CURRICULUM AND SYLLABUS

(*Academic Year 2025-2026 onwards*)

For

Bachelor of Architecture (B.Arch.)

Programme

NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI – 620 015

TAMIL NADU, INDIA

VISION

To create a world class learning environment to meet the challenges of built environment

MISSION STATEMENT

- Create professionally competent and socially responsible architects with human values
- Enhance knowledge and skill through academic, research and application
- Serve the society through meaningful interactions

PROGRAM EDUCATIONAL OBJECTIVES	
PEO 1	To provide students with a deep foundation in architectural history, theory, cultural contexts, and fine arts to enrich design.
PEO 2	To develop graduates capable of creating innovative, sustainable architectural designs with functionality, technical proficiency, and aesthetics.
PEO 3	To equip students with digital tools and advanced technologies to address contemporary challenges in design and planning.
PEO 4	To instill professional responsibility and ethical integrity towards socio-cultural, economic and environmental concerns.
PEO 5	To foster research, analytical thinking, and evidence-based design skills to meet emerging trends.

PROGRAM OUTCOMES (POs)

1. PO1: Ability to create architectural designs that satisfy both aesthetic and technical requirements.
2. PO2: Adequate knowledge of the histories and theories of architecture and the related arts, technologies and human sciences.
3. PO3: Knowledge of the fine arts as an influence on the quality of architectural design.
4. PO4: Adequate knowledge of urban design, planning and the skills involved in the planning process.
5. PO5: Understanding of the relationship between people and buildings, and between buildings and their environment, and the need to relate buildings and the spaces between them to human needs and scale
6. PO6: Understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors.
7. PO7: Understanding of the methods of investigation and preparation of the brief for a design project.
8. PO8: Understanding of the structural design, constructional and engineering problems associated with building design.
9. PO9: Adequate knowledge of physical problems and technologies and the function of buildings so as to provide them with internal conditions of comfort and protection against the climate
10. PO10: The necessary design skills to meet building users' requirements within the constraints imposed by cost factors and building regulations.
11. PO11: Adequate knowledge of the industries, organizations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning.

S. No	Course Code	Course Name	Semester	L	T	P	C	Category	
SEMESTER 1									29
1	AR101	Environmental Science	1	3	0	0	3	BS & AE	
2	AR103	Architecture of Early Civilizations	1	3	0	0	3	PC	
3	AR105	Theory of Architecture	1	3	0	0	3	PC	
4	AR107	Architectural Graphics and Geometric Representation	1	1	0	3	4	PC	
5	AR109	Communicative English	1	2	0	1	3	SEC	
6	AR111	Basic and Architectural Design – I	1	0	0	9	9	PC	
7	AR113	Fundamentals of Drawing and Sketching	1	0	0	4	4	PC	
SEMESTER 2									30
1	AR102	Computer-Aided Design: Tools and Techniques for Architecture	2	1	2	0	3	SEC	
2	AR104	History of Indian Architecture	2	3	0	0	3	PC	
3	AR106	Mechanics of Solids	2	2	1	0	3	BS & AE	
4	AR108	Perspective and Sciography	2	1	0	3	4	PC	
5	AR110	Building Construction and Materials – I	2	1	0	3	4	BS & AE	
6	AR112	Architectural Design – II	2	0	0	9	9	PC	
7	AR114	Drawing and Sketching in Colour	2	0	0	4	4	PC	
8	SWIR11	NCC, NSS, NSO	2						
SEMESTER 3									28
1	AR201	Digital Modeling and Visualization for Architecture	3	1	2	0	3	SEC	
2	AR203	European Architecture: From Romanesque to Rococo	3	3	0	0	3	PC	
3	AR205	Structural Analysis	3	2	1	0	3	BS & AE	
4	AR207	Building Construction and Materials – II	3	1	0	3	4	BS & AE	
5	AR209	Surveying and Site Planning	3	1	0	2	3	BS & AE	
6	AR211	Architectural Design – III	3	0	0	9	9	PC	
7	AR213	Architectural Model Making	3	0	0	3	3	PC	

S. No	Course Code	Course Name	Semester	L	T	P	C	Category	
SEMESTER 4									30
1	AR202	Climate Responsive Architecture	4	3	0	0	3	BS & AE	
2	AR204	Lighting and Electrical Services	4	3	0	0	3	BS & AE	
3	AR206	Contemporary Architecture	4	3	0	0	3	PC	
4	AR208	Architectural Workshop	4	0	0	4	4	PC	
5	AR210	Building Construction and Materials – III	4	1	0	3	4	BS & AE	
6	AR212	Architectural Design – IV	4	0	0	9	9	PC	
7	AR214	Strength of Materials Laboratory	4	1	0	2	3	BS & AE	
8	AR216	Educational Tour I (Winter Vacation)	4				1	PC	
SEMESTER 5 (5 + 2 PE)									29
1	AR301	Plumbing Services and Architectural Acoustics	5	3	0	0	3	BS & AE	
2	AR303	Design of R.C.C. Structures	5	2	1	0	3	BS & AE	
3	AR305	Landscape Architecture	5	3	0	0	3	PC	
4	AR307	Building Construction and Materials – IV	5	1	0	3	4	BS & AE	
5	AR309	Architectural Design – V	5	0	0	9	9	PC	
6		Programme Elective - 1	5	3	0	0	3	PE	
7		Programme Elective - 2 (S)	5	0	0	4	4	PE	
SEMESTER 6 (5+ 1 PE + 1 OE)									30
1	AR302	Air-conditioning and Mechanical Services	6	3	0	0	3	BS & AE	
2	AR304	Estimation and Specification	6	2	1	0	3	PC	
3	AR306	Architectural Working Drawings	6	0	0	4	4	BS & AE	
4	AR308	Building Construction and Materials - V	6	1	0	3	4	BS & AE	
5	AR310	Architectural Design – VI	6	0	0	9	9	PC	
6		Programme Elective 3 (S)	6	0	0	4	4	PE	
7		Open Elective 1	6				3	OE	

S. No	Course Code	Course Name	Semester	L	T	P	C	Category	
SEMESTER 7 (4+ 2 PE + 1 OE)									29
1	AR401	Building Codes, Bye-Laws, and Universal Accessibility	7	2	1	0	3	PAECC	
2	AR403	Energy Efficient Buildings	7	3	0	0	3	BS & AE	
3	AR405	Urban Design: Principles, Evolution, and Contemporary Practices	7	3	0	0	3	PC	
4	AR407	Architectural Design –VII	7	0	0	9	9	PC	
5		Programme Elective 4 (S)	7	0	0	4	4	PE	
6		Programme Elective 5	7	3	0	0	3	PE	
7		Open Elective 2	7				3	OE	
8	AR409	Educational Tour II (Summer Vacation)	7				1	PC	
SEMESTER 8									17
1	AR402	Professional Training	8				17	PAECC	
SEMESTER 9 (4+3 PE)									28
1	AR501	Urban Planning	9	3	0	0	3	PC	
2	AR503	Architectural Design – VIII	9	0	0	9	9	PC	
3	AR505	Architectural Dissertation	9	0	0	3	3	PAECC	
4	AR507	Housing	9	3	0	0	3	PC	
5		Programme Elective 6 (S)	9	0	0	4	4	PE	
6		Programme Elective 7	9	3	0	0	3	PE	
7		Programme Elective 8	9				3	PE	
SEMESTER 10 (3 + 1 PE)									25
1	AR502	Building Economics and Construction Management	10	2	1	0	3	PAECC	
2	AR504	Professional Practice	10	3	0	0	3	PAECC	
3	AR506	Architectural Design Thesis	10	0	0	16	16	PC	
4		Programme Elective 9	10				3	PE	
								Total	**275**

Note: Categories as per COA (Minimum Standards of Architectural Education) Regulations, 2020

PC – Program Core
BS & AE - Building Sciences and Applied Engineering
PE - Professional Electives
OE – Open Elective
PAECC - Professional Ability Enhancement Compulsory Courses
SEC - Skill Enhancement Courses

S. No.	Course Code	Name of Elective	Sem	L	T	P	C
SEMESTER 5							
1. Program Elective – 1							
a	AR351	Sustainable Architecture	5	3	0	0	3
b	AR353	Disaster Mitigation and Management	5	3	0	0	3
c	AR355	Traditional knowledge systems of the built environment in South India	5	3	0	0	3
d	AR357	Society, Culture & Built Environment	5	3	0	0	3
e	AR359	Design thinking and innovations	5	3	0	0	3
2. Program Elective – 2 (S)							
a	AR361	Vernacular Architecture	5	0	0	4	4
b	AR363	Interior Design	5	0	0	4	4
c	AR365	Parametric Design Lab	5	0	0	4	4
SEMESTER 6							
3. Program Elective – 3 (S)							
a	AR352	Graphic Design	6	0	0	4	4
b	AR354	Building Science Laboratory for Architecture	6	0	0	4	4
c	AR356	Metaverse Architecture	6	0	0	4	4
4. Open Elective – 1							
a	AROE02	Innate Intelligence and Holistic Well-being	6	2	0	1	3
b	___XX*	Open Electives / Online Courses	6				3
*X- Even Number							
SEMESTER 7							
5. Program Elective - 4 (S)							
a	AR451	Furniture design Workshop	7	0	0	4	4
b	AR453	Environmental Control and Design Workshop	7	0	0	4	4
c	AR455	Landscape Design	7	0	0	4	4
d	AR457	Advanced Building Information Modelling (BIM)	7	0	0	4	4
6. Program Elective - 5							
a	AR459	Facilities Programming	7	3	0	0	3
b	AR461	Cost Efficient Construction Techniques	7	3	0	0	3
c	AR463	Earthquake Resistant Building Design	7	3	0	0	3
d	AR465	Architecture for the Extreme Built Environment	7	3	0	0	3

