals of PERT – activity and network assumptions.	1
3.8	Recalling the normal curve and fundamental statistical techniques. Creation of PERT network. Calculating time values, variance, and probability factor.	1
3.9	Exercise on PERT Network analysis and findings.	1
MODULE IV [9 hours]		
4.1	An overview of the five resources for planning and scheduling.	1
4.2	Allocation of resources – resource smoothing and levelling.	1
4.3	Concept of materials management – planning and control of inventory.	1
4.4	Economic order quantity, Safety stock and ABC analysis.	1
4.5	Planning of machinery for construction projects.	1
4.6	Project cost and budget.	1
4.7	Cost – benefit analysis of construction projects. Time – cost tradeoffs.	1
4.8	Project Crashing or accelerating a project and its downstream effects.	1
4.9	Safety management in construction projects.	1
MODULE V [9 hours]		
5.1	Computerization and its advantages.	1
5.2	Integrated Project management information system.	1
5.3	Project management software like Project Libre or Microsoft Project or similar and their use.	1

5.4	Application of BIM in project management.	1
5.5	Role of AI in project management.	1
5.6	Digital twin and its application in project management.	1
5.7	Project management task using modern tools and methods under the guidance of experts from the industry.	1
5.8	Project management task using modern tools and methods under the guidance of experts from the industry.	1
5.9	Project management task using modern tools and methods under the guidance of experts from the industry.	1

CO Assessment Sample Questions

1	Demonstrate the procedure of awarding contract for a 1BHK residential building proposed to be built at Kollam, through a process of competitive bidding.
2	If the following are the data and PERT times (in days) for the activities of a project; then (i) Draw the network diagram, (ii) Determine the critical path, (iii)Find the project duration, (iv) Calculate the project variance, and (v) Find out the probability of completing the project in 120 days.
3	Define what is ABC analysis of inventory. Explain how ABC analysis helps to decide the priority of attention given to inventory in construction projects.
4	Differentiate between hazard and risk and discuss the three steps in risk management in construction projects.
5	Discuss about the relevance of Integrated Project management information system in construction management.

Activity	A	B	C	D
Predecessor	—	A	A	B, C
Optimistic time	25	20	17	50
Most likely time	37	25	23	55
Pessimistic time	45	30	29	62

23ARP906	SEMINAR IN ARCHITECTURE	L	T	P	S	C	Year of Introduction
		0	2	0	0	2	2023

Preamble:

The course is designed to prepare students to research a subject area using a research methodology. Students are expected to analyse the existing literature, identify the research gap and write a research paper based on literature review, case study, and analysis along with oral and visual presentation. Students are introduced to plagiarism check in research writing and the ethics of publication.

Course Outcomes: After the completion of the course the student will be able to

CO1	Demonstrate a comprehensive understanding of the relevant literature in their research area and effectively synthesize and critically analyze existing research.
CO2	Formulate a well-structured and academically sound research proposal, including a clear research question, objectives, and methodology.
CO3	Collect, organize, and analyze data using appropriate tools and techniques, drawing meaningful conclusions from the data.
CO4	Master academic writing, including proper citation and referencing techniques, adhering to relevant styles
CO5	Understand the process of publishing research in academic journals and other scholarly outlets to disseminate their work.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓			✓		✓		
CO2	✓	✓										
CO3	✓	✓		✓	✓			✓		✓		
CO4	✓	✓		✓	✓			✓		✓		
CO5	✓	✓		✓	✓			✓		✓		

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Review 1	Review 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse		✓	✓	✓
Evaluate		✓		✓
Create				

Mark Distribution of CIA						
CourseStructure [L-T-P]	**Attendance**	**Seminar**				**Total Marks**
		Review1	**Review 2**	**Viva**	**Technical paper**	
	5	15	30	40	10	**100**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	100	-	-

SYLLABUS
MODULE I
Introduction to Research resources and analysis of paper Identify a research paper, news article, report and book chapter and differentiate between referenced sources, websites and non-referenced sources Comprehensive understanding of the relevant literature in their research area. Descriptive writing about a paper to demonstrate comprehension of subject matter, research methods and paraphrasing Analytical writing and framing a focused topic for study
MODULE II
Structure of the study Formulate aims and objectives of study and prepare a methodology based on literature study for a study proposal Select appropriate research methods and techniques, demonstrating the ability to design and justify a research methodology.
MODULE III
Organising and analysing data Plan survey and interviews and qualitative research methods, and conduct case study Collect, organize, and analyze data using appropriate tools and techniques, drawing meaningful conclusions from the data Document findings and communicate research findings clearly and effectively
MODULE IV
Paper writing Compare and analyse readings and master academic writing, including proper citation and referencing techniques, adhering to relevant style guides Prepare a draft paper
MODULE V
Presenting the paper Prepare a visual presentation based on written paper Present the research findings professionally through academic conferences, seminars

Reference books

1. Smith, Korydon; 2012; Introducing Architectural Theory: Debating a Discipline; Routledge-Taylor and Francis Group, New York, London.
2. Walliman Nicholas; 2008; A step by step guide for the first time researcher; Vistaar Publications; New Delhi
3. Qualitative Research Methods by Hennink Monique, Hutter Inge and Bailey Ajay- 2011; Sage, New Delhi

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [24]
	MODULE 1[2 weeks]	
1.1	Identify a research paper, news article, report and book chapter and differentiate between referenced sources, websites and non-referenced sources	1
1.2	Comprehensive understanding of the relevant literature in their research area.	1
1.3	Descriptive writing about a paper to demonstrate comprehension of subject matter, research methods and paraphrasing Analytical writing and framing a focused topic for study	2
	MODULE II[2 weeks]	
2.1	Formulate aims and objectives of study and prepare a methodology based on literature study for a study proposal	2
2.2	Select appropriate research methods and techniques, demonstrating the ability to design and justify a research methodology.	2
	Review 1	
	MODULE III[4 weeks]	
3.1	Plan survey and interviews and qualitative research methods, and conduct case study Document findings and communicate research findings clearly and effectively	2
3.2	Collect, organize, and analyse data using appropriate tools and techniques, drawing meaningful conclusions from the data	2
3.3	Document findings and communicate research findings clearly and effectively	2

MODULE IV[2 weeks]		
4.1	Compare and analyse readings and master academic writing, including proper citation and referencing techniques, adhering to relevant style guides	2
4.2	Prepare draft paper	2
MODULE V[2 weeks]		
5.1	Prepare a visual presentation based on written paper	1
5.2	Present the research findings professionally through academic conferences, seminars	1
	Review 2	

CO Assessment Questions	
CO1 CO2	**Review 1** Identify research papers, and review relevant literature in their research area to critically analyze existing research. Frame a focused topic for study Formulate a sound research proposal, including a clear research question, objectives, and methodology. Select appropriate research methods and techniques to justify methodology
CO3 CO4 CO5	**Review 2** Carry out survey, interviews using appropriate qualitative research methods Conduct relevant case studies Document findings Analyse and organize data using appropriate tools and techniques, Communicate research findings Technical Paper - journal/seminar/ conference Visual presentation - ppt, sheets
	Viva Ppt presentation of research Technical paper

ELECTIVE 5

OPEN ELECTIVES

23ARE902

ELECTIVE 6

23ARE903

223ARE903.1	PARAMETRIC DESIGN	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:
The course introduces the students to parametric designing and computational architecture to effectively address and navigate the design challenges that arise in a technologically advanced society by demonstrating sensitivity and considering the contextual factors at play. This course aims to enhance graduates' skill sets by comprehensively delving into advanced digital design.

Course Outcomes: After the completion of the course, the student will be able to

CO 1	Appraise parametric and generative computational design and their relation to contemporary architecture.
CO 2	Generate geometrical models using generative computational techniques.
CO 3	Generate performative, parametric computational models.
CO 4	Correlate advanced prototyping, modelling, manufacturing techniques, and parametric design with examples of small, complex models.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										
CO 2	✓	✓	✓	✓	✓		✓			✓		✓
CO 3	✓	✓	✓	✓	✓		✓			✓		✓
CO 4	✓	✓	✓	✓	✓		✓			✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse			✓	
Evaluate			✓	
Create			✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L - T]			Total Marks
		Assignments	Test-1	Test 2/ Portfolio/ Presentation	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4 X 5 =20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4 X 10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 40 marks	

SYLLABUS
MODULE I: Introduction – Digital and parametric process in architectural design
Historical development of digital technology, parametric and computational design in Architecture, Design and computational aspects of digital architecture Design automation, parametric, and influence in architectural form and space Computational methods and generative architecture, comparative study of scope, methods, and limitations of non-digital, digital, and computational generative architecture. Tools for parametrization. Influence in the perception of space and form studied through examples and case studies of contemporary projects.
MODULE II: Geometric Modelling– Tools and Methods
Definition and scope of geometric modelling and computational architecture, constraint solving reasoning with diagrams in the design process. Elements of geometry and structure, types of geometric modelling, steps in geometric modelling, transformation, integration of forms, shape grammar, hypersurface. Tools for geometrical modelling. Fundamental concepts in geometrical modelling and optimization: coordinates and transformations, Surface Construction: Freeform curves to surfaces, Surface Development: surface offsets, sweeping and evolutions, Deformations, Discretization: Converting surfaces to meshes
MODULE III: Parametric modelling and generative designing – Tools and techniques
Introduction to parametric thinking and modelling, interactions, and iterations in the workflow. Data types, transformation methods, vector geometry, paths, indexing, and matrices.

Data tree structure and geometry, surface panelling, surface mapping, and mesh modelling.
Sequencing of solutions, mathematical operations, and iterations.
Proximity-based transformations, grids, meshes, and topology
Generative methods and data visualization

MODULE IV: Performative modelling and evaluation – Tools and techniques

Analyse spatial models with performance metrics and morphological characteristics, concept of evidence-based decision making.
Tool and techniques for generating iterative random design models using dynamic building performance simulations for land and site suitability, weather analysis, energy efficiency, daylighting. Selection of fitted models, and graphical visualization.

Introduction to digital fabrication methods, Prototyping tooling and manufacturing using 3D printing techniques, and types of advanced manufacturing processes.

Introduction to parametric structural solutions, acoustics and service integration

MODULE V: Design and model

Generate a computational geometry for a building based on a given site and area constraints.
Create an optimized model based on parametric algorithms using any one of the performative tools.

Reference books

1. Tedeschi A., AAD – AAD – Algorithms-Aided Design., Len Penseur Publisher, 2014.
2. Woodbury R., Elements of Parametric Design., Routledge, 2010.
3. Pottmann H., Asperl A., Hofer M., and Kilian A., Architectural Geometry. Bentley Institute Press, 2007.
4. Jabi W., Parametric Design for Architecture. Lawrence King Publishing, 2013.
5. A. Menges, S. Ahlquist (Eds.), A.D. Reader: Computational Design Thinking, John Wiley & SonsLtd, (2011)
6. B. Kolarevic (Ed.), Architecture in the Digital Age: Design and Manufacturing, Taylor & Francis, New York (2003)
7. Lan Gibson, David W. Rosen and Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
8. Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, 2011.
9. CK Chua, Kah Fai Leong, "3D Printing & Rapid Prototyping- Principles & Applications", W.S., 2017.