S. No.	Course Code	Name of Elective	Sem	L	T	P	C
7. Open Elective 2							
a	AROE03	Digital twins for smart cities	7	1	2	0	3
b	___YY**	Open Electives/ Online Courses	7				3
**Y - Even Number							
SEMESTER 9							
8. Program Elective - 6 (S)							
a	AR551	Product Design	9	0	0	4	4
b	AR553	Architectural Design Lab with AI and Prompt Engineering	9	0	0	4	4
c	AR555	People, Place, and Urban Experience Studio	9	0	0	4	4
d	AR557	Alternative Construction Techniques and Practices	9	0	0	4	4
9. Program Elective - 7							
a	AR559	Environment and Behaviour	9	3	0	0	3
b	AR561	Industrial Architecture	9	3	0	0	3
c	AR563	Net Zero Buildings	9	3	0	0	3
10. Program Elective - 8							
a	AR565	Construction Technology	9	3	0	0	3
b	AR567	Environmental Planning	9	3	0	0	3
c	AR569	Architectural Entrepreneurship	9	3	0	0	3
d	AR571	Introduction to Geospatial Techniques	9	1	0	2	3
SEMESTER 10							
11. Program Elective - 9							
a	AR552	Building Automation and Management Systems	10	3	0	0	3
b	AR554	Architectural Conservation	10	3	0	0	3
c	AR556	Architectural Journalism and Photography	10	2	1	0	3
d	AR558	Tall Buildings: Architecture and Performance	10	3	0	0	3

Note: “S” refers to Studio

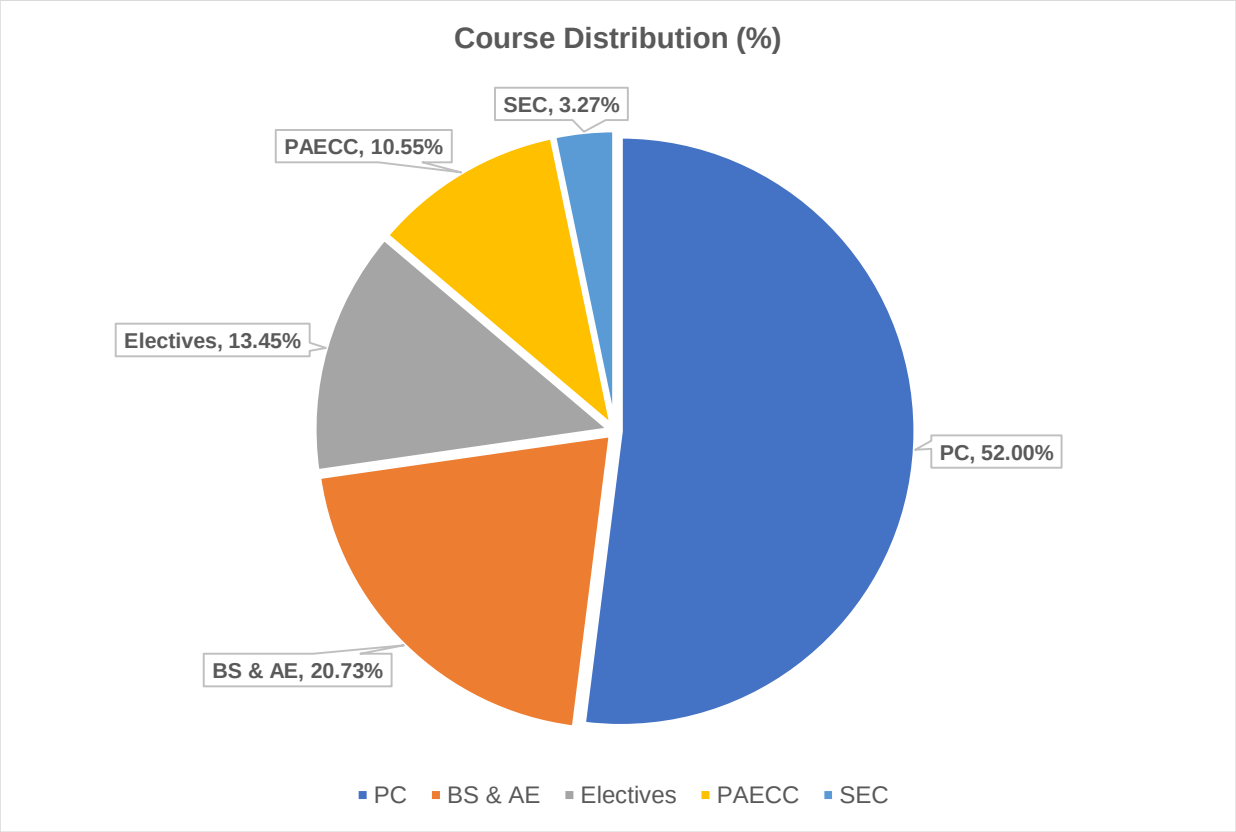
PROGRAM EECTIVE CATEGORY MAPPING

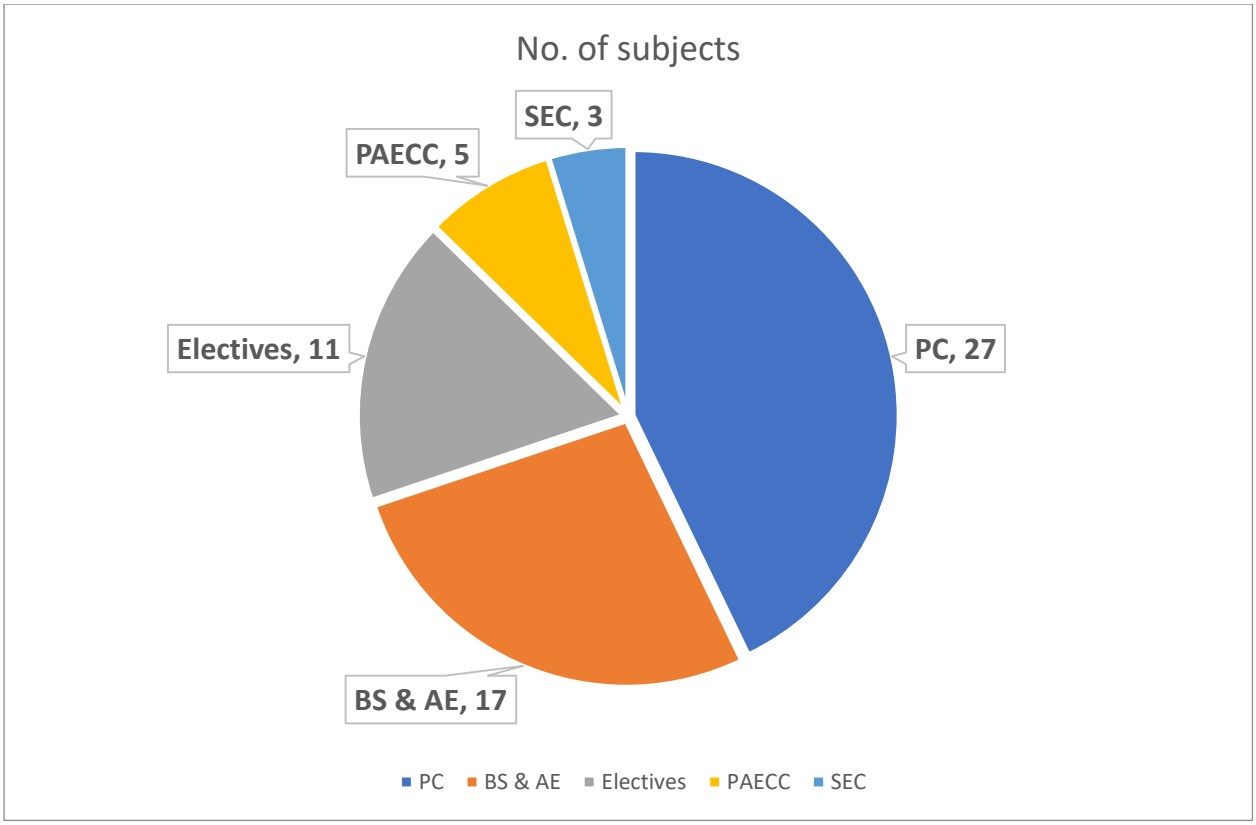
S. No.	Course Code	Name of Elective	Categories
1		**Program Elective - 1**	
a	AR351	Sustainable Architecture	Sustainability & Environment
b	AR353	Disaster Mitigation and Management	Building Science, Construction & Technological Advancements
c	AR355	Traditional knowledge systems of the built environment in South India	Architecture Specialisation
d	AR357	Society, Culture & Built Environment	Humanities, Architecture Theories & Interdisciplinary Learning
e	AR359	Design thinking and innovations	Professional Skills Upgradation
2		**Program Elective - 2 (S)**	
a	AR361	Vernacular Architecture	Architecture Specialisation
b	AR363	Interior Design	Design Specialisation
c	AR365	Parametric Design Lab	Digital Technology
3		**Program Elective - 3 (S)**	
a	AR352	Graphic Design	Design Specialisation
b	AR354	Building Science Laboratory for Architecture	Sustainability & Environment
c	AR356	Metaverse Architecture	Digital Technology
4		**Program Elective - 4 (S)**	
a	AR451	Furniture design Workshop	Design Specialisation
b	AR453	Environmental Control and Design Workshop	Sustainability & Environment
c	AR455	Landscape Design	Architecture Specialisation
d	AR457	Advanced Building Information Modelling (BIM)	Digital Technology
5		**Program Elective - 5**	
a	AR459	Facilities Programming	Professional Skills Upgradation
b	AR461	Cost Efficient Construction Techniques	Building Science, Construction & Technological Advancements
c	AR463	Earthquake Resistant Building Design	Architecture Specialisation
d	AR465	Architecture for the Extreme Built Environment	Sustainability & Environment

S. No.	Course Code	Name of Elective	Categories
6		**Program Elective – 6 (S)**	
a	AR551	Product Design	Design Specialisation
b	AR553	Architectural Design Lab with AI and Prompt Engineering	Digital Technology
c	AR555	People, Place, and Urban Experience Studio	Humanities, Architecture Theories & Interdisciplinary Learning
d	AR557	Alternative Construction Techniques and Practices	Building Science, Construction & Technological Advancements
7		**Program Elective - 7**	
a	AR559	Environment and Behaviour	Humanities, Architecture Theories & Interdisciplinary Learning
b	AR561	Industrial Architecture	Architecture Specialisation
c	AR563	Net Zero Buildings	Sustainability & Environment
8		**Program Elective - 8**	
a	AR565	Construction Technology	Building Science, Construction & Technological Advancements
b	AR567	Environmental Planning	Sustainability & Environment
c	AR569	Architectural Entrepreneurship	Professional Skills Upgradation
d	AR571	Introduction to Geospatial Techniques	Digital Technology
9		**Program Elective - 9**	
a	AR552	Building Automation and Management Systems	Building Science, Construction & Technological Advancements
b	AR554	Architectural Conservation	Architecture Specialisation
c	AR556	Architectural Journalism and Photography	Professional Skills Upgradation
d	AR558	Tall Buildings: Architecture and Performance	Sustainability & Environment

Course Distribution

		Credits	Percentage	No. of subjects
Program Core (PC)		143	52.00%	27
Building Sciences and Applied Engineering (BS and AE)		57	20.73%	17
Electives		37	13.45%	11
	Professional Electives (PE)	(31)	(11.27%)	(9)
	Open Electives (OE)	(6)	(2.18%)	(2)
Professional Ability Enhancement Compulsory Courses (PAECC)		29	10.55%	5
Skill Enhancement Courses (SEC)		9	3.27%	3
Total		**275**		




No. of subjects
SEC, 3
PAECC, 5
Electives, 11
PC, 27
BS & AE, 17
PC
BS & AE
Electives
PAECC
SEC

SEMESTER – 1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	AR101	ENVIRONMENTAL SCIENCE	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To provide exposure to various concepts related to understanding various aspects of the environment.
CLO2	To understand the impact of use of natural resources on the environment.
CLO3	To learn the role of individual in conservation of natural resources.
CLO4	To learn the importance of biodiversity and its conservation.
CLO5	To understand the relation between social issues and the environment.

Course Outcomes

Code	Outcome
CO1	Enables to design buildings which are environmentally sensitive.
CO2	Enables to design buildings which provide less load on natural resources.
CO3	Makes students to be sensitive to all living organisms.
CO4	Enables students to be a socially responsible individual.
CO5	Encourages students to contribute to improving the environment.

Course Content

Natural resources and associated problems. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Concept, Structure and function of an ecosystem. Energy flow in the ecosystem. Introduction, types, characteristic features, structure and function of various ecosystems.

Biodiversity: Genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: Biodiversity at global, national and local levels. Hot spots of biodiversity. Threats to biodiversity: Endangered and endemic species of India. Conservation of biodiversity.

Environmental Pollution: Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution. Role of an individual in prevention of pollution. Disaster management: Floods, earthquake, cyclone and landslides.

Social Issues: Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. Environmental ethics. Climate changes and global warming. Environmental protection Act. Public awareness.

Human Population: Population growth, Population explosion, Environment and human health. Human rights. Value education. HIV / AIDS, Women and Child Welfare. Role of information Technology in Environment and human health.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Agarwal, K. C. (2001). Environmental biology (4th ed.). Nidi Publishers.
2. Bharucha, E. (2005). Textbook of environmental studies for undergraduate courses. University Grants Commission / Universities Press (India) Pvt. Ltd.
3. Cunningham, W. P., & Cunningham, M. A. (2008). Principles of environmental science: Inquiry and applications (5th ed.). McGraw-Hill Education.
4. Miller, G. T., & Spoolman, S. (2014). Environmental science (14th ed.). Cengage Learning.
5. Textbook for Environmental Studies – Erach Bharucha

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1					3				2		
CO2					3						
CO3		2									
CO4						1					
CO5					3						

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	**AR103**	**ARCHITECTURE OF EARLY CIVILIZATIONS**	**3**	**3**	0	0	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the evolution of architecture from prehistoric times
CLO2	Understand how architectural style evolves in response to contextual factors
CLO3	Identify the distinguishing characteristics of the various architectural styles
CLO4	Learn to identify, understand and analyse the salient features of important buildings representative of each of the architectural styles under discussion
CLO5	Learn, understand and analyse the planning principles, the relationship between architectural form and function and the use of materials, methods and systems appropriate to the function and context

Course Outcomes

Code	Outcome
CO1	Demonstrate knowledge and understanding of the evolution of architecture and architectural styles, their features and contextual influences
CO2	Demonstrate knowledge and understanding of building typologies, key buildings, design principles, appropriate application of materials, methods and systems in response to function and context
CO3	Apply critical thinking and analytical skills in the evaluation and comparison of architectural works
CO4	Demonstrate research skills in investigating architectural history
CO5	Demonstrate visual literacy – the ability to interpret and understand architectural drawings and models; and visual communication skills in architectural representation through drawings and models

Course Content

Introduction to Ancient World Architecture - A brief outline of the Neolithic revolution and its impact on built forms – brief study of a few. Neolithic settlements – Jericho, Catal Huyuk, Hassuna, Koln-Lindenthal & Skara Brae

Overview of the architectural styles of the ancient world - factors influencing the style – salient features of the style – key examples – comparative study of all the styles of the ancient world

Egyptian Architecture – factors influencing the style – salient features of the style – building typologies - Evolution of Pyramids & cult temples –detailed study of the pyramid of Cheops, Giza, temple of Ammon, Karnak.

Early Mesopotamian Architecture - factors influencing the style – salient features of the style – building typologies - detailed study of Ziggurat of Urnammu, Ur.

Assyrian Architecture - factors influencing the style – salient features of the style – building typologies - detailed study of the Palace of Sargon, Khorsabad.

Persian Architecture - factors influencing the style – salient features of the style – building typologies - detailed study of the Palace at Persepolis

Greek Architecture - factors influencing the style – salient features of the style - detailed study of important construction techniques, visual refinement (Optical correction), The Greek Orders - – building typologies - brief description of the urban spaces, temples & other public buildings, Greek houses etc. – detailed study of the Agora, Acropolis, Parthenon, Erechtheion & Theatre at Epidaurus - all in Athens.

Roman Architecture – factors influencing the style – salient features of the style – a brief account of materials, structural systems adopted and construction techniques - the Roman Orders - a short description of Roman urban spaces and building typologies - temples, thermae, basilicas, theatres, amphitheatres, circuses & houses – detailed study of the Pantheon, Colosseum, thermae of Hadrian, theatre of Marcellus, Basilica of Constantine, all at Rome

Early Christian Architecture - factors influencing the style – salient features of the style - evolution of church form – detailed study of (old) St. Peters, Rome.