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36]
MODULE 1 [6 hours]		
1.1	Historical development of digital technology, parametric and computational design in Architecture,	1
1.2	Design and computational aspects of digital architecture	1
1.3	Design automation, parametric design concepts	1
1.4	Influence of parametric in architectural form and space	1
1.5	Comparative study of scope, methods, and limitations of non-digital and digital designs	1
1.6	Comparative study of scope, methods, and limitations of computational generative architecture.	1
MODULE II [7 hours]		
2.1	Definition and scope of geometric modelling and computational architecture, constraint-solving reasoning with diagrams in the design process.	1
2.2	Elements of geometry and structure, types of geometric modelling, steps in geometric modelling, transformation	1
2.3	Transformation, integration of forms, shape grammar, hypersurface.	1
2.4	Tools for geometrical modelling. Fundamental concepts in geometrical modelling and optimization: coordinates and transformations, Surface Construction.	1
2.5	Tools for geometrical modelling. Fundamental concepts in geometrical modelling and optimization: Freeform curves to surfaces.	1
2.6	Tools for geometrical modelling. Fundamental concepts in geometrical modelling and optimization: Surface Development: surface offsets, sweeping and evolutions.	1
2.7	Tools for geometrical modelling. Fundamental concepts in geometrical modelling and optimization: Deformations, Discretization: Converting surfaces to meshes.	1
MODULE III [7 hours]		
3.1	Introduction to parametric thinking and modelling, interactions, and iterations in the workflow.	1
3.2	Data types, transformation methods, vector geometry, paths, indexing, and matrices.	1
3.3	Data tree structure and geometry, surface panelling, surface mapping, and mesh modelling.	1
3.4	Sequencing of solutions, mathematical operations.	1
3.5	Iterations and design selection	1
3.6	Proximity-based transformations, grids, meshes, and topology Generative methods and data visualization	1

3.7	Generative methods and data visualization	1
MODULE IV [6 hours]		
4.1	Analyze spatial models with performance metrics and morphological characteristics, concept of evidence-based decision making.	1
4.2	Tool and techniques for generating iterative random design models using dynamic building performance simulations for land and site suitability parametric structural solutions.	1
4.3	Tool and techniques for generating iterative random design models using dynamic building performance simulations for weather analysis, energy efficiency,	1
4.4	Tool and techniques for generating iterative random design models using dynamic building performance simulations for comfort, daylighting, acoustics, etc., selection of fitted models, and graphical visualization.	1
4.5	Introduction to digital fabrication methods, Prototyping tooling and manufacturing using 3D printing techniques, and types of advanced manufacturing processes.	1
4.6	Introduction to parametric structural solutions, acoustics and service integration	1
MODULE V[10 hours]		
5.1	Generate a computational geometry for a building based on a given site and area constraints.	4
5.2	Create an optimized model based on parametric algorithms using any one of the performative tools.	6

CO Assessment Sample Questions	
CO 1	With a suitable example, explain the process of generative algorithm-based design. Compare the parametric and conventional design processes and enumerate the advantages of using parametric algorithms for architectural solutions.
CO 2	Generate a computational geometry for a building based on a given site and area constraints.
CO 3	Create an optimized model based on parametric algorithms using any one of the performative tools.
CO 4	Identify measures, tools, and techniques for scalar manufacture of prototypes.

23ARE903.2	BIOMIMICRY IN DESIGN	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course provides a comprehensive and interdisciplinary approach to understanding biomimicry in design, focusing on architecture, urban planning, and its integration with nature. The course is focused on teaching thought processes in design that follow the patterns set by nature and then imitate these structures, methods, systems, and techniques to solve problems for people in a sustainable way. The course aims to equip students with theoretical knowledge, practical skills, and critical thinking to apply biomimetic principles responsibly in real-world design challenges.

Course Outcomes: After the completion of the course, the student will be able to

CO 1	Demonstrate a comprehensive understanding of the principles and concepts of Biomimicry, including its historical development and relevance to various design disciplines.
CO 2	Recognize the importance of Biomimicry in promoting sustainable and environmentally responsible design and apply this knowledge to create resource-efficient and eco-friendly solutions.
CO 3	Evaluate biophilic design patterns and elements from architectural projects, and analyse how human well-being is influenced by fostering a stronger connection with nature in built environments.
CO 4	Apply biomimetic thinking and methodologies in the design process, integrating nature-inspired solutions into architectural, urban planning, and product design projects.
CO 5	Develop critical thinking skills, enabling them to identify design challenges, analyse biomimetic solutions, and collaborate effectively with interdisciplinary teams to address complex real-world problems.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓					✓			✓		✓
CO 2	✓	✓					✓			✓		✓
CO 3	✓	✓					✓			✓		✓
CO 4	✓	✓	✓	✓			✓			✓		✓
CO 5	✓	✓	✓	✓	✓		✓			✓		✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse	✓	✓	✓	✓
Evaluate			✓	✓
Create			✓	✓

Mark Distribution of CIA

Course	Attendance	Theory [L- T-P]	Total

Structure [L-T-P]		Assignment	Test-1	Test 2/ Portfolio/ Presentation	Marks
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4 X 5 =20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4 X 10 = 40 marks) Time: 3 hours	60
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS

MODULE I: Introduction to Bio-mimicry

Definition of Biomimicry, bio morphology, biomimicry chronology and its history. Biomimicry - three primary levels: organism, behaviour, and ecosystem. Understanding Biomimicry through theory and case studies, Reconnect with nature

MODULE II: Biomimicry in Architecture

Biomimicry in integration with nature. Biomimicry in architecture. Requirements and design methodology. Introduction to Biophilic Architecture. Benefits of Biophilic Design. Patterns of Biophilia. Examples of Biophilic Architecture (Khoo Teck Puat Hospital, Singapore, Louisiana Children's Museum, New Orleans, Louisiana USA, JR Kumamoto Railway Station Building Kumamoto, Japan, The Jewel – Singapore, Singapore, Barbican Centre – London, UK). Biophilic Design & Sustainability

MODULE III: Solar-Driven Energy Systems in Nature & Technology
Macroscopic Solar-Driven Energy Systems in Nature & Technology: Building envelope design, Solar -responsive adaptive designs, Biomimetic ventilation systems. Managing Daylighting & Energy Consumption in Buildings. Biomimicry inspired Adaptive Building Envelope in hot climates examples - Eastgate Center, Zimbabwe, Ministry of Municipal Affairs and Agriculture Office (MMAA), Qatar, The Council House 2 (CH2), Melbourne.
MODULE IV: **Biomimicry and Nature in Cities**
Importance of Nature in Cities: Biophilic Cities. Biophilia and Urban Resilience. Biomimicry and Cities: Learning from Nature. Elements of biophilic urban design and planning. Biomimetic urban infrastructure and transportation systems. Pedersen Zari, the GREEN SURGE Project. Thinking about the future of cities + nature. Global Biophilia: Cities Caring for Global Nature. Equity and Ethics in the Biophilic City; Final Discussion: Future Directions in Biophilic Cities.
MODULE V: Future Directions in Biophilic Cities
Cases: Integration among the components of ecosystems: living organisms, climate, and the environment. Case studies and design approaches supporting sustainability principles of biophilia.
Reference books 1. Michael Pawlyn, "Biomimicry in Architecture", 2011, RIBA Publishing, London. 2. Dora Lee, "Biomimicry: Inventions Inspired by Nature", 2011, Kids Can Press, Toronto, Canada. 3. Stephen R. Kellert, "Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life, 2011, John Wiley & Sons, New Jersey. 4. Stephen R. Kellert, "Nature by Design: The Practice of Biophilic Design", 2018, Yale Univ. Press. 5. Benjamin R. Krueger, "Biomimicry: Nature as Designer", 2016, CreateSpace Independent Publishing Platform 6. Beatley, Biophilic Cities, "The Importance of Nature and Wildness in Our Urban Lives," and "The Nature of (in) Cities"; Cities and Biodiversity Outlook, 2013 7. Kellert, "Dimensions, Elements, and Attributes of Biophilic Design," in Kellert, Heerwagen and Mador, eds., Biophilic Design; Optional Read: E.O. Wilson, Biophilia, "The Right Place," and "The Conservation Ethic." 8. Beatley and Newman, "Biophilic Cities Are Sustainable, Resilient Cities," Sustainability, found at: http://www.mdpi.com/2071-1050/5/8/3328. 9. Jeanine Benyus, "A Good Place to Settle: Biomimicry, Biophilia, and the Return of Nature's Inspiration to Architecture," in Kellert, Heerwagen and Mador, Biophilic Design; 10. How Humans Are Tapping into Nature's Secrets to Design and Build a Better Future by Amina Khan 11. Nature Design: From Inspiration to Innovation, Angeli Sachs, 2007 12. Inspired by Nature: Animals: The Building/ Biology Connection, Alejandro Bahamon, 2009 13. The Extended Organism: The Physiology of Animal-Built Structures, J. Scott

Turner, 2000
14. https://www.mdpi.com/2313-7673/8/1/107

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36]
MODULE 1[8 hours]		
1.1	Definition of Biomimicry: Understanding the concept and principles of Biomimicry as a design approach inspired by nature's solutions.	2
1.2	Bio morphology: Exploring the morphology of biological organisms and its relevance to design.	1
1.3	Biomimicry Chronology and History: Tracing Biomimicry's historical development and evolution as a discipline.	1
1.4	Three Levels of Biomimicry: Understanding the different levels of Biomimicry: organism, behaviour, and ecosystem.	1
1.5	Theory and Case Studies: Analysing theoretical frameworks and real-world examples to learn from successful biomimetic design projects.	1
1.6	Reconnecting with Nature: Emphasizing the importance of reconnecting with nature to inspire and inform design solutions.	2
MODULE II [6 hours]		
2.1	Integrating Nature in Architecture: Exploring the relationship between architecture and nature and how Biomimicry can be integrated into design practices.	1
2.2	Design Methodology: Understanding the approach and methods used in biomimetic architecture.	1
2.3	Introduction to Biophilic Architecture. Benefits of Biophilic Design. Biophilic Design & Sustainability.	1
2.4	Patterns of Biophilia: Examining biophilic design patterns that foster a deeper connection with nature in architectural settings.	1
2.5	Examples of Biophilic Architecture (Khoo Teck Puat Hospital, Singapore, Louisiana Children's Museum, New Orleans, Louisiana USA, JR Kumamoto Railway Station Building Kumamoto, Japan, The Jewel – Singapore, Singapore, Barbican Centre – London, UK).	2
MODULE III [8 hours]		
3.1	Solar-Responsive Building Envelopes. Applying biomimetic principles to design building envelopes that respond to solar energy.	2
3.2	Biomimetic Ventilation Systems: Exploring natural ventilation strategies found in nature and applying them to architectural designs.	2

3.3	Daylighting & Energy Consumption: Managing daylighting and energy consumption in buildings through biomimetic design approaches.	2
3.4	Examples of biomimicry in Adaptive Building Envelope - Eastgate Center, Zimbabwe, Ministry of Municipal Affairs and Agriculture Office (MMAA), Qatar, The Council House 2 (CH2), Melbourne.	2
MODULE IV[8 hours]		
4.1	Biophilic Cities: Understanding the importance of nature in urban environments and how biophilic design can be incorporated into cities.	1
4.2	Urban Resilience and Biophilia: Examining how biophilic design contributes to urban resilience.	2
4.3	Biomimetic Urban Infrastructure: Applying Biomimicry to urban infrastructure and transportation systems.	2
4.4	Green Architecture and Biophilic Design Features: Incorporating green walls, green rooftops, and other biophilic design features in urban settings.	2
4.5	Global Biophilia: Exploring the concept of cities caring for global nature and its implications.	1
MODULE V [6 hours]		
5.1	Case studies and analysis exhibiting different aspects of biomimicry and principles of biophilia.	2
5.2	Finding design in nature that can be incorporated into their design, establishing principles through observations.	2
5.3	Apply the lessons of nature into their design experience in varied fashion.	2

CO Assessment Sample Questions	
CO 1	Present a case study illustrating how biomimicry principles were used in an architectural project. What were the key takeaways from this case study regarding sustainable design?
CO 2	How can Biomimicry be applied in urban planning to address climate change and environmental conservation? Share an example of a city or urban project that effectively integrated biomimetic solutions to tackle these challenges.
CO 3	Explain the concept of solar-responsive adaptive designs. How can biomimicry principles be applied to create buildings that dynamically adapt to changing environmental conditions, optimizing energy consumption?
CO 4	Present a case study of an architectural project or urban development that effectively incorporated biophilic design patterns and elements. What were the outcomes regarding human well-being and the connection between urban environments and nature?