Byzantine Architecture - factors influencing the style – salient features of the style -technique adopted to construct domes over square spaces – detailed study of the Hagia Sophia, Constantinople

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Sir Banister Fletcher, "A History of Architecture", Butterworth Heinmann, 19th or 20th edition, 1987.
2. Francis D. K. Ching, Mark M. Jarzombek & Vikramaditya Prakash, "A Global History of Architecture", 3rd Edition, Wiley, 2017
3. "History of World Architecture (series): Vols. Titled Ancient Architecture, Primitive architecture, Greek architecture, Roman architecture & Byzantine architecture", 1980.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	3	1	1	3	1	1	3	2	1	-
CO2	2	3	1	1	3	1	1	3	2	1	-
CO3	3	3	-	1	3	2	2	3	2	1	-
CO4	2	3	-	1	2	1	3	3	2	1	-
CO5	3	3	1	1	3	1	2	3	2	1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	AR105	THEORY OF ARCHITECTURE	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the basic knowledge about architecture and design theory
CLO2	To identify and analyse key design elements, principles, and architectural concepts.
CLO3	To evaluate aesthetic and beauty concepts in design and assess their impact on user experience.
CLO4	To examine and interpret the relationship between architectural form and function through design analysis.
CLO5	To describe and apply architectural design methodologies and programming processes in architectural project development

Course Outcomes

Code	Outcome
CO1	Ability to identify and explain fundamental architectural theories and design principles.
CO2	Capability to apply architectural theories and principles to practical design problems and case studies.
CO3	Potential to analyse architectural concepts and apply them to real-world design situations with contextual relevance.
CO4	Competence to evaluate the relationship between form and function and arrive at design solutions that reflect their integration.
CO5	Ability to synthesize theoretical knowledge to develop a personal design philosophy and demonstrate readiness for leadership in architectural practice.

Course Content

An Introduction to Architecture. Scope of architecture. Context of built environment/ architecture in the fulfilment of human needs: functional, aesthetic and psychological, and the Architect's role in creation of the built environment. Vitruvian principles of architecture. Elements of architecture- Basic elements: Point, line, plane & volume. Qualities of shape, colour, texture, scale, proportion; qualities of surfaces, edges and openings; Principles of Design - Form, space and their organizational pattern, relationships, hierarchy. Ordering principles. Concept of beauty and aesthetics- varying dimensions- Philosophical, psychological, subjective & objective variations, social, regional & temporal variations. Basic principles of visual perception. Experiencing Architecture: Circulation- approach and entry, path configuration and access, sequence of spaces. Multi-sensory dimension of architectural design- Light, view, touch, hearing and smell. Relationship of form and function in architecture. Elaboration on "function" in architecture-

Pragmatic function, circulatory function, symbolic function, psychological function, cultural and contextual function etc. Importance of incorporation of empathy in design. Introduction to Architectural design methodology and processes- Architectural programming- user requirements, needs, aspirations, socio cultural factors, economic factors, legal restraints, user activity spatial analysis; Site analysis; concept development; schematic design; working drawings; site execution. Liaison with other experts- Structural, services, construction, management etc.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Ching, F. D. K. (2007). Architecture: Form, space, and order. Van Nostrand Reinhold Company.
2. Pramar, V. S. (1973). Design fundamentals in architecture. Somaiya Publications.
3. Unwin, S. (2003). Analysing architecture. Routledge.
4. Pandya, Y. (2007). Elements of space making. Mapin.
5. Smithies, K. W. (1983). Principles of design in architecture. Chapman & Hall.
6. Van der Voordt, T. J. M., & Van Wegen, H. B. R. (2005). Architecture in use: An introduction to the programming, design, and evaluation of buildings. Architectural Press.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	3			3	3			3		
CO2	2	3			3				3		
CO3					3	3	1		2		
CO4	2	3							3		
CO5							2				2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	**AR 107**	**ARCHITECTURAL GRAPHICS AND GEOMETRIC REPRESENTATION**	**4**	**1**	0	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the basic principles of architectural graphics as an essential language for architects
CLO2	To apply representative fraction and the different types of scales adopted in architecture
CLO3	To comprehend the four different quadrants and their respective location. Orthographic projection (first and third angle) in detail.
CLO4	To visualize sections of solids, true sections, intersection of solids and development of surfaces.
CLO5	To construct the scale used for isometric projection and to work with isometric views and projections.

Course Outcomes

Code	Outcome
CO1	Become familiar with drafting, dimensioning, lettering and simple geometric construction.
CO2	Use of Plain scales, diagonal scales and comparative scale and to identify the scale factor for a given architectural drawing.
CO3	Become familiar with third angle projection and drawing plans and elevation (top and front view) of points, lines, planes and solids.
CO4	Able to work with cut solids, true shape of sections, intersection/interpenetration of solids and identify the lines of intersection, radial line and parallel line development of the lateral surface of solids.
CO5	Advantages and use of Isometric. Construction of isometric scale and drawing of isometric projection for simple and complex examples. Exercise on a simple measured drawing.

Course Content

Essentials and Principles of Architectural Graphics: Lines, Lettering, Dimensioning and application of simple Geometric Construction. Introduction to Scales, Representative Factor, Plain Scale, Diagonal Scale and Comparative Scale and its use in Architectural Drawings.

Introduction to Orthographic Projection: The Four Quadrants and the types of projection. Third Angle and First Angle Projection. Projection of Points, Lines and Planes. Orthographic Projection of Solids with emphasis on the First Angle method. Introduction to Projection on the Profile Plane/

Auxiliary Projection. Simple and Complex Solids, Shifting of the Object and Moving of the Plane. Sections of Solids and True Shape of the Section. Intersection/ Interpenetration of Solids.

Development of Surfaces: Parallel line and Radial line Development. Isometric Drawing and Projection: Difference between Isometric View and an Isometric Projection. Construction of Isometric scale- Methods. Simple and Complex Solids. Learning to observe, measure and draw to scale the plans, elevations of simple objects such as Furniture and small Buildings.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Ching, Francis D.K. (2015), Design Drawing, 2nd Edition, Wiley K.L.Narayana & P.Kanniah, "Engineering Graphics - 1st angle projection", Tata McGraw Hill publishing company, NewYork,1992.
2. Prof. Vee Ess, “Step by Step Engineering Drawing (1st angle projection)", V.K.Publishers, Bangalore, 1990.
3. George A. Dinsmore, "Analytical Graphics", Van Nostrand Company Inc., Canada,1968.
4. Thomas E French, Charles J. Vierck & Robert J. Foster, "Graphic Science & Design", International Edition, McGraw Hill Co., NewYork,1986.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2										
CO2	1				2						
CO3	2										
CO4	1										
CO5	1				2						

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	**AR109**	**COMMUNICATIVE ENGLISH**	**3**	**2**	0	**1**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To develop reading strategies such as skimming, scanning, predicting, and inferring for better comprehension.
CLO2	To enhance listening skills through structured talks and academic lectures.
CLO3	To improve verbal communication through speeches, dialogue practice, and extempore speaking.
CLO4	To strengthen written communication by constructing effective sentences and cohesive paragraphs.
CLO5	To familiarize students with the use of library resources and referencing tools.

Course Outcomes

Code	Outcome
CO1	Apply reading techniques to comprehend academic texts and identify key information.
CO2	Demonstrate effective listening and note-taking skills during lectures and recorded talks.
CO3	Express ideas fluently and clearly in social and academic situations through structured speech.
CO4	Write concise and well-organized content including technical definitions, descriptions, and summaries.
CO5	Utilize library resources efficiently for academic research and improve vocabulary through contextual learning.

Course Content

Skimming, scanning, inferring, predicting, and responding to content - guessing the meaning of words from contexts - note-making and vocabulary extension. Listening and understanding recorded, structured talks and classroom lectures - comprehending the matter - understanding the links between different parts of speech - practice in note-taking. Features of an effective speech - practice in speaking fluently - dialogue practice - simple social exchanges - short extempore talks. Effective sentences - cohesive paragraphs - clear and concise writing - introduction to technical writing - definition, description, instruction - summary writing practice. Use of library - role of bibliography, table of contents, index, etc. - use of dictionary.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Bailey, S. (2017). Academic writing: A handbook for international students (5th ed.). Routledge.

2. Goleman, D. (2006). Social intelligence: The new science of human relationships. Bantam Books.
3. Jones, L. (2007). The student's book of speaking skills. Cambridge University Press.
4. Swan, M., & Walter, C. (2014). Oxford English grammar course: Advanced. Oxford University Press.
5. Wallace, M. J. (2004). Study skills in English (2nd ed.). Cambridge University Press.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	2	2	1	2	2	3	1	1	1	2
CO2	1	2	2	1	2	2	3	1	1	1	2
CO3	2	2	2	1	3	3	2	1	1	2	3
CO4	2	3	2	1	2	3	2	1	1	2	3
CO5	1	2	1	1	2	2	3	1	1	1	2

Sem	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	**AR111**	**BASIC AND ARCHITECTURAL DESIGN – I**	**9**	**0**	**0**	**9**	**9**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To introduce design as a way of thinking and communication
CLO2	To understand the elements and the principles of design through exercises that will develop originality, expression, skill and creative thinking
CLO3	To involve students in a number of exercises to understand the grammar of design and visual composition
CLO4	To enable understanding of 2D and 3D composition
CLO5	To prepare for the understanding between grammar of design and architecture

Course Outcomes

Code	Outcome
CO1	Ability to express and represent ideas using grammar of design and visual composition
CO2	Ability to create original 2D/ 3D compositions using principles of design
CO3	Development of skills and Implementation of ideas using form construction
CO4	Ability to compare and critically evaluate designs using fundamentals learnt
CO5	Ability to Interpret and make the connections between designer, design, society and environment

Course Content

Understanding Basic Elements of Visualisation, Principles of design and composition through simple and creative exercise on balance, proportion, order, symmetry, rhythm, etc., using points, lines, shapes, planes, solids, texture, colour, pattern, etc

Translating complex ideas through abstraction, typography and composition.

Fundamentals involved in 2-dimensional and 3-dimensional design - 2D visual studies: Representation and transformation of idea and image through 2D elements, Story Telling and communication through design; 3D visual studies: Exploration of aesthetics, identity, expressions. Simple introduction to form construction, Models to understand the evolution of three-dimensional forms from two dimensional shapes. Medium of exploration may be paper, boards, wires, glass, wood, discarded materials, Plaster of Paris, Materials of various textures and mixed media.

Studies in light and shadow on 3-dimensional Forms.

Design as a medium for the communication and expression of Society, Culture and Environment.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Ching, F. D. K. (2014). Architecture: Form, space, and order (4th ed.). Wiley.
2. Eckler, J. F. (2012). Language of space and form: Generative terms for architecture. Wiley.
3. Ocvirk, O. G., Stinson, R. E., Wigg, P. R., Bone, R. O., & Cayton, D. L. (2012). Art fundamentals: Theory and practice. McGraw-Hill Education.
4. Stewart, M. (2011). Launching the imagination: A comprehensive guide to basic design. McGraw-Hill.
5. Vyas, K. (2009). Design and environment: A primer. National Institute of Design.
6. Zelanski, P., & Fisher, M. P. (2006). Shaping space: The dynamics of three-dimensional design. Cengage.
7. Pramar, V. S. (1997). Design fundamentals in architecture. Somaiya Publications Pvt. Ltd.
8. Wallschlaeger, C., & Busic-Snyder, C. (1992). Basic visual concepts and principles for artists, architects, and designers. McGraw-Hill.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	3	3	-	1	-	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	-	-
CO3	2	3	2	-	-	-	-	-	-	-	-
CO4	-	2	-	-	-	-	1	-	-	-	-
CO5	-		-	-	2	1	-	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
1	**AR113**	**FUNDAMENTALS OF DRAWING AND SKETCHING**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To Introduce elements of art through exercises using lines, shapes, form, Color, value and texture.
CLO2	To develop freehand sketching skills and visual perception & thinking by drawing still life objects, furniture, equipment etc., by observing in the art studio.
CLO3	To develop outdoor sketching skills by observing the buildings in the present environment around us.
CLO4	To develop through understanding of human anatomy by sketching for anthropometric studies.
CLO5	To Enable the students to render with pen and ink outdoor environment with human figures and details with an observation skill to express it in interesting way using different mediums like graphite pencils, charcoal, pen& ink on different and appropriate papers.

Course Outcomes

Code	Outcome
CO1	Create interesting art composition and schemes with the acquired adequate knowledge on elements of arts.
CO2	Create and implement the concepts with basic principles of Composition of still life objects.
CO3	Formulate the strong techniques of Composition of with different grades of pencils depending upon the need of the assignment or project
CO4	Excel in expressing the concepts with graphical communication skills in a professional way.
CO5	Create and implement compositional concepts by observing outdoor environment with Human figures and other essential elements of environment using graphite pencils, charcoal and pen and ink medium.

Course Content

Knowledge on elements of Art: Line, shapes, form, space, colour, value & texture - exercises Pertaining to comprehension of the elements of art. Medium: pencils

Comprehension of principles of Art: Balance, unity, pattern, emphasis, movement, rhythm & contrast and applying the principles by doing rendering exercises to explain this condition. Medium: pencils

Free hand drawing exercises to comprehend and develop visual perception & thinking with the understanding of light and shade by drawing still life objects, furniture, equipment and Home appliances. Medium: Different grades of pencils.

Outdoor exercises sketching with the understanding of light and shades of settings like buildings, streets, rows of buildings and human figures. Understanding of anatomy for anthropometric studies. Medium: Different grades of pencils.

Exercises for Applying the skills of rendering of still life composition and human figure and landscape with knowledge of light and shades in different mediums in order to provide sufficient training and practice in using various qualities of pencils, pen & ink. (Pencil, Charcoal, Lumograph Pencil).

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

References:

1. Wayne Enstice, Melody Peters, 1990. "Drawing space, Form, Expression", Prentice hall, Englewood Cliffs, New Jersy.
2. Palmer John, 1993 "Drawing & Sketching", Brock Hampton Press, London,
3. Muneesh Kumar 2010. Fundamentals of Visual Arts , Doaba Publications.
4. Jake, S. (2018). How to Draw Sketch and Draw Anything, Anywhere. Ilex Press.
5. Pereznieto, Leonardo. (2021). Basics of Drawing: Ultimate guide for beginners. Get Creative 6

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	**3**	**2**	**3**	**-**	**-**	-	-	-	-	-	-
CO2	**3**	**2**	**3**	**-**	**-**	-	-	-	-	-	-
CO3	**3**	**2**	**3**	**-**	**-**	-	-	-	-	-	-
CO4	**3**	**2**	**3**	**2**	**3**	-	-	-	-	-	-
CO5	**3**	**1**	**3**	**1**	**2**	-	-	-	-	-	-

SEMESTER – 2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	AR102	COMPUTER-AIDED DESIGN: TOOLS AND TECHNIQUES FOR ARCHITECTURE	3	1	2	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Demonstrate understanding of key features, commands, and tools in CAD relevant to architectural drawing, including the use of drawing aids, geometric construction tools, and editing functions.
CLO2	Understand the process of setting up and organizing drawings in CAD, including managing layers and utilizing blocks for more efficient design.
CLO3	Apply CAD's advanced geometry editing and drafting tools to create and edit architectural drawings, ensuring accuracy and precision.
CLO4	Analyze the structure of CAD drawings by using inquiry tools to interpret and manipulate drawing data, and apply customization features such as hatch patterns, layers, and dimension styles to enhance architectural representations.
CLO5	Develop cohesive architectural drawing workflows in CAD by integrating multiple functionalities—importing/exporting files, embedding OLE objects, and generating detailed presentations—into a unified design process.

Course Outcomes

Code	Outcome
CO1	Proficiency in using CAD for creating accurate and detailed architectural drawings.
CO2	Knowledge of organizing and managing drawing elements using layers, blocks, and attributes in CAD.
CO3	Ability to apply advanced CAD tools such as geometry editing, text annotation, and dimensioning to enhance drawing precision.
CO4	Competence in working with CAD’s design center, plotting, and printing functionalities for presenting and sharing architectural designs.
CO5	Ability to incorporate OLE objects, work with external data, and create detailed presentations using CAD tools.

Course Content

Basic concepts of Computer-Aided Design (CAD), introduction to precision drawing techniques, geometric shapes, and drawing aids.

Setting up the drawing environment, creating templates, managing views, and organizing drawings with layers.

Geometry editing tools, creating and using blocks, integrating blocks into drawings, Design Center, inquiry tools for drawing organization and data extraction.

Creation and management of text annotations, dimension styles, hatch patterns, customizing text and dimension styles, ensuring consistency in architectural drawings.

Printing and plotting drawings, configuring plot styles, creating layouts, data management, importing and exporting files, object linking and embedding (OLE) for external data integration.

Course Assessment Methods: Continuous Assessment and End Assessment

Learning Resources & References:

1. Linton, S., & McCabe, D. (2018). The Essential Guide to Computer Applications in Architecture. Elsevier.
2. Mastering AutoCAD 2015 and AutoCAD LT 2015: by George Omura& Brian C. Benton (Jul 2014)
3. Autodesk. (2019). AutoCAD 2020 for Architecture: A Power Guide for Beginners and Intermediate Users. CADArtifex.
4. Jefferis, A., & Madsen, D. (2021). Architectural Drafting with AutoCAD 2021.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	-	-	1	-	3	-	-	-	-
CO2	2	-	-	3	-	-	3	1	-	-	-
CO3	-	-	-	2	3	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	2
CO5	-	-	-	-	-	2	-	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR104**	**HISTORY OF INDIAN ARCHITECTURE**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To identify and differentiate key architectural styles across the Indian subcontinent, noting their historical and regional characteristics.
CLO2	To analyse the influence of socio-cultural factors on architectural development and design practices.
CLO3	To explore and evaluate ancient architectural heritage and traditional building technologies within historical contexts.
CLO4	To examine the properties and assess the architectural applications of various building materials.
CLO5	To analyse and critique the aesthetic qualities and distinctive features of architecture of the past

Course Outcomes

Code	Outcome
CO1	Ability to identify and differentiate major architectural styles across the Indian subcontinent based on their historical, geographical, and cultural contexts.
CO2	Competence to analyse how socio-cultural, religious, and political factors have shaped architectural development and design ideologies in different regions of India.
CO3	Capability to explore significant examples of ancient architecture and evaluate the relevance and innovation of traditional building technologies in historical contexts.
CO4	Potential to examine the properties of various traditional and regional building materials and a**ssess** their functional and aesthetic roles in architecture.
CO5	Ability to analyse and critique the aesthetic richness and distinctive architectural features of heritage structures, with an emphasis on proportion, ornamentation, and spatial composition.