CO 5	Choose a case study discussed in class and propose how the biomimicry principles demonstrated in that case study could be applied to a different context or project. Discuss potential challenges and benefits of this application.

23ARE903.3	BUILDING AUTOMATION AND MANAGEMENT SYSTEMS	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course enables the students to understand basic concepts and logic of the design of building automation systems and their impact on the production of complex buildings. A concise understanding of automation technology applicable to electrical, HVAC, fire and safety, access control, energy efficiency and management is introduced. The students will be able to understand the various aspects of different systems seen in well-structured buildings.

Course Outcomes: After the completion of the course, the student will be able to

CO 1	Identify and demonstrate the basic concept, current philosophy, technology, terminology, and practices used in building automation
CO 2	Comprehend various automated systems used in building design
CO 3	Appraise and plan the access control system in building automation management.
CO 4	Plan the HVAC system as per the requirements of energy management and sustainability.
CO 5	Discuss efficiency of a building with automation

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										
CO 2	✓	✓	✓	✓							✓	✓
CO 3	✓	✓	✓	✓							✓	✓
CO 4	✓	✓	✓	✓							✓	✓
CO 5	✓	✓	✓	✓							✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test 2	Other tools	
Remember				
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze			✓	
Evaluate				
Create				

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L- T-P]			Total Marks
		Assignment	Test-1	Test-2/ Portfolio/ Viva	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 hours

End Semester Examination [ESE]: Pattern

PATTERN	PART A	PART B	ESE Marks
PATTERN 1	4 questions with one question from each of the first four modules, with 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	60
	Total Marks: 20	Total Marks: 40 marks	

SYLLABUS

MODULE I: Introduction

Introduction Concept and application of Building Management System (BMS) and Automation, requirements and design considerations and its effect on functional efficiency of the building automation system, architecture and components of BMS. Automated Systems in building - Automated Lighting systems, Automated access control systems, Application of Env control system, smart systems, smart plumbing systems, automated Sewerage systems, sensor-controlled fixtures. Automation in irrigation.

MODULE II: Automation of electrical distribution system

Integration of electrical systems with building automation, components of electrical automation and Optimized consumption.

Maintenance, operation and security. Electrical grounding and protection, lightning security.

Efficient energy consumption using automated usage control.Automated integration integrated with alternative energy sources,

MODULE III: Security Systems and Access Control System

Fundamentals, Introduction to Security Systems, Concepts. Components, Technology, Advanced Applications.

Security Design: Security system design for verticals.

Access Control System: Access Components, Access Control System Design basics. CCTV: Camera: Operation & types, Camera Selection Criteria, Camera Applications, DVR Based system, DVM. Components of CCTV system.

MODULE IV: HVAC system & Energy Management System

HVAC system Fundamentals: Introduction to HVAC, HVAC Fundamentals, Basic Processes (Heating, Cooling, etc)

Human Comfort: Human comfort zones, Effect of Heat, Humidity, Heat loss. Air quality, building integrated alternative energy sources.

Energy Management: Energy Savings concept & methods, lighting control, Building Efficiency improvement, Green Building, LEED rating Concept and examples. Net zero concepts.

MODULE V: Case Study

Case study and appraisal of buildings with automated systems and services

Reference books

1. Shengwei Wang, Intelligent Buildings and Building Automation, 2009.
2. Reinhold A. Carlson Robert A. Di Giandomenico, Understanding Building Automation Systems: Direct Digital Control, Energy Management, Life Safety, Security Access Control, Lighting, Building,1st edition (R.S. Means Company Ltd), (1991).
3. Roger W. Haines, "HVAC system Design Handbook", fifth edition.
4. National Joint Apprenticeship & Training Committee, Building Automation System Integration with Open Protocols: System Integration with Open Protocols
5. John I. Levenhagen and Donald H. Spethmann, HVAC Controls and Systems (Mechanical Engineering), 1992.
6. James E.Brumbaugh, "HVAC fundamentals", vol 1 to 3

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]
	MODULE 1[7 hours]	
1.1	Introduction Concept and application of Building Management System (BMS) and Automation.	2
1.2	Requirements and design considerations and their effect on functional efficiency of the building automation system.	1
1.3	Architecture and components of BMS.	1

1.4	Automated Lighting systems, Automated access control systems, Application of Env control system	1
1.5	Smart systems, Smart plumbing systems	1
1.6	Automated Sewerage systems, sensor-controlled fixtures. Automation in irrigation.	1
MODULE II[8 hours]		
2.1	Integration of electrical systems with building automation, components of electrical automation	2
2.2	Even distribution of power, control of transmission loss, and Optimized consumption.	1
2.3	Maintenance, operation and security. Electrical grounding and protection, lightning security.	1
2.4	Maintenance, operation and security. Electrical grounding and protection, lightning security.	1
2.5	Efficient energy consumption using automated usage control.	1
2.6	Automated integration integrated with alternative energy sources.	1
2.7	Automated integration integrated with alternative energy sources.	1
MODULE III [7 hours]		
3.1	Access Control System: Access Components, Access Control System Design basics.	1
3.2	CCTV: Camera: Operation & types, Camera Selection Criteria, Camera Applications, DVR Based system, DVM.	1
3.3	Components of CCTV system.	1
3.4	Fundamentals, Introduction to Security Systems.	1
3.5	Components, Technology, Advanced Applications.	1
3.6	Components, Technology, Advanced Applications.	1
3.7	Security Design: Security system design for verticals basic concept.	1
MODULE IV[8 hours]		
4.1	HVAC system Fundamentals: Introduction to HVAC, HVAC Fundamentals, Basic Processes (Heating, Cooling, etc)	1
4.2	HVAC system Fundamentals: Introduction to HVAC, HVAC Fundamentals, Basic Processes (Heating, Cooling, etc)	1
4.3	HVAC system Fundamentals: Introduction to HVAC, HVAC Fundamentals, Basic Processes (Heating, Cooling, etc)	1

4.4	Human Comfort: Human comfort zones, Effect of Heat, Humidity, Heat loss.	1
4.5	Energy Management: Energy Savings concept & methods, lighting control methods.	1
4.6	Energy Management: Energy Savings concept & methods, lighting control methods.	1
4.7	Building Efficiency Improvement, Green Building (LEED) Concept & Examples.	1
4.8	Green Building (LEED) Concept & Examples, Net zero concepts	1
MODULE V[6 hours]		
5.1	Case study and appraisal of buildings with automated systems and services -energy efficiency	2
5.2	Case study and appraisal of buildings with automated systems and services – lighting, hvac	2
5.3	Case study and appraisal of buildings with automated systems and services -security systems	2

CO Assessment Sample Questions	
1	Briefly explain the concept and application of Building Management System (BMS) and Automation. Briefly explain different building automation systems.
2	What are the safety measures to be followed during electrical grounding and protection, and lightning security? Explain the role of automation in the planning of electrical grounding and protection, and lightning security.
3	Write short notes on components of Security Systems and Access Control Systems.
4	Write short notes on components of HVAC Systems.
5	Explain briefly with suitable example how the efficiency of a building can be improved with the help of building automation.

23ARE903.4	URBAN RESILIENCE	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course is designed to provide architecture students with a fundamental understanding of urban resilience and its significance in shaping sustainable and adaptable cities. Urban resilience refers to the capacity of cities to withstand shocks and stresses, adapt to changes, and recover effectively from various challenges, such as climate change, natural disasters, rapid urbanization, and social issues. Through a multidisciplinary approach, this course will explore the principles, strategies, and practices involved in creating resilient urban environments.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO 1	Understand the concept of urban resilience and its significance in addressing various challenges faced by cities.
CO 2	Understand resilience considerations into architecture and urban planning.
CO 3	Understand the importance of communities in resilience planning.
CO 4	Incorporate resilience considerations into urban planning

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		✓	✓	✓		✓	✓					
CO 2		✓	✓	✓	✓		✓					
CO 3		✓	✓	✓	✓		✓					
CO 4		✓	✓	✓	✓		✓					

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2/ Portfolio/ Presentation	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyse		✓	✓	✓
Evaluate		✓	✓	✓
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test 2/ Portfolio/ Presentation**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	**60**
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS
MODULE I: Introduction to Urban Resilience
Definition and concepts of urban resilience, Importance of urban resilience in the face of challenges, Historical examples of urban resilience, Key Components of Urban Resilience: Social, economic, and environmental dimensions, identifying vulnerabilities and strengths, Challenges faced by cities, including climate change, natural disasters, rapid urbanization, and social issues.
MODULE II: Assessing Urban Vulnerabilities
Identifying and mapping physical and social vulnerabilities, introduction to risk assessment tools, understanding the impact of climate change on urban areas, strategies for mitigating environmental risks, analyzing social and economic factors affecting resilience, impact of Community engagement and social cohesion.
MODULE III: Building Urban Resilience

Infrastructure Resilience: Designing and planning resilient infrastructure, Retrofitting and upgrading existing infrastructure; Governance and Policy for Resilience: Importance of governance in building resilience, Policy frameworks and planning for resilience; Community Engagement and Capacity Building: Involving communities in resilience planning, Capacity building and awareness programs, strategies for addressing social disparities and ensuring inclusivity in urban resilience projects, Participatory design approaches.Nature based solutions for urban resilience, gender equality and social inclusion for urban resilience

MODULE IV: Resilient Urban Planning

Role of urban planning in building resilience. Approaches to integrate resilience into urban master planning, such as creating mixed-use zoning to promote compact cities, encouraging transit-oriented development to reduce dependency on private vehicles, and designing resilient urban green spaces that can act as multifunctional assets for climate adaptation and community well-being. Water management strategies, such as green infrastructure and sustainable drainage systems.