Course Content

Outline of ancient Indian architecture: the Indus valley civilization - city planning, one typical residence, granary, great bath; Evolution of early Aryan architectural forms - impact on architecture of later days; Outline of Buddhist architecture: the Hinayana and Mahayana phases; Evolution of the form of the Hindu temple – Gupta and early Chalukyan temples. South Indian Hindu architecture**:** Pallava Architecture - Rock-cut rathas & mandapas, Shore temple, Mahabalipuram, Kailasanathar temple &Vaikunthaperumal temple, Kanchipuram; Chola Architecture: Brihadeswara temple, Thanjavur; Pandya & Madura Styles - Evolution of the Gopuram, City planning, Meenakshi temple, Madurai & Temple at Srirangam; Hoysala Style.: Temple at Belur; A comparative study of all the South Indian styles. Hindu architecture of other Regions: Orissa Style: Lingaraja temple, Bhubaneshwar; Gujarat Style. (Hindu & Jain): Dhilwara temple, Mt. Abu; A

comparative study of the Dravidian and Indo-Aryan styles; Indo Islamic architecture - Advent of Islamic architecture in India – background, characteristic elements, typical buildings – mosques, tombs etc.; Imperial era: Slave kings - Qutub mosque, Qutub Minar, Tomb of Nasir-ud-din-Mohammed shah, Khilji dynasty - Alai Darwaya, Tughlaq Dynasty - Tomb of Ghiyas - ud - din Tughlaq, Kirki mosque, Delhi. Sayyid and Lodi Dynasty - Development of Octagonal & Square tombs, Mothi - Ki - Masjid. Provincial styles : Gujarat - earlier period – Mosque at Broach, Jami Masjid at Ahmedabad, middle period - Mosque at Champanir, Teen Darwaza, later period - Siddi Sayad mosque, Adalaj - step well; Outline idea of Bijapur style; Mughal architecture: Babur - Humayuns Tomb – Delhi, Akbar - Agra fort, Fathepursikri - site planning, Jodhabais palace, Birbal palace, Diwan-e- khas, Salim Chisti's Tomb & Buland Darwaza; Jahangir - Akbar's mausoleum at Sikandra, Shah - Jahan Taj - Mahal - Agra.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Brown, P. (1978). Indian architecture: Buddhist & Hindu periods. Taraporewala & Sons.
2. History of world architecture series. (1980). Oriental/Faber & Faber Ltd.
3. Brown, P. (1983). Indian architecture (Islamic period). D.B. Taraporevala Sons & Co.
4. Kamiya, T., Lopez, A., & Parameshwaran, G. (2009). The guide to the architecture of the Indian subcontinent. Architecture Autonomous.
5. Hardy, A. (1995). Indian temple architecture: Form and transformation - The Karnataka Dravida tradition 7th to 13th centuries. Abhinav Pubns.

	PROGRAM OUTCOME										
	1	2	3	4	5	6	7	8	9	10	11
CO1		3			3						
CO2		3			3	3					
CO3				1							
CO4			2					1	2		
CO5			2								1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR106**	**MECHANICS OF SOLIDS**	**3**	**2**	**1**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the basics of building materials their types and properties
CLO2	To study the mechanics and geometry of structural elements with fundamentals
CLO3	To analyse the beams with kinds of loads for Shear forces and Bending Moments
CLO4	To derive the various factors and their relation in theory of simple bending
CLO5	To study and analyse types of plane trusses for their member forces

Course Outcomes

Code	Outcome
CO1	To develop the knowledge in the mechanics of materials and their application
CO2	To analyse the structural elements and their behaviour and equilibrium
CO3	To study the different factors and their relation for the structural elements in bending
CO4	To know the geometry of structures with the stability and behaviour
CO5	To understand the roof trusses and their analysis by different methods

Course Content

Elasticity - stress & strain - Types of stresses - elastic limit - Hooke's law - modulus of elasticity (young's modulus)- deformation of a body due to force acting on it - stresses in composite bars - relation between elastic constants. Introduction to strain energy.

Centroid - centre of gravity of simple figures - C.G. by geometrical considerations - solid bodies - C.G. with cut out holes - moment of inertia - theorems of M.I. of parallel & perpendicular axes - M.I. of a circular section, hollow section - M.I. of composite sections - modulus of section.

Beams & support conditions - types of supports, shear force and bending moment diagrams for simply supported beams, cantilevers, and overhanging beams with concentrated, uniformly distributed and uniformly varying loads.

Theory of simple bending - stress distribution at a cross section due to bending moment and shear force moment of resistance - bending stresses in sections.

Statically determinate plane trusses, perfect and Imperfect frames - Deficient &Redundant frames - analytical methods for finding out the forces - method of joints.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. S.S. Bhavikatti, "Strength of Materials", VIKAS Publishing House Pvt. Ltd., Chennai,1997.

2. Vazirani & Ratwani, “Analysis of Structures", Khanna Publishers, NewDelhi,1996.
3. Khurumi, "Strength of Materials & Mechanics of Structures", Standard Publishing co. Ltd., New Delhi, 1996.
4. Srinath, "Advanced Mechanics of Solids", Tata McGraw Hill Co., New Delhi, 1996

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1										
CO2		2						1			
CO3								3			
CO4									2		
CO5								2			2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR108**	**PERSPECTIVE AND SCIOGRAPHY**	**4**	**1**	**0**	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Develop the ability to represent three-dimensional architectural forms through axonometric and perspective drawings.
CLO2	Understand the principles of sciography and its application in architectural drawings.
CLO3	Apply shade and shadow techniques to enhance the perception of depth in architectural representations.
CLO4	Construct accurate one-point and two-point perspective projections of buildings, interiors, and urban spaces.
CLO5	Utilize efficient perspective construction techniques for rapid visualization of architectural forms.

Course Outcomes

Code	Outcome
CO1	Generate accurate axonometric projections of simple and complex architectural forms.
CO2	Apply sciography principles to create realistic shade and shadow effects in architectural drawings.
CO3	Construct perspective views of interior and exterior spaces with precise spatial depth.
CO4	Develop advanced visualization skills using traditional and digital rendering techniques.
CO5	Enhance architectural presentations with efficient and expressive perspective drawing methods.

Course Content

Introduces the principles of *sciography*, focusing on the role of light, shade, and shadow in architectural representation. It begins with understanding the shadows cast by basic elements such as points, lines, and simple 2D planes, progressing to the sciography of fundamental three-dimensional solids including the cube, pyramid, prism, cone, and cylinder. Students explore how shadows behave on and around composite architectural forms and complex built structures. The practical application of sciography is examined in building plans and elevations, with an emphasis on integrating shades and shadows into site plans to reflect real-world lighting conditions and enhance visual realism.

In addition to sciography, the course covers the fundamentals of *perspective projection*, introducing essential concepts such as the picture plane, vanishing points, station point, horizon, cone of vision, and line of vision. It covers various types of perspective projections—one-point, two-point, and three-point—and trains students in the construction of both simple and complex geometric forms. Perspective views of interior spaces are developed using one-point and two-point perspectives,

including the application of sciography to depict shadows on walls, furniture, and other spatial elements. Exterior views of buildings are also represented in perspective, with shades and shadows added to enhance spatial depth and realism.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Ching, Francis D.K. (2015), Design Drawing, 2nd Edition, Wiley.
2. Shah, M.G., Kale, C.M., & Patki, S.Y. (2015), Building Drawing with an Integrated Approach to Built Environment, Tata McGraw-Hill.
3. Wakita, Osamu A., Linde, Richard M., & Bakhoum, Nagy R. (2011), The Professional Practice of Architectural Working Drawings, 4th Edition, Wiley.
4. Kuehn, Kevin Forseth (1994), Architectural Rendering: Techniques and Tips for Digital and Traditional Media, Watson-Guptill.
5. Gattegno, Tony (2013), Architectural Drawing Course: Tools and Techniques for 2D and 3D Representation, Thames & Hudson.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	-	2	-	-	-	-	-	-	2	-
CO2	3	-	2	-	-	-	-	-	2	2	-
CO3	3	-	2	-	2	-	-	-	2	2	-
CO4	3	2	3	2	2	2	2	-	-	3	2
CO5	3	2	3	2	2	2	2	-	-	3	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR110**	**BUILDING CONSTRUCTION & MATERIALS – I**	**4**	**1**	**0**	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To comprehend the different building components and their representation – like foundation, plinth, flooring, wall, roof, finishes, projections, openings
CLO2	To understand the concept of load bearing & framed structures through natural materials like mud, stone, bamboo, straw-bale
CLO3	To understand the properties of basic materials like mud, stone, bamboo straw bale
CLO4	To learn the principles of simple construction techniques
CLO5	To learn detailing of a basic building construction drawing

Course Outcomes

Code	Outcome
CO1	Ability to represent and understand building materials and components
CO2	Understanding of properties of basic materials and their applications
CO3	Understanding the principles of basic and simple construction using mud, stone, bamboo and straw
CO4	Understanding of principles of load bearing and framed structures through basic materials
CO5	Ability to make construction details using basic building materials

Course Content

BUILDING MATERIALS, COMPONENTS AND THEIR REPRESENTATION - Basic Components of a building – foundation, plinth, floor, wall, roof, finishes, openings, fins, sunshade, column, beam, footing, arches, lintel, sill, corbel, doors, windows, jaali, ventilators, staircase, elevators, escalators, ramp, etc.