MODULE V – Case studies

Emerging trends in urban resilience
Best Practice - Copenhagen, Denmark: Climate-Resilient City; Medellín, Colombia: Social Resilience through Urban Transformation; Tokyo, Japan: Earthquake and Disaster Resilience

Reference books

1. "Resilience: A New Paradigm of Nuclear Safety" by Dimitri B. Kececioglu
2. "Urban Resilience for Emergency Response and Recovery: Fundamental Concepts and Applications" by Guy F. Brasseur, Daniel J. Jacob, and John E. Penner
3. "Designing for Resilience: A Guide to Creating Buildings and Communities that Can Withstand Disasters" by Anne H. Lusk and Frederick R. Steiner
4. "Climate Resilient Cities: A Primer on Reducing Vulnerabilities to Disasters" by Neeraj Prasad, Jianping Yan, and Rajib Shaw
5. "The Resilience Dividend: Being Strong in a World Where Things Go Wrong" by Judith Rodin
6. "Urban Resilience: A Transformative Approach" by Olga Kordas and Igor Kuznetsov
7. "Building Resilience: A Green Infrastructure Handbook for Towns and Cities" by Chris Zevenbergen and J. Nijsse
8. "The Resilient City: How Modern Cities Recover from Disaster" by Lawrence J. Vale and Thomas J. Campanella
9. "Resilient Sustainable Cities: A Future" by José A. Puppim de Oliveira and Jiawen Yang
10. "Resilient by Design: Creating Businesses That Adapt and Flourish in a Changing World" by Joseph Fiksel

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36 hours]
MODULE 1 [6 hours]		
1.1	Definition and concepts of urban resilience, Importance of urban resilience in the face of challenges	2
1.2	Historical examples of urban resilience	1
1.3	Key Components of Urban Resilience: Social, economic, and environmental dimensions	1
1.4	Identifying vulnerabilities and strengths, Challenges faced by cities, including climate change, natural disasters, rapid urbanization, and social issues.	2
MODULE II [6 hours]		
2.1	Identifying and mapping physical and social vulnerabilities	1
2.2	Introduction to risk assessment tools, understanding the impact of climate change on urban areas	2
2.3	Strategies for mitigating environmental risks	1
2.4	Analyzing social and economic factors affecting resilience, impact of Community engagement and social cohesion.	2
MODULE III [10 hours]		
3.1	Infrastructure Resilience: Designing and planning resilient infrastructure, Retrofitting and upgrading existing infrastructure	2
3.2	Governance and Policy for Resilience: Importance of governance in building resilience, Policy frameworks and planning for resilience	2
3.3	Community Engagement and Capacity Building: Involving communities in resilience planning, Capacity building and awareness programs	2
3.4	Strategies for addressing social disparities and ensuring inclusivity in urban resilience projects	2
3.5	Participatory design approaches. Nature based solutions for urban resilience, gender equality and social inclusion for urban resilience	2
MODULE IV [6 hours]		
4.1	Role of urban planning in building resilience.	1

4.2	Approaches to integrate resilience into urban master planning, such as creating mixed-use zoning to promote compact cities,	1
4.3	Transit-oriented development to reduce dependency on private vehicles, and designing resilient urban green spaces	2
4.4	Water management strategies, such as green infrastructure and sustainable drainage systems.	2
MODULE V [8 hours]		
5.1	Emerging trends in urban resilience - examples	2
5.2	Best Practice - Copenhagen, Denmark: Climate-Resilient City	2
5.3	Best Practice - Medellín, Colombia: Social Resilience through Urban Transformation; Tokyo, Japan: Earthquake and Disaster Resilience	4

CO Assessment Sample Questions	
CO 1	1) Identify and explain the key components of urban resilience. 2) How do social, economic, and environmental factors contribute to urban resilience? 3) Can you provide examples of cities that have successfully integrated these components into their resilience strategies?
CO 2	1) Identify and explain the key components of urban resilience. 2) How do social, economic, and environmental factors contribute to urban resilience? 3) Can you provide examples of cities that have successfully integrated these components into their resilience strategies?
CO 3	1) How does building social cohesion contribute to the overall resilience of a community? 2) In what ways can urban planning foster social connections and community resilience? 3) Can you provide examples of cities that have effectively promoted social cohesion through their resilience planning efforts?
CO 4	1) In what ways do local government decisions impact the resilience of a city? 2) Can you provide examples of cities that have implemented effective resilience-focused policies?

23ARE903.5	DISASTER MITIGATION & MANAGEMENT	L	T	P	S	C	Year of Introduction
		2	0	1	0	3	2023

Preamble:

The course enables the students to understand the types of hazards and their magnitude, the preparedness and mitigation for each hazard based on their characteristics and to understand the importance of disaster preparedness and management

Prerequisite: Nil.

Course Outcomes: After the completion of the course the student will be able to

CO 1	Recall Fundamental concepts of hazards and disasters
CO 2	Discuss the types of hazards and their characteristics.
CO 3	Examine different phases of Disaster management cycle.
CO 4	Examine Response and recovery strategies for various typologies of disasters.
CO 5	Analyze national and international frameworks for disaster management and advancement in technology in the field of disaster monitoring & management.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓										
CO 2	✓	✓		✓			✓			✓		✓
CO 3	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
CO 4	✓		✓		✓		✓		✓			✓
CO 5	✓				✓				✓	✓	✓	

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2/ Portfolio/ Presentation	Other tools	
Remember	✓			
Understand	✓	✓	✓	✓
Apply			✓	✓
Analyse		✓		✓
Evaluate				
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	Theory [L]			Total Marks
		Assignment	**Test-1**	**Test-2/ Portfolio/ Viva**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	**60**
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS

MODULE I Introduction to an overview of disaster, Terminologies

Terminologies, concepts & definition, Understanding disasters -An overview, - Hazard, Disaster, Risk, Vulnerability, Adaptation, Mitigation, Capacity building Resilience, Awareness and Impact of disasters.

MODULE II Typology of disasters – hazards and its characteristics

Natural -Floods, Landslides, Earthquakes
Manmade disasters - Human induced disasters: - soil erosion, droughts, landslides, fire; nuclear explosion, terrorism causes, impacts, measures.

MODULE III Different phases of Disaster management cycle

Introduction to Disaster management cycle, Disaster management cycle: Pre-disaster and Post disaster management.

Mitigation strategies for various disaster typologies Community empowerment and preparedness, preparing hazard-zonation maps, forecasting & warning, Sheltering and casualty management, retrofitting.

Response and Recovery phases, Response and recovery strategies for various typologies of disasters.

Community health and casualty management. Evacuation, Disaster Communication. Damage and Needs Assessment, Restoration of Critical Infrastructure, Early Recovery, Reconstruction, Rehabilitation and Redevelopment; Relief, Resilience building.

MODULE IV National and international frameworks for disaster management

Disaster Management Act 2005, National Policy on Disaster Management, UN frame works on disaster management, administrative framework in India, role of various governmental & nongovernmental agencies.

Role of Land use management and Building Control regulations in vulnerable regions.

MODULE V Case study for analysing disaster management of various disasters

A critical assessment of Kerala Floods 2018 and 2019.

Relevant Case study for analysing disaster management cycle of various disasters.

Reference books

1. Andrew, S., "Environmental Modeling with GIS and Remote Sensing", John Willey, 2002
2. Ariyabandu, M. and Sahni P. "Disaster Risk Reduction in South Asia", PrenticeHall (India), 2003.
3. Bell, F.G., "Geological Hazards: Their assessment, avoidance and mitigation", E & FN SPON Routledge, London. 1999
4. Bossler, J.D., "Manual of Geospatial Science and Technology", Taylor and Francis, 2001
5. David Alexander, "Natural Disasters", Research Press, New Delhi, 1993
6. Matthews, J.A., "Natural hazards and Environmental Change", Bill McGuire, Ian Mason, 2002
7. Mitigating Natural Disasters, Phenomena, Effects and options, A Manual for policy makers and planners, United Nations. New York, 1991
8. Nick Carter. W., "Disaster Management - A Disaster Manager's Handbook". Asian Development Bank, Philippines. 1991
9. Gupta M C, Manual on natural disaster management in India, NIDM, New Delhi 2000

COURSE CONTENTS AND LECTURE SCHEDULE		
No.		No. of Hours [36]
MODULE 1 [8 hours]		
1.1	Terminologies, concepts & definition of disaster	1
1.2	Terminologies, concepts & definition of disaster	1
1.3	Understanding disasters -An overview, - Hazard, Disaster, Risk, Vulnerability.	2
1.4	Understanding disasters -An overview, - Adaptation, Mitigation.	1
1.5	Understanding disasters -An overview, - Capacity building Resilience.	1
1.6	Understanding disasters -An overview - Awareness and Impact of disasters.	2
MODULE II [7 hours]		
2.1	Typology of disasters Natural hazards and Disasters -Earthquake, cyclone.	1
2.2	Typology of disasters Natural hazards and Disasters - Floods, lightning, Tsunami.	1
2.3	Typology of disasters Natural hazards and Disasters -Cloud burst: Causes, impacts, measures, policy changes	1
2.4	Relevant case studies Human induced disasters: - soil erosion, droughts, landslides, fire; nuclear explosion, terrorism causes, impacts, measures.	1
2.5	Relevant case studies Human induced disasters: - Relevant case studies	2
2.6	Advancements in science and technology for disaster monitoring and management such as GIS, Remote sensing etc.	1
MODULE III [10 hours]		
3.1	Introduction to Disaster management cycle, Disaster management cycle: Pre-disaster and Post disaster management.	1
3.2	Preparing hazard-zonation maps, forecasting & warning, Sheltering and casualty management, retrofitting.	1

3.3	Disaster management cycle: Pre-disaster and Post disaster management.	1
3.4	Mitigation, Adaptation & Preparedness - Mitigation strategies for various disaster typologies Community empowerment	1
3.5	Mitigation, Adaptation & Preparedness - Mitigation strategies - Community empowerment	1
3.6	Response and Recovery phases, Response and recovery.	1
3.7	Strategies for various typologies of disasters.	1
3.8	Community health and casualty management. Evacuation, Disaster Communication. Damage and Needs Assessment	1
3.9	Restoration of Critical Infrastructure, Early Recovery, Reconstruction.	1
3.10	Rehabilitation and Redevelopment; Relief, Resilience building.	1
MODULE IV [5 hours]		
4.1	Disaster Management Act 2005, National Policy on Disaster Management	1
4.2	UN frame work on disaster management	1
4.3	Administrative framework in India in terms of disaster management	1
4.4	Role of various governmental & nongovernmental agencies in disaster management.	1
4.5	Role of Land use management and Building Control regulations in vulnerable regions.	1
MODULE V [6 hours]		
5.1	A critical assessment of Kerala Floods 2018 and 2019.	2
5.2	Relevant Case study for analyzing disaster management cycle of various disasters.	4

CO Assessment Sample Questions	
CO 1	1.Definition of disaster. 2.Explain Hazard, Risk, Vulnerability. 3.How disaster differ from hazard?
CO 2	1.Explain different typology of hazard. 2.Explain Causes, Impacts and measures for various natural and human induced disasters.
CO 3	1.What is disaster management act 2005. 2.What are the disaster management challenges in India. 3.Explain National policy on disaster management. 4.Explain disaster management cycle. 5.Explain mitigation strategies for various disaster typologies.
CO 4	1.Explain disaster management with a case study. 2.What is community health & causality management? 3.What is disaster communication? 4.Explain UN frame works on disaster management. 5.Explain administrative framework of India with respect to disaster management. 6. Role of various governmental & nongovernmental agencies in disaster management.
CO 5	1.What are the Role of Land use management and Building Control regulations in vulnerable regions 2. Prepare a critical assessment of Kerala flood. 3.Explain technologies used for disaster monitoring and management

23ARE903.6	REAL ESTATE MANAGEMENT	L	T	P	S	C	Year of Introduction
		2	0	1	0	3	2023

Preamble:

The course Real Estate Management is structured to provide the students with domain knowledge and expertise in the principles and framework of Real Estate design, development and management, to acquaint the students with the issues, regulations and functioning of Real of Estate market, economic concepts, land acquisition, legal matters concerning land and property.