Building vocabulary like basement, cellar, courtyard, atrium, mezzanine, penthouse, attic, skylight, clerestory, etc. Types of structures- load bearing & framed, methods of spanning, types of roofs.

Representation of building components in drawings, Representation of different materials in drawings- mud, brick, timber, glass, concrete, etc

MUD – types of soil, properties and composition of soil, soil testing, soil stabilizers, Common methods of mud wall construction-Cob, Adobe, Rammed Earth, Wattle and daub. Mud for roofing and flooring. Weather proofing and maintenance of mud structures. Foundation, walls, openings, roofing and composite construction using mud.

STONE- types of stone and their properties, strength testing of stone, selection of stone, types of stone masonry, jointing rubble and ashlar masonry, seasoning, dressing, artificial stones and its

application. Stone foundations, retaining walls, walls, arches, lintels, roofing, floorings, coping, finishes.

BAMBOO- bamboo anatomy, strength & properties of bamboo, processing, harvesting, treatment and preservation of bamboo, bamboo joints, bamboo working tools, application of bamboo for wall, roof, floor, foundations, finishes, doors and windows, arches, woven bamboo panels, composite construction, etc

STRAW & THATCH - Straw as a building material, properties, fire, moisture, insects, pests proofing; Straw bale construction for walls-properties, baling methods, sizes, load bearing and framed methods, plastering, protection; Walls, roofs, fences using straw and palm leaves

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Punmia,B.C & Jain, A.K(2016), A text book of Building Construction, Laxmi Publications.
2. McKay, W.B (2019), Building Construction, Vol -1,2 Pearson Education India.
3. Ching, F.D.K. (2019), Building Construction Illustrated, Wiley.
4. Baker, L (1993), Mud, COSTFORD.
5. Dukeeberg, K (2000), Bambus- Bamboo, Karl Kramer Verlag Stuttgart Germany.
6. Janssen, J.J.A. (2003), Building with Bamboo- A handbook, Practical Action Publishing.
7. Vivian,J (2014), Building Stone Walls, Storey Publishing, LLC.
8. Minke,G & Krick,B. (2020),Straw Bale Construction Manual, Birkhauser Architecture, 2nd ed.
9. The American Institute of Architects & Hall, D.J, Giglio N.M (2016), Architectural Graphic Standards, John Wiley & Sons

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	2	-	-	-	1	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	1	-	-
CO3	-	-	-	-	-	1	-	3	-	-	-
CO4	-	-	-	-	-	-	-	3	1	-	-
CO5	2	-	-	-	-	1	-	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR112**	**ARCHITECTURAL DESIGN – II**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111

Course Learning Objectives

Code	Learning Objectives
CLO1	To enable them to understand the principles of anthropometrics and their influence on built spaces.
CLO2	To develop skills in documentation and measured drawing of existing spaces.
CLO3	To foster problem-solving skills by involving them in the design of simple and functional spaces
CLO4	To introduce site, context and environment as determinants in architectural design.
CLO5	To facilitate students to translate abstract concepts to built form and to express architectural ideas through various presentation methods that enable creative thinking process.

Course Outcomes

Code	Outcome
CO1	Understand the site and the immediate context, and their role in shaping the design of the space.
CO2	Critically analyze a small liveable space in terms of its anthropometrical, aesthetical, and psychological needs and experiences.
CO3	Present architectural concepts through diagrams and illustrations, demonstrating an understanding of space functions, user requirements, and circulation patterns.
CO4	Ideate and design small-scale spaces with a comprehensive understanding of organization and sensitivity to users and the environment.
CO5	Display presentation skills using various techniques in 2D architectural drawings and 3D modelling.

Course Content

Study of anthropometrics and its influence on built spaces - Understand the relationship between form and function, Human comfort - Exercises on designing a common household article/ utility sculpture.

Documentation and measured drawing of an existing space/ a single room/ small building along with activity space analysis, circulation pattern and furniture layout. Exercise on the reorganization of an existing interior space for a different activity.

Developing designs for simple buildings – by understanding various factors in the context – spatial, functional, social, cultural, economic, and psychological needs by employing the usage of traditional/local materials and simple load bearing and basic framed structure. Analysis of existing spaces of similar functions and standards to understand these aspects better;

Development of form through application of design theories learnt in the previous semester.
Expressing ideas through the presentation of illustrations, architectural drawings and models.
Suggestive exercises: Design of Kiosk, Bus shelter, Booths, Small private space, Single activity area like Living/ Dining/ Bedroom/ Kitchen/Toilet.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Francis D. K. Ching, “Architecture: Form, Space, & Order”, 4th edition, John Wiley & Sons, 2014.
2. Francis D. K. Ching, “A Visual Dictionary of Architecture”, 2nd edition, John Wiley & Sons, 2012.
3. Francis D. K. Ching, “Architectural Graphics”, 6th edition, John Wiley & Sons, 2015.
4. Ernst Neufert and Peter Neufert, “Architects' Data”, 6th edition, John Wiley & Sons, 2023.
5. Joseph DeChiara, Julius Panero, and Martin Zelnik, “Time-Saver Standards for Interior Design and Space Planning”, 2nd edition, McGraw-Hill, 2001.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	1	-	-	3	-	-	-	2	-	1
CO2	2	3	-	-	3	-	-	-	-	-	-
CO3	1	3	2	-	1	-	1	-	-	-	-
CO4	3	2	-	-	1	1	1	1	1	1	-
CO5	2	2	3	-	1	-	1	1	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR114**	**DRAWING AND SKETCHING IN COLOUR**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To Introduce colour basics, quality of colours primary, secondary and complementary colours etc.,
CLO2	To develop understanding on creating colour harmonies and design in art by observing the objects and environment.
CLO3	To develop skills on using various mediums of colour by sketching and colour rendering of objects and the built environment.
CLO4	To develop observation and skill of expressing graphically - for understanding objects three dimensionally and to have effective visual thinking.
CLO5	Enable the students to render with colour pencils and water colours by observing the outdoor environment with human figures.

Course Outcomes

Code	Outcome
CO1	Create interesting colour schemes with the acquired adequate knowledge on color theory
CO2	Create and implement the concepts with basic principles of Composition of still life Painting
CO3	Formulate the strong techniques of Composition of with different colour mediums depending upon the need of the assignment or project.
CO4	Excel in expressing the concepts with graphical communication skills in a professional way.
CO5	Create and implement water colour compositional concepts by observing outdoor environment with Human figures and other essential elements of environment in a Painting Composition

Course Content

Knowledge pertaining Primary, Secondary & Complementary colours. Hue, Intensity & Value - other qualities of colours - Shades & Tints - Warm & Cool Colours. The various functions of colour in creating Designs. Use of various colour harmonies in Design / Art.

Comprehension of characteristics of Water colours - Transparent, Opaque (Tempera/Poster Colours),Pastels, Colour Pencils and Oils and their application in expression of a composition / design.

Exercises pertaining to comprehension of various forms of still life objects from daily life to develop observation skill of expressing it graphically . Rendering exercises with compositions

of natural plants foliage, fruits, vegetables in color mediums like color pencils , water colors, and poster colors.

Comprehension and visual perception of Human figures by observing live models to have effective visual perception on proportion of Human anaotmy and applying the comprehnded knowledge by rendering of human in monochromatic and color mediums like clor pencils and water colors.

Rendering ourdoor settings applying the comprehension of three dimensional objects in sketching and color rendering of built environment along with human figures proportainately in the settings. - Building perspectives, interior & exteriors in various mediums like color pencils, ink, pastels, water colours – opaque and transparent.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. David Astin,1981"Learn to Paint and Draw", Leisure Books, Baldock, Herts, UK .
2. Goodman Sue & Porter Tom., 1988. "Designer Primer", Butterworth Architecture,London,.
3. Art Fundamentals 2nd Edition: 2020. Color, Light, Composition, Anatomy, Perspective, and Depth 3d Total publishing; United Kingdom.
4. Muneesh Kumar 2010. Fundamentals of Visual Arts , Doaba Publications.
5. Jake, S. (2018). How to Draw Sketch and Draw Anything, Anywhere. Ilex Press.
6. Pereznieto, Leonardo. (2021). Basics of Drawing: Ultimate guide for beginners. Get Creative 6.
7. Vaze, Pundalik. (2005). How to Draw and Paint series- Nature, object, Design. Jyotsna Prakashan.
8. Dews, Pat. (2003). Creative Composition and Design. North Light Books.
9. Jagtap, Jayprakash. (2018). Color Theory. Jagatap Publishing House.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	3	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-
CO4	3	2	3	1	-	-	-	-	-	-	-
CO5	3	1	3	1	-	-	-	-	-	-	-

SEMESTER 3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
3	AR201	DIGITAL MODELING AND VISUALIZATION FOR ARCHITECTURE	3	1	2	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To develop proficiency in 3D modelling techniques
CLO2	To acquire knowledge and skills in Building Information Modelling (BIM) for effective architectural planning and documentation.
CLO3	To enhance skills in rendering and visualizations
CLO4	To improve communication and presentation techniques through digital tools.
CLO5	To integrate various software applications for producing a complete architectural design.