Course Outcomes: After the completion of the course the student will be able to

CO1	Comprehend the fundamentals of Real estate management and principles of Real estate sectors.
CO2	Comprehend Real estate market and Land valuation.
CO3	Discuss the legal framework for Real estate management, land development.
CO 4	Analyse real estate in different aspects to understand the physical and economic factors.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓						✓
CO2	✓	✓										✓
CO3	✓			✓		✓						
CO 4	✓											

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test2/ Portfolio/Presentation	Other tools	
Remember	✓		✓	✓
Understand	✓	✓	✓	✓
Apply		✓		
Analyse		✓	✓	✓
Evaluate				
Create		✓		

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test2/ Portfolio/Presentation	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**

100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	**60**
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS

MODULE I

INTRODUCTION TO REAL ESTATE

Definition, Real Estate Scope, principles of real estate value concepts, Real estate sectors and its stakeholders, objectives and scop of land economics.

MODULE II

LAND PRICING AND REAL ESTATE MARKETS

Market mechanism and Land use pattern, Process, Cost of development, source of finance, financial calculation for Real estate developer and Land valuation techniques. Real estate's facilitator of development: Development of real estate as a tool for controlling land and property prices: Transaction and renting of real estate, Lease deeds/ sale deeds, sale documents, registration; Mortgage and pledging

MODULE III

LEGAL FRAMEWORK FOR REAL ESTATE

Private ownership and social control of land, disposal of land, land development charges, land use restrictions and compensations, economical aspects of land policies, Law & Regulations in real estate Industry and its compliance. Role of Government in real estate market. Statutory Approvals and NOCs.

MODULE IV

Physical and economic analysis of real estate projects

Analysis of location of specific uses like residential, commercial, industrial and institutional in the light of location theory. Techniques of cost benefit, analysis of urban development programme, housing affordability.

MODULE V

CASE STUDIES:
Case studies of real estate development in public, private, partnership sectors.

Text books

1. Gelbtuch, H.C., Mackmin, D. and Milgrim, M.R., Real Estate Valuation in Global Markets, Amazon Books
2. Rangwal, S. C., Valuation of Real Properties, Charotar Publishing House, 2003
3. Chapin, S., and Keeble, L., Urban Land Use Planning
4. Urban Development management-I.T.P.I. Journal
5. Reading Material on Land Economics-I.T.P.I. Journal

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. ofHours [36 hours]
	MODULE 1 [6 hours]	
1.1	Introduction to Real Estate Management: Definition	2
1.2	Real Estate Scope, principles of real estate value concepts.	2
1.3	Real estate sectors and its stakeholders, objectives and scope of land economics.	2
	MODULE II [12 hours]	
2.1	Market mechanism and Land use pattern.	3
2.2	Process, Cost of development, source of finance, financial calculation for Real estate developer.	3
2.3	Land valuation techniques.	2
2.4	Real estate – facilitator of development	1
2.5	Development of real estate as a tool for controlling land and property prices.	1
2.6	Transaction and renting of real estate, Lease deeds/ sale deeds, sale documents, registration	1
2.7	Mortgage and pledging	1
	MODULE III [6 hours]	
3.1	Private ownership and social control of land.	2

3.2	Disposal of land, land development charges, land use restrictions and compensations.	2
3.3	Role of Government in real estate market. Statutory Approvals and NOCs.	2
MODULEIV [6 hours]		
4.1	Analysis of specific uses like residential, commercial, industrial and institutional in the light of location theory	3
4.2	Techniques of cost benefit, analysis of urban development programme, housing affordability.	3
MODULEV [6 hours]		
5.1	Case studies of real estate development in public, private, partnership sectors	3
5.2	Case study - Real estate as a tool for controlling land and property prices.	3

CO Assessment Sample Questions	
CO1	Define Real Estate and Enumerate briefly Real Estate Act, 2016. What do you mean by Real Estate Management?
CO2	What are the tools for controlling land and property prices?
CO3	Explain the role of Government in real estate market.
CO4	Explain the Physical and Economical analysis of Real Estate Management?

23ARE903.7	REMOTE SENSING AND GIS IN PLANNING	L	T	P	S	C	Year of Introduction
		1	0	2	3	3	2023

Preamble:

This course introduces the principles and applications of remote sensing and Geographic Information Systems (GIS) in architectural planning. Students will learn how to acquire, process, and interpret remote sensing data and utilize GIS tools for spatial analysis and decision-making in architectural and urban design projects.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO	Comprehend the concept of geoinformatics.
CO	Acquire, manage, analyze, and interpret spatial remote sensing data
CO	Understand modelling tools and software to demonstrate spatial analysis
CO	Apply Remote Sensing and GIS in planning contexts

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓			✓	✓	✓				✓	✓	✓
CO 2	✓			✓	✓	✓				✓	✓	✓
CO 3	✓			✓	✓	✓				✓	✓	✓
CO 4	✓			✓	✓	✓				✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test 1	Test 2/ Portfolio/ Presentation	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	
Analyse	✓	✓	✓	✓
Evaluate	✓	✓	✓	✓
Create	✓	✓	✓	

Mark Distribution of CIA

Course Structure [L-T-P]	Attendance	Theory [L]			Total Marks
		Assignment	Test-1	Test 2/ Portfolio/ Presentation	
	4	12	12	12	**40**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
100	40	60	3 Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
PATTERN 1	4 questions, one from each of the first four modules, and 5 marks for each question. Answer all questions. Marks: (4x5 = 20 marks)	8 questions with two questions from each of the first four modules, of which the student should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4x10 = 40 marks) Time: 3 hours	**60**
	Total Marks: 20 marks	Total Marks: 40 marks	

SYLLABUS
MODULE I
Introduction to Remote Sensing Introduction to Geoinformatics: Components and Application. Basic principles of Remote sensing. Process of Remote sensing. Remote sensing systems and its components. Types of remote sensing data and sensors (satellite, aerial, UAV, etc.). Introduction to spatial data analysis and visualization. Applications of Remote sensing.
MODULE II
Remote sensing - Image Interpretation and Analysis Introduction to analysis software. Techniques for acquiring, interpreting and analyzing remote sensing imagery. Image classification methods (supervised and unsupervised). Change detection and monitoring using remote sensing data. LULC analysis and NDVI analysis.
MODULE III
Introduction to GIS and Spatial Data Concepts Overview of GIS: Definition of GIS and its role in various fields and industries. Understanding the components and functions of a GIS. Spatial Data Types and Models: Introduction to vector data (points, lines, polygons) and raster data. Explanation of spatial data models (vector vs. raster) and their applications. Coordinate Systems and Map Projections: Understanding geographic coordinate

systems (latitude-longitude) and projected coordinate systems (UTM, State Plane, etc.). Explanation of map projections and their importance in maintaining spatial accuracy.
Data Sources and Acquisition: Different sources of spatial data (satellite imagery, aerial photography, GPS, etc.). Methods of data acquisition (remote sensing, field surveys) and data conversion.

MODULE IV

Data Management and Analysis in GIS
Data Entry and Editing: Techniques for digitizing and entering spatial data into a GIS. Overview of data editing tools to maintain data quality and integrity.
Spatial Query and Analysis: Conducting attribute and spatial queries to retrieve specific information from GIS databases. Performing spatial analysis operations (buffering, intersection, overlay, etc.) for decision-making.
Geoprocessing and Spatial Analysis Tools: Introduction to geoprocessing tools for data manipulation and analysis. Hands-on exercises using GIS software to solve real-world spatial problems.
GIS Data Visualization: Techniques for creating thematic maps and cartographic representations of spatial data. Understanding map symbology, color schemes, and layouts for effective data visualization.

MODULE V

Applications of GIS in Various Fields
Urban Planning and Land Management: LULC mapping.
Environmental and Natural Resource Management: NDVI and NDBI mapping.
Case Studies and Project Work: Reviewing real-world GIS projects in different sectors. Undertaking individual or group projects to apply GIS concepts and tools to specific spatial problems

Reference books

1. "Remote Sensing and Image Interpretation" by Thomas Lillesand, Ralph W. Kiefer, and Jonathan Chipman
2. "Geographic Information Science and Systems" by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind
3. "Introduction to Remote Sensing" by James B. Campbell and Randolph H. Wynne
4. "GIS Fundamentals: A First Text on Geographic Information Systems" by Paul Bolstad
5. "GIS for Environmental Management" by Michael F. Goodchild, Louis T. Steyaert, Bradley O. Parks, Carol Johnston, and David Maidment
6. "Remote Sensing for GIS Managers" by Stan Aronoff

COURSE CONTENTS AND LECTURE SCHEDULE

No.		No. of Hours [36]

MODULE 1 [6 hours]		
1.1	Introduction to Geoinformatics: Components and Application	1
1.2	Basic principles of Remote sensing. Process of Remote sensing. Remote sensing systems and its components.	2
1.3	Types of remote sensing data and sensors (satellite, aerial, UAV, etc.). Introduction to spatial data analysis and visualization.	1
1.4	Applications of Remote sensing.	1
MODULE II [8 hours]		
2.1	Introduction to analysis software. Techniques for interpreting and analyzing remote sensing imagery	2
2.2	Image classification methods (supervised and unsupervised)	2
2.3	Change detection and monitoring using remote sensing data.	2
2.4	LULC analysis and NDVI analysis.	2
MODULE III [8 hours]		
3.1	Definition of GIS and its role in various fields and industries. Understanding the components and functions of a GIS.	1
3.2	Introduction to vector data (points, lines, polygons) and raster data. Explanation of spatial data models (vector vs. raster) and their applications.	2
3.3	Understanding geographic coordinate systems (latitude-longitude) and projected coordinate systems (UTM, State Plane, etc.).	1
3.4	Explanation of map projections and their importance in maintaining spatial accuracy.	1
3.5	Different sources of spatial data (satellite imagery, aerial photography, GPS, etc.)	1
3.6	Methods of data acquisition (remote sensing, field surveys) and data conversion.	2
MODULE IV [8 hours]		
4.1	Techniques for digitizing and entering spatial data into a GIS. Overview of data editing tools to maintain data quality and integrity.	1
4.2	Conducting attribute and spatial queries to retrieve specific information from GIS databases.	1

4.3	Performing spatial analysis operations (buffering, intersection, overlay, etc.) for decision-making.	2
4.4	Introduction to geoprocessing tools for data manipulation and analysis. Hands-on exercises using GIS software to solve real-world spatial problems.	2
4.5	Techniques for creating thematic maps and cartographic representations of spatial data.	1
4.6	Understanding map symbology, color schemes, and layouts for effective data visualization.	1
MODULE V [6 hours]		
5.1	LULC mapping and urban sprawl mapping - Using GIS for land-use planning, zoning, and infrastructure development. Analyzing urban growth patterns and transportation networks.	2
5.2	NDVI and NDBI mapping - Applications of GIS in environmental monitoring	2
5.3	Reviewing real-world GIS projects in different sectors. Undertaking individual or group projects to apply GIS concepts and tools to specific spatial problems	2

CO ASSESSMENT SAMPLE QUESTIONS	
CO 1	1) What is remote sensing, and how is it used to capture images of the Earth's surface? 2) Name a few common applications of remote sensing in everyday life? 3) How might analysing satellite images help in tracking changes in forests or urban areas? 4) What are some basic features on the Earth's surface that can be identified using remote sensing imagery?
CO 2	1) What is GPS, and how is it used to collect location data? 2) Why is it important to organize data accurately when working with maps and spatial information?
CO 3	1) What does spatial analysis mean, and how is it different from regular data analysis? 2) What is a geographic information system (GIS), and how is it used in spatial modelling? 3) How might spatial modelling assist city planners in predicting traffic patterns?
CO 4	1) How can remote sensing and GIS technologies be integrated into urban and regional planning processes? Provide examples of specific planning tasks where these technologies are particularly beneficial. 2) Discuss the role of remote sensing and GIS in environmental impact assessments. How do these technologies assist in evaluating the potential environmental consequences of proposed development projects? 3) Provide case studies where the application of remote sensing and GIS in planning contexts led to more sustainable and efficient urban development. What were the key challenges faced, and how were they overcome to achieve successful outcomes?

ELECTIVE 7

23ARE904

23ARE904.1	MANAGEMENTINFORMATION SYSTEMS	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble: The course aims to cultivate a multifaceted skill set, empowering students to navigate the complexities of modern architectural practice by integrating cutting-edge technologies, strategic planning methodologies, and efficient project management techniques. The course will equip architecture students with holistic and practical knowledge to apply key concepts in Management Information Systems (MIS), Project Planning and Network Methods, Building Information Modeling (BIM) Framework, Lean Construction, and Supply Chain Management (SCM) within the construction industry.

Prerequisite: Nil

Course Outcomes: After the completion of the course the student will be able to

CO1	Describe the basic concepts of Management information systems
CO2	Identify the steps of construction planning and network analysis.
CO3	Appraise the importance of SCM in the construction sector
CO4	Demonstratedigitaltoolsavailabletomodeltheattributesandinformationofa building.

CO-POMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	□		□	□	□				□			
CO2	□	□	□	□	□	□		□	□	□	□	□
CO3	□	□	□	□	□	□		□	□	□	□	□
CO4	□	□	□	□	□	□	□	□	□	□	□	□

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	□	□		□
Understand	□	□		□
Apply				
Analyze	□	□	□	□
Evaluate		□		□
Create				

Mark Distributionof CIA

Course Structure [L-T-P]	Attendance	Theory[L]			Total Marks
		Assignment	Test-1	Project/Viva	
	4	12	12	12	**40**

Total Mark distribution			
TotalMarks	**CIA(Marks)**	**ESE(Marks)**	**ESEDuration**
100	40	60	3Hours

End Semester Examination [ESE]:Pattern			
PATTERN	**PARTA**	**PARTB**	**ESE Marks**
	4 Questions with one question from each of the first four modules and 5 Marks for each question. Marks: (4 X 5 =20 marks)	8 questions with two questions from each of the first four modules, of which students should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4 X 10 = 40 marks) Time:3 hours	60
	TotalMarks:20	Total Marks: [40 marks]	

SYLLABUS

MODULEI

Introduction to Management Information System (MIS)

Definition of MIS, Pyramid structure of MIS, relevance and scope, MIS in construction industry, components of MIS for construction-based projects.

MODULEII

Planning Process and Network Methods

Project Planning, Role of the decision in project management, Pre-construction Planning Process, Pre-construction planning Activities, Scheduling and controlling, Importance of time, cost and resources, Methods of planning and programming, degree of details, review of project progress, Activity inter relationships, time uncertainties, Network Method.
Elements of network:-Event-Tail Event, Head Event, Dual Role Event, Activity–representation and Identification, Interrelationships, Network Analysis.
Network Crashing.

MODULEIII

BIM Frame work and Lean Construction

Objectives of BIM, Uses of BIM, BIM Management, Employer's Information Requirements (EIR), BIM Execution Plan (BEP), Master Information Delivery Plan (MIDP), BIM hierarchy of roles, different stages of projects and BIM applications.

An Introduction to Lean Construction: The Purpose of Lean Construction, Lean Implementation Techniques. Principles, Lean delivery within the design and construction industry, Benefits of Lean, Project Delivery, Integrated Project Delivery(IPD), and Last Planner concept.

MODULEIV

Supply chain management(SCM)

Supply chain management, the importance of SCM, functions of SCM, flow of materials, products, resources, information and money in the construction value chain.

Components of supply chain management - Planning, Sourcing, inventory, production and transportation, returns of goods .Tools and techniques for effective logistics and supply chain management. Benefits and implementation difficulties.

MODULEV

CasestudiesofarchitecturalprojectsexecutedwithBIM.*Exercise:Develop a project plan using BIM, considering design, documentation, and collaboration.*

Reference books

1. A Guide to the Project Management Body of Knowledge by Project Management Institute, USA.
2. Construction project management: a practical guide to field Construction Management by S. Keoki Sears. Richard Hudson Clough, Glenn A.Sears.
3. Construction Project Management: Planning, Scheduling and Controlling by K. K. Chitkara.
4. RobertS. Wegant, 'BIM Content Development: Standards, Strategies, and Best Practices', John Wiley, 2011.
5. Chuck Eastman et al, 'BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors', John Wiley, 2011.
6. Eastman, C.; Teicholz, P.; Sacks, R.; Liston, K,.'BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, Wiley, 2011.
7. Ray Crotty, 'The Impact of Building Information Modeling: Transforming Construction'. Spons Architecture Price Book,2011

COURSECONTENTSANDLECTURESCHEDULE

No.		No.ofHours [36hours]
MODULE1[3hours]		
1.1	MIS-Definition of MIS, Pyramid structure of MIS	1
1.2	MIS-Relevance and scope, MIS in the construction industry	1
1.3	Components of MIS for construction	1
MODULEII[10hours]		
2.1	Project Planning, Role of decision in project management	1
2.2	Pre- construction Planning Process	1
2.3	Scheduling and controlling, Importance of time,costand resources	1
2.4	Methods of planning and programming	1
2.5	Degree of detail, review of project progress	1
2.6	Activity interrelationships, time uncertainties	1
2.7	Network Method, Elements of network:-Event-Tail Event, Head Event, Dual Role Events	2
2.8	Activity–Representation and Identification, Interrelationships,	1
2.9	Network Analysis, Network Crashing	1
MODULEIII[10hours]		
3.1	Objectives of BIM, Uses of BIM, BIM Management	1
3.2	Employer's Information Requirements(EIR)	1
3.3	BIM Execution Plan(BEP),Master Information Delivery Plan(MIDP)	1
3.4	BIM hierarchy of roles, different stages of projects and BIM applications.	1
3.5	Different stages of projects and BIM applications.	1
3.6	An Introduction to Lean Construction: The Purpose of Lean Construction	1
3.7	Lean Principles	1
3.8	Lean delivery within the design and construction industry, Benefits of Lean Project Delivery	2
3.9	Integrated Project Delivery(IPD), Last planner system	1
MODULEIV[8hours]		
4.1	Supply chain management, importance, functions of SCM	1

4.2	Flow of materials, products, and resources.	1
4.3	Information and money in the construction value chain	1
4.4	Components of supply chain management-planning	1
4.5	Components of supply chain management- Sourcing, inventory.	1
4.6	Components of supply chain management- Production and transportation, returns of goods.	1
4.7	Tools and techniques for effective logistics and supply chain management.	1
4.8	Benefits and implementationdifficulties.	1
MODULEV[5hours]		
5.1	Casestudies of architectural projects executed withBIM.	1
5.2	*Exercise:Develop a project plan using BIM, considering design, documentation, and collaboration.*	4
COAssessment Sample Questions		
CO 1	Define MIS and explain its relevance in the construction industry. Provide examples of how MIS can enhance decision-making in construction projects.	
CO 2	Explain the planning process inconstruction management. Highlight the role of decision-making in project management and its impacton planning.	
CO 3	Define Supply Chain Management(SCM)and discuss its importance in the construction industry. How does SCM contribute to the flow of materials, products, and information in the construction value chain?	
CO 4	Explainthe objectives anduses of Building Information Modeling (BIM).How does BIMcontribute to effective project management in the construction industry?	

23ARE904.2	TRANSFORMING SELF TO NURTURE LEADERSHIP TRAITS	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course "Transforming Self to Nurture Leadership Traits" is designed to enable students to prepare themselves to embark on paths of personal leadership development. Learning basic leadership skills early in architecture is necessary for productive teamwork, team collaboration, and managing relationships; and it can provide a core building block for a student's future personal and professional development. This course is designed to empower individuals with a comprehensive understanding of leadership across diverse domains ,equipping them to navigate complexities, inspire teams, and shape a sustainable and innovative future.

Course Outcomes: After the completion of the course the student will be able to

CO1	Evaluate the fundamental patterns for managing global leadership attributes.
CO2	Analyze the role of the architect as a leader in implementing societal changes.
CO3	Explore the principles of Design Thinking and its application in the realm of leadership.
CO4	Analyze the importance, principles and practices of sustainable leadership and examine the contributions of prominent figures in architecture in influencing Sustainable leadership.

CO-POMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓		✓				✓	✓	✓	✓	✓
CO2		✓	✓	✓				✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓				✓	✓	✓	✓	✓
CO4		✓	✓				✓	✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply		✓		✓
Analyze	✓	✓		✓
Evaluate	✓	✓		✓
Create				

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory [L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA (Marks)**	**ESE (Marks)**	**ESE Duration**
100	40	60	3Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PART A**	**PART B**	**ESE Marks**
	4 Questions with one question from each of the first four modules and 5 Marks for each question. Marks: (4 X 5 =20 marks)	8 questions with two questions from each of the first four modules, of which students should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4 X 10 = 40 marks)	60
	Total Marks:20	Total Marks: 40	

SYLLABUS

MODULE I

Leadership and Team Management

Introduction to leadership and team management- Interactional Framework for analyzingLeadership-CharismaticandTransformationalLeadership-Leadership for tomorrow.

Leadership Attributes- Personality traits, types and Leadership- Power and Leadership- Art of Influence in Leadership- Role of ethics and values in Organizational Leadership- Leadership in crisis situation- Global Leadership- Motivation and Leadership- Team decision making and Conflict Management- Development Planning-GAPS Analysis.

Women in leadership roles-The Art of Communication- Enhancing creativity problem-solving skills-Building credibility

And trust- Skills for developing others.

MODULE II

Architectural Leadership: Shaping Better Places through Education, Design, and Public Policy

The Importance of Leadership in Architectural Education; Principles of Architectural Leadership; Leadership Success Strategies in Architecture; How Building Design Can Influence Team Dynamics; Emotional Intelligence; Five Practices of Exemplary Leadership; Architecture as Public Policy and role of State in promoting a better environment for occupants.

MODULE III

Integrating Design Thinking into Leadership Skills

Introduction to Design Thinking; Evolution of Design Thinking; Design Thinking in Current Context; Five-stage Design Thinking Model; Relationship between Design Thinking and Leadership Skills; Influence of Design Thinking In Leadership Development.

MODULEIV

Sustainable Leadership in Architecture

Introduction to Sustainable Leadership; Importance of Sustainable Leadership; Qualities of Sustainable Leaders; Sustainable Leadership practices; Examples of Sustainable Leadership Initiatives; Significance of Political Leaders for Successful and Sustainable Leadership; Contributions of great leaders in climate action: Al Gore, Christiana Figueres, etc.

Sustainability leadership in a local government context: The administrator's role in the process; Understand the leadership journeys of great architects by reflecting upon and framing their life stories and experiences to date- Laurie Baker, Geoffrey Bawa, Hassan Fathy, Zaha Hadid.

MODULEV		
Case studies of leadership models in architectural practice.		
Reference books 1. Kouzes, James and Barry Posner. The Leadership Challenge. Jossey-Bass, 2008. 2. Bass, Len; Pal Clements, and Rick Kazman. Software Architecture in Practice. Addison-Wesley, 2003. 3. Goleman, Daniel. Working with Emotional Intelligence.Bantam,2000. 4. Meadows, Donella H. Thinking in Systems: A Primer. Chelsea Green Publishing, 2008.		
COURSECONTENTSANDLECTURESCHEDULE		
No.		No. of Hours [36hours]
MODULE1[12 hours]		
1.1	Introduction to leadership and team management	1
1.2	Interactional Framework for Analyzing Leadership	1
1.3	Charismatic and Transformational Leadership- Leadership for Tomorrow-	1
1.4	Leadership Attributes- Personality traits, types and Leadership	1
1.5	Power and Leadership-Art of Influence in Leadership	1
1.6	Role of ethics and values in Organizational Leadership	1
1.7	Leadership in crisis situation- Global Leadership- Motivation and Leadership	1
1.8	Team decision- making and Conflict Management	1

1.9	Development Planning –GAPS Analysis- Women in leadership roles	1
1.10	The Art of Communication	1
1.11	Enhancing creativity and problem- solving skills	1
1.12	We are building credibility and trust- Skills for developing others.	1
MODULE II [6 hours]		
2.1	The importance of leadership in architectural education; Principles of Architectural Leadership	1
2.2	Leadership Success Strategies in Architecture	1
2.3	How Building Design Can Influence Team Dynamics	1
2.4	Emotional Intelligence	1
2.5	Five practices of Exemplary leadership	1
2.6	Architecture as Public Policy and the role of the state in promoting better places	1
MODULE III [6 hours]		
3.1	Introduction to Design Thinking; Evolution of Design Thinking	1
3.2	Design Thinking in the Current Context	1

3.3	Five-stage design thinking model	1
3.4	Relationship between Design Thinking and Leadership skills	1
3.5	Relationship between Design Thinking and Leadership skills	1
3.6	Influence of Design Thinking on Leadership Development	1
MODULE IV [6 hours]		
4.1	Introduction to Sustainable Leadership; Importance of Sustainable Leadership; Qualities of Sustainable Leaders;	1
4.2	Sustainable Leadership practices; Examples of Sustainable Leadership initiatives;	1
4.3	Significance of Political Leaders for Successful and Sustainable Leadership; Contributions of great leaders in climate action: Al Gore, Christiana Figuere, etc.	1
4.4	Sustainability leadership in a local government context: The administrator's role in the process;	1
4.5	Understand the leadership journeys of great architects by reflecting upon and framing their life stories and experiences to date- Laurie Baker, Geoffrey Bawa, Hassan Fathy, Zaha Hadid.	1
4.6	Understand the leadership journeys of great architects by reflecting upon and framing their life stories and experiences to date-Laurie Baker, Geoffrey Bawa, Hassan Fathy, Zaha Hadid.	1
MODULE V [6 hours]		
5.1	Case Study of a native architect to understand his/ her leadership journey and to learn the Architect's contribution towards Sustainable leadership. (Include an interview with the	6

	Architect and a site visit to the architect is well-known projects, formulating reports and presentations)	

CO Assessment Sample Questions	
CO 1	Explain the key traits of a global leader and provide examples of how these Traits contribute to effective leadership in an international context.
CO 2	How can effective leadership positively impact architectural education, And what role does leadership play in shaping the future of architects?
CO 3	Elaborate on the evolution of Design Thinking and its current relevance. How Does Design Thinking complement and enhance leadership skills in various contexts?
CO 4	Analyze the role of political leaders in promoting sustainable practices in architecture. Provide examples of successful sustainable leadership initiatives led by political figures.

23ARE904.3	ENTREPRENEURSHIP SKILLS FOR ARCHITECTS	L	T	P	S	C	Year of Introduction
		2	0	1	3	3	2023

Preamble:

The course is intended to provide students with the fundamental strategies of architectural entrepreneurship and make them familiar with the basic terminologies of entrepreneur management. After the completion of this course the students will be informed of the legal aspects of architectural entrepreneurship. The students will be familiarized with ethical codes, time management and skills to manage an architectural project with strategic collaboration of stakeholders.

Prerequisite: NIL

Course Outcomes: After the completion of the course the student will be able to

CO1	Outline the relevance of entrepreneurship & its importance in economic development.
CO2	Appraise various legal guidelines to start a small-scale unit.
CO3	Demonstrate skills to market architectural services
CO4	Formulate schemes and strategies to effectively manage an establishment.

CO-POMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓	✓		✓					✓	✓	
CO3	✓	✓	✓		✓					✓	✓	✓
CO4	✓	✓	✓		✓			✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Examination
	Test1	Test2	Other tools	
Remember	✓	✓		✓
Understand	✓	✓		✓
Apply	✓	✓		✓
Analyze		✓		✓
Evaluate				
Create				

Assessment tools–Case studies to discuss the various laws in architectural practice and understand how an architectural establishment functions.

Mark Distribution of CIA					
Course Structure [L-T-P]	**Attendance**	**Theory[L]**			**Total Marks**
		Assignment	**Test-1**	**Test-2**	
	4	12	12	12	**40**

Total Mark distribution			
Total Marks	**CIA(Marks)**	**ESE(Marks)**	**Ese Duration**
100	40	60	3Hours

End Semester Examination [ESE]: Pattern			
PATTERN	**PARTA**	**PARTB**	**Ese Marks**
PATTERN 1	4 Questions with one question from each of the first four modules and 5 Marks for each question. Marks: (4 X 5 =20 marks)	8 questions with two questions from each of the first four modules, of which students should answer any one question from each module. Each question carries 10 marks. One or two questions can have subdivisions. Marks: (4 X 10 = 40 marks)	60
	TotalMarks:20	TotalMarks:40marks	

SYLLABUS

MODULE I

Introduction to Entrepreneurship

An introduction to entrepreneurship versus paid employment. The directions Ahead for young professionals. Basic concepts of partnerships, proprietorships, and private and public limited companies. Developing the mind set of being an entrepreneur

MODULE II

Legal aspects of becoming an architectural entrepreneur

Legal aspects of becoming an architectural entrepreneur in the Indian

environment. Statutory requirements and formalities, Insurance, taxation, documentation and records. Special statutes pertaining to the architectural profession. The scope of diversification into activities allied to Architecture

Setting up an establishment

Setting up establishment capital and revenue studies, planning for business, review of strategy, tapping of lateral opportunities, SWOC studies.

MODULE III

Business planning and Work flow in an architect's office

The concept of workspace-shared workspace. Business planning model. Workflow arrangement.

Understanding market needs, gaining marketing intelligence, survey and analysis of efficiency and productivity, risk assessment, managing competition.

Introduction to Intellectual Property Rights.

Outreach-the use of social media and marketing platforms.

MODULE IV

Project management

Stages in project management from start to end in an architect's establishment. Time management-the role of clients, contractors and service providers. The management of project delivery and Time management. The skills of architectural presentation and the management of project delivery. – Scaling up and planning for the future- Discussions on contemporary

Professional trends. New vistas of Architectural entrepreneurship in the 21st-century environment to generate innovative business models.

MODULE V

Case studies to discuss how successful practices in India manage their establishments.

Reference books

1. H. Nandan, Fundamentals of Entrepreneurship, PHI,3rdEdition2013
2. Rajeev Roy, Entrepreneurship, Oxford,2ndedition2011
3. Kaira, Entrepreneurship Development, AITBS
4. S.S. Khanka, Entrepreneurial Development, SC hand Publishers

COURSECONTENTSANDLECTURESCHEDULE		
No.		No. of Hours [36]
MODULE1 [6hours]		
1.1	Introduction to Entrepreneurship	2
1.2	Understanding the basic concepts and importance of Entrepreneurship, entrepreneurship versus paid employment	2
1.3	Developing the mind set of being an entrepreneur.	2
MODULE II [8hours]		
2.1	Legal aspects of becoming an architectural entrepreneur in the Indian environment.	1
2.2	Business management, finance and Law. Statutory requirements and formalities, Insurance, taxation, documentation and records.	1
2.3	Special statutes about the architectural profession.	2
2.4	The scope of diversification into activities allied to Architecture	1
2.5	Setting up establishment- capital and revenue studies, planning for business, review of strategy,	2
2.6	Tapping of lateral opportunities, SWOC studies.	1
MODULEIII [10hours]		
3.1	Business planning and Workflow in an architect's office. The concept of workspace-shared workspace. Business planning model. Workflow arrangement.	2
3.2	Understanding market needs, gaining marketing intelligence, survey and analysis of efficiency and productivity	2
3.3	Risk assessment, managing competition, etc.	2
3.4	Introduction to Intellectual Property Rights. The concept of workspace- shared workspace. Workflow arrangement.	2
3.5	Outreach-the use of social media and marketing platforms.	2

MODULEIV [6hours]		
4.1	**Project management** stages in project management from start to end in an architect's establishment.	1
4.2	Time management-the role of clients, contractors and service providers- The management of project delivery and Time management	1
4.3	The skills of architectural presentation, and the management of project delivery.	2
4.4	Scaling up and planning for the future-Discussions on contemporary professional trends.	1
4.5	New vistas of Architectural entrepreneurship in the 21st-century environment to generate innovative business models.	1
MODULEV [6hours]		
5.1	Case studies to discuss how successful practices in India manage their establishments.	6

CO Assessment Sample Questions	
CO 1	How does entrepreneurship contribute to job creation and innovation in the economy?
CO 2	What are the essential legal requirements for starting a small-scale business in your country?
CO 3	Discuss the importance of financial planning and management for entrepreneurial success.
CO 4	What are the potential advantages and challenges of relying on government support in the early stages of an entrepreneurial venture?

SEMESTER 10

23ARD1001	ARCHITECTURAL THESIS	L	T	P	S	C	Year of Introduction
		0	0	18	18	18	2023

Preamble:

The course provides an opportunity to the students to study and handle a complete design project of his / her choice in a practical manner using one's creative ability. It is a judgment of the knowledge gained by the student through the course of study. A student is required to design a thesis project responsive to the contextual and program requirements. It combines the systematic/methodological learning from various stages of study and analysis in design process towards culmination of an informed design. It enables the student to develop a design program based on the spatial and the social requirements and feasibility of the selected project. The project will include complexities demanding site observations, understanding of regional climate, local resources, historic and socio-economic context, feasibility of project, sustainability and significance. A student is expected to communicate the ideas clearly using writing, verbal and visual presentation including a physical model. The student is required to apply various codes, standards and regulations governing the project, demonstrating synthesis of creativity and technical knowledge.

Prerequisite: Architectural Design VII

Course Outcomes: After the completion of the course the student will be able to

CO 1	Formulate a clearly stated design problem by integrating functional and contextual requirements for large-scale design projects and demonstrate a systematic design process which includes identification of project requirements, site study and analysis, case studies, programming, schematic design and Design development.
CO 2	Analyse architectural design cases specific to the project based on different parameters to prepare well defined inferences.
CO 3	Apply the knowledge acquired through live and literature data (site, data collection, case studies etc.) in devising original and context specific design solutions integrating creativity, critical thinking, socio-cultural and environmental aspects.
CO 4	Prepare and present architectural drawings demonstrating technical drawing skills, and presentation (visual and verbal) skills to express designs with clarity.

CO - PO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO 3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO 4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Assessment Pattern

Bloom's Category	Continuous Assessment Tools			End Semester Jury Examination
	Reviews	Guide discussions	Other tools	
Remember	✓	✓	✓	✓
Understand	✓	✓	✓	✓
Apply	✓	✓	✓	✓
Analyze	✓	✓	✓	✓
Evaluate	✓	✓	✓	✓
Create	✓	✓	✓	✓

Assessment tools: Research, primary survey, case study, site study, socio-economic study relating to topic, environmental sensitivity, application of all courses studied in the five years of B. Arch, application of technical and presentation skills, ethical practices, communication skills, knowledge of new technological advancements in the building industry, construction practices, approximate estimate of realizing the project, financial concerns, managerial aspects, coordination with different consultants and time management.

Mark Distribution of CIA

Course Structure [L-T-P]	Theory [L- T]		Total Marks
	Reviews (Panel)	Guide	
	125	125	**250**

Total Mark distribution

Total Marks	CIA (Marks)	ESE (Marks)	ESE Duration
500	250	250	Jury

End Semester Examination [ESE]: Pattern Jury examination

THESIS MANUAL

Introduction

Students of the B.Arch. Degree course are required to prepare an Architectural Design Thesis during the tenth semester of the B.Arch. Degree program under the guidance of the faculty appointed by the department. A department Thesis committee is to be formulated with the Head of the Department, Staff Advisor, Thesis coordinator and senior faculty as members in order to oversee the proper conduct of the thesis in the department. This shall be independent of the thesis evaluation committees.

a) Selection of thesis topic

The student has to obtain prior permission on the subject of thesis from the

department
thesis committee. The main areas of study and research shall include advanced architectural design including contemporary design processes, urban design including
urban infill, environmental design, conservation and heritage precincts, housing etc. However specific thrust should be Architectural design of built environment. The student shall be allotted a faculty of the department as guide. The project and the special topic shall be worked out by the student under the guidance of the guide.

b) Thesis course work

The thesis work shall include a detailed study of the project, its spatial requirements and theoretical aspects, detailed site study with respect to topography, climate, context and suitability of the site for the project.

Students are required to maintain a work diary of the thesis work which shall be endorsed weekly by the guide and submitted for the progress evaluation review along with the thesis work.

The special topic should be selected on the basis of the design challenge posed and should have sufficient scope to provide detailed architectural design scheme.

c) Scheme of Thesis evaluation are as follows:

- Evaluation by supervising guide- 20%
- Internal evaluation by a panel of examiners- 30%
- Final Evaluation by team of two examiners - 50%

d) Internal Evaluation of thesis

The department shall set up an internal evaluation committee consisting of the guide, and two faculty members either from the department or an academician or practicing architect registered with Council of Architecture, incorporated under the Architect's act 1972 and with minimum of five years of experience. The progress of thesis work shall be assessed by the internal evaluation committee periodically through, four reviews, the dates of which shall be published by the department. The student should orally present the thesis work with the aid of architectural drawings (hand drawn sheets/ print outs), block model and the work diary. The mock review shall be scheduled with sufficient days prior to the final thesis submission.

e) The scope for each review

Review-1

Introduction of the Thesis Topic, Feasibility studies & justification for architectural intervention in context, basic data, space standards, case studies (at least two case studies and one case from literature) /Primary surveys, spatial Analysis, arriving at inferences and Design Program with area statement, site analysis including local architectural context, climatic and environmental conditions, and prevalent bylaws.

Review-2
Review of Previous stage, detailed design development process including concept, proximity studies, zoning at site and built level, development of master plan, layout plan and selection and approval of the special topic.

Review-3
Review of Previous stages, Sketch design for various building blocks including all floor
Plans, Sections, Elevations, Views, Block Model and case study of the special topic.

Review-4
Review of Previous stages, detailed site layout with landscape and service details, detailed plans of all the floors, sections, elevations, views, drawings of application of special topic, service drawings and Draft Report.

Mock Review
The student shall present all finalized drawings, a sample sheet with title block, and Final Draft of the report. The student should appear for mock review to be eligible for the final evaluation.

f) Marks split up for continuous internal evaluation

Review Stage	Guide marks	Panel marks	Review marks (internal evaluation)
1	25	37.5	**62.5**
2	25	37.5	**62.5**
3	25	37.5	**62.5**
4	25	37.5	**62.5**
Mock review	-	-	
Total	100	150	**250 marks**

A candidate who fails to secure a minimum of 40% marks in each review stage, ie. Guide mark and panel mark put together, will be given a supplementary review chance on the date announced by the department. There will be only one supplementary review chance for each stage. The marks improved for a stage by appearing in a supplementary chance will be limited to 50% for that stage.

g) Eligibility to appear for the Final External Evaluation

The student should present the thesis work for all the four progress evaluations and mock review and also obtain a minimum of 40% marks combining the marks of four progress evaluations, to be eligible to appear for the final evaluation by a committee appointed by the HoD.

h) Documents to be submitted for the Final External Evaluation

The student shall submit all the following documents at the teaching institution for the

final external evaluation at the date and time announced by the institution.

1. Architectural drawings not exceeding 30 numbers of A1 size sheets, prepared in the format prescribed by the thesis committee to be submitted at the teaching institution on a working day specified by the institution, prior to the external evaluation.
2. One copy of the Data Collection of the thesis project shall be compiled and presented along with the final submission in A3 size.
3. Two copies of the Final Report prepared in the format prescribed by the thesis committee shall be submitted on the date and time announced by the institution.
4. Models to be submitted on the date of the final external evaluation at or before 9 a.m.

Any other instructions regarding the schedule of reviews, preparation of the bound volumes of Data Collection, Final Report, Final Sheets, Model, etc. will be announced by the teaching institution.

i) Final External Evaluation

A committee appointed by the CoE/ HoD shall do the final external evaluation of the thesis work. The committee shall consist of one senior faculty member from the institute and one senior faculty member from other institutes or from among the Architects registered with the Council of Architecture, incorporated under the Architect's Act 1972,with not less than ten years of experience.

a. Minimum required for a Pass

Students shall secure minimum of 40% of marks in the internal assessment (marks for the four progress evaluations) and minimum of 40% for the final evaluation (external jury) and an aggregate of 50% for the internal assessment and external jury marks put together, for successfully completing the architectural thesis.

b. Repeat chance

Students who have failed to secure minimum 40 % for internal assessment (marks for the four progress evaluations) shall register for the thesis inthe next thesis

semester.

Those students who have acquired a minimum pass in the internal assessment, but failed in the external evaluation will be given an opportunity to resubmit the thesis in the supplementary chance within one month of the publication of the result. Otherwise, the student will have to register for the final external evaluation in the next thesis semester.

THESIS INTERNAL REVIEWS

SYNOPSIS

The synopsis will be a brief introduction of the proposed thesis / project and has to be submitted by the student at the end of the semester previous to the thesis semester.

REVIEW I: DATA COLLECTION, CASE STUDIES, SITE ANALYSIS

Introduction of the Thesis Topic, Feasibility studies & justification for Architectural intervention in context, basic data, space standards, case studies (at least two live case studies and one case study from literature) /Primary surveys, Spatial Analysis, arriving at inferences and Design Program with area statement, site analysis including local Architectural context, climatic and environmental conditions, and prevalent bylaws.

REVIEW II: AREA REQUIREMENTS, CONCEPT DEVELOPMENT and SPECIAL TOPIC

Review of Previous stage, detailed design development process including concept, proximity studies, zoning at site and built level, development of master plan, layout plan and selection and approval of the special topic.

REVIEW III: PRELIMINARY DESIGN

Review

Review of Previous stages, Sketch design for various building blocks including all floor

Plans, Sections, Elevations, Views, Block Model and case study of the special topic..

REVIEW IV: PRE-FINAL DESIGN

Review of Previous stages, detailed site layout with landscape and service details, detailed plans of all the floors, sections, elevations, views, drawings of application of special topic, service drawings and Draft Report

MOCK REVIEW

- Drawings of all previous stages with improvements
- Working Drawings: Working drawing of important parts of building
- Construction details: Construction details of elements of the building

- Landscape design: plans and sketches showing organization of open spaces, trees, shrubs and flower plants, with their botanical names.

Reference books

1. Research methods: the key concepts by Hammond, Michael-2013, Routledge, Oxon
2. Fink, A. (1998). Conducting research literature reviews: from paper to the Internet. Thousand Oaks: Sage.
3. Luca, R. (2016). Research Methods for Architecture. Lawrance King Publishing.
4. Groat L.& Wang D. (2002), Architectural Research Methods, John Wiley and Sons Inc

CO ASSESSMENT SAMPLE METHODS	
1	1. Data Collection & Analysis 1. Anthropometric data 2. Data on space standards/ activities/ furniture 3. Data on building services 4. Data on building byelaws / regulations 5. Any other data pertinent to one's topic 2. Site study & Analysis 1.Context (Macro Level): Location, Access, Viewpoints, Important Landmarks, Socio-cultural aspects. 2: Context (Micro Level): Infrastructure (incl. site services), Transportation (access), Site boundaries and neighboring elements (shadow pattern), Site specific byelaws. 3: Site: Topography, Micro and Macro Climate, Existing Elements (Natural & Manmade), Views and Vistas, Special Features
2	Case study & Analysis requirements 1. Case study sheets with location plan, site layout plans, Plans of all floors, Sections, elevations and views/ photographs. 2. A detailed analysis on inside road layout, placement of individual blocks, connection between blocks, types of transition spaces used between blocks and landscape details. 3. A detailed analysis on service details, water sump, overhead tank, type of drainage, location of septic tanks and sewage treatment plants, fire service details (location of fire escape stair, access road all around, location of generator room, electrical rooms, fire safety measures etc.), electrical and HVAC services, surface drainage, rain water harvesting etc.. 4. Individual space analysis sheets (graphical) dealing with a critical analysis of both the function / utility and aesthetic analysis of the space. 5. A critical study (graphical) of any particular concepts or materials or techniques that are of importance. 6. An inference sheet showing the inferences from each case study.

3	Design development and Presentation Requirements: 1. Introduction sheets containing Project brief, Feasibility studies, list of detailed project requirements and Project Methodology flow chart. 2. A summary of all the Case studies and detailed Site study and Site analysis. 3. Detailed Design brief with optimum space study and final area requirements based on standards and case studies. 4. Site zoning and concept sheets portraying appropriate justification for the evolution of plan forms and 3-D forms. The inference from literature research, case studies and site study shall provide a base work for the 'concept' to be generated. 5. Design scheme containing the various stages of Design development and alternative design solutions to evolve the Final Design have to be presented sequentially and graphically. 6. Site layout, Building Plans, Elevations, Sections, Exterior and Interior Views, Landscape Scheme & details, Service plan & details, Structural Details with grid system, foundation, wall and roof details, building safety, Material details and specifications, application of Special topic.
4	Final Presentation Requirements: Prepare and present architectural drawings demonstrating technical drawing skills, and presentation (visual and verbal) skills to express designs with clarity. 1. Introduction sheets containing Project brief, Feasibility studies, list of detailed project requirements and Project Methodology flow chart. 2. A summary of all the Case studies and detailed Site study and Site analysis. 3. Detailed Design brief with optimum space study and final area requirements based on standards and case studies. 4. Site zoning and concept sheets portraying appropriate justification for the evolution of plan forms and 3-D forms. The inference from literature research, case studies and site study 5. Design scheme containing the various stages of Design development and alternative design solutions to evolve the Final Design to be presented sequentially and graphically. 6. Final site Layout, Final Design for various building blocks through relevant Plans, Sections, Elevations, Views etc., details of Building safety and Site Services, Site Planning and Landscape drawings, Preparation of relevant structural and Detailed Drawings, Application of Special Topic in the design scheme.