Course Outcomes

Code	Outcome
CO1	Understand the principles of 3D modelling available in various software tools.
CO2	Create 3D renders and produce photo-realistic images using the specified software.
CO3	Analyse the efficiency and performance of architectural designs using BIM software
CO4	Utilize BIM software to generate construction documents
CO5	Create comprehensive architectural projects by selecting appropriate software and plugins, and effectively utilizing these applications for presentations.

Course Content

Overview of 3D Modelling in Architecture - Importance and applications in architectural design; Basic modelling Techniques - Understanding the user interface and navigation tools in different software, creating basic shapes and structures using drawing tools: Line, Rectangle, Circle, and Polygon, modifying shapes: Move, Rotate, Scale, Follow me.

Complex Modelling Techniques – Using push/pull, extrude, revolve, sweep, Boolean commands; Using groups and components, sandbox, working with layers and scenes, camera, scenes, styles; Utilizing plugins and extensions; importing from warehouse; Exporting models to different formats, Creating layouts, Integration with other software.

Introduction to BIM, Concepts and applications in architecture, Basic Architectural Elements - Creating walls, doors, windows, understanding levels and grids, Detailed Modelling, modelling sites and contours, using families and components, creating plans, sections, elevations, Annotating and detailing drawings, creating sheets, schedules, quantities, legends, linking files, Exporting and printing documents, Using cloud-based collaboration tools.

Introduction to Visualization - Importance of visualization in architecture, Rendering Techniques- Setting up scenes and lighting, Material application and texture mapping, rendering settings and optimization, creating walkthrough animations, Importing and exporting models between various platforms; Basic location settings and energy simulations.

Basics of Image Editing, enhancing renderings and post-processing, creating effective presentation boards and layouts, Combining Different Media - Integrating 3D models, renderings, and edited images, Creating interactive presentations.

Suggestive Softwares: 3D Modeling: AutoCAD 3D, SketchUp | BIM: Revit | Rendering: Enscape (or) V-Ray (or) Twin motion (or) Lumion or any similar software | Image Editing: Photoshop or Illustrator or Canva or any similar software

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Brightman, M. (2018). The SketchUp workflow for architecture: Modeling buildings, visualizing design, and creating construction documents with SketchUp Pro and LayOut (2nd ed.). Wiley.
2. Schreyer, A. C. (2023). Architectural design with SketchUp: 3D modeling, extensions, BIM, rendering, making, scripting, and layout (3rd ed.). John Wiley & Sons.
3. Stine, D. J. (2024). Design integration using Autodesk Revit 2025: Architecture, structure, and MEP. SDC Publications.
4. Yori, R., Kim, M., & Kirby, L. (2019). Mastering Autodesk Revit 2020. Sybex.
5. Anton, K. K., & DeJarld, T. (2022). Adobe InDesign classroom in a book (2022 release). Adobe Press.
6. Chavez, C. (2023). Adobe Photoshop classroom in a book (2024 release). Adobe Press.
7. Scott, R. W. (2018). The graphic design portfolio: Adobe Photoshop and Illustrator CC 2018. Against The Clock, Inc.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	3	-	-	-	-	-	-	-	-	-
CO2	2	-	3	-	1	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	3	2	3	-
CO4	2	-	-	-	-	-	1	1	-	1	1
CO5	3	-	3	-	-	1	1	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
3	AR 203	EUROPEAN ARCHITECTURE: FROM ROMANESQUE TO ROCOCO	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To thoroughly comprehend the Romanesque architecture, its origin, architectural style and how it prevailed in Europe.
CLO2	To understand Gothic architecture, its structural system, and its manifestation of novel architectural style, classification and character.
CLO3	To understand the importance of Romanesque and Gothic through important architectural examples which prevailed in Italy, France and Britain.
CLO4	To understand the birth and spread of Renaissance architecture and its impact in Europe. Classification of the style including the late flowering of Baroque and Rococo.
CLO5	To study the important phases, the great masters involved through the varied examples in Italy, France and Britain.

Course Outcomes

Code	Outcome
CO1	To study the birth of Romanesque, its roots and its salient architectural features.
CO2	Gothic and its profound impact towards architecture. Its new structural principle and its impact. Important features and its architectural style.
CO3	A clear-cut understanding of both the Romanesque and Gothic examples.
CO4	Complete study about the origin and birth of Renaissance architecture, its spread, impact and the detail classification of the style.
CO5	Learn about the various masters involved and their contribution towards Renaissance through the complete study of the important examples.

Course Content

Italian Romanesque Architecture: Architectural characteristics of the churches of Northern Italy, Central Italy and South Italy. eg. Pisa Cathedral - (Central Italy). French Romanesque - eg. Abbey - Aux - Hommes at Caen. British Romanesque - eg. Durham's Cathedral. Introduction to Gothic architecture, its evolution of structural systems, arches, vaults and cross vault, decoration, characteristic of French architecture. eg. Notre - Dame, Paris. Understanding the general influences and characteristics of British & Italian gothic architecture and its structural developments and decorative motives. Characteristics of British gothic Architecture. Characteristics of Italian gothic Architecture - eg. Milan Cathedral. Birth of Renaissance and its impact Architectural style of Early Renaissance: Characteristics and works of Brunelleschi. High Renaissance and Mannerism: Study of the works of Bramate and Michelangelo. Baroque and Rococo: Architectural style of Palladio & Bernini , Basilica, Vicenza French Renaissance: Characteristics and style of French Renaissance example The Louvre, Paris. British Renaissance: Tudor, Elizabethan and Jacobean Styles:

Characteristics and work of Inigo Jones. Christopher wren's contribution towards Renaissance Architecture with S. Paul's, London as an example.
Course Assessment Methods: Continuous Assessment, End Assessment
Learning Resources & References:

1. Fletcher, B. (2022). A history of architecture on the comparative method (21st ed.). Bloomsbury Visual Arts.
2. Trachtenberg, M., & Hyman, I. (2014). Architecture: From prehistory to postmodernity (2nd ed.). Pearson.
3. Watkin, D. (2005). A history of Western architecture (4th ed.). Laurence King Publishing.
4. Murray, P. (1986). The architecture of the Italian Renaissance. Batsford.
5. Honour, H., & Fleming, J. (2009). A world history of art (7th ed.). Laurence King Publishing.
6. Cyril Mango, "Byzantine Architecture", Harry N. Abrams Inc. Publishers, New York, 1976

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	3							1		
CO2		3						2			
CO3		3									
CO4		3		2							
CO5		3									2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
3	AR205	STRUCTURAL ANALYSIS	3	2	1	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the slope and curvature of structural elements with their relation
CLO2	To differentiate determinate and indeterminate beams and methods of analysis
CLO3	To analyse the structures with moving loads and learn influence diagrams
CLO4	To study the concept and types of arches and cables with various loads and analysis
CLO5	To analyse the short and long columns with Euler's and Rankine's theories

Course Outcomes

Code	Outcome
CO1	Able to understand the behaviour of structural member towards the applied loads
CO2	Understand determinate and indeterminate beams and their methods of analysis
CO3	Analyse the structures for moving loads and learn the influence line diagrams
CO4	To understand concept of arches and cables types and analysis for the same
CO5	Analyse the short and long columns with specific methods for their strengths

Course Content

Slope, curvature of the bending beam - relation between slope, deflection & radius of curvatures, simple problems to find out slope and deflection for different loads on beams - Double integration method, Macaulay's method, moment area method, Conjugate beam method.

Propped cantilever beams - Reaction of prop. - Propped cantilever beams with different types of loads - sinking of the prop. Fixed beams - bending moment diagram for fixed beams - continuous beams - moment distribution method - sinking of the supports.

Moving loads and influence lines for statically determinate structures - Types of loads - combination of loads - Influence lines – Introduction.

Theory of arches - classification of arches - Analysis of three hinged arches - Bending moment diagram for given loads - Normal thrust and radial shear - Introduction to cables - Types - Bending moments & force analysis.

Theory of columns - Types of end conditions of columns - Equivalent length of a column - Axial loads, combined bending & axial loads, Indian Standard Code recommendations - Euler's formula for long columns - Rankine's formula - Practical applications

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Punmia, B. C., Jain, A. K., & Jain, A. K. (2004). Theory of structures (14th ed.). Laxmi Publications.
2. Reddy, C. S. (2017). Basic structural analysis (4th ed.). McGraw Hill Education.
3. Timoshenko, S. P., & Young, D. H. (1965). Elements of strength of materials (5th ed.). D. Van Nostrand Company.
4. Ramamrutham, S., & Narayanan, R. (2014). Theory of structures (5th ed.). Dhanpat Rai Publishing Company.
5. Hibbeler, R. C. (2016). Structural analysis (9th ed.). Pearson Education.
6. Bari, S.A. "Elements of Structural Analysis", Chand & Company Ltd., NewDelhi,1997

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3										
CO2		2									
CO3			1								
CO4								2			
CO5									2		

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
2	**AR207**	**BUILDING CONSTRUCTION & MATERIALS – II**	**4**	**1**	**0**	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To study the properties of brick, lime and timber as a building material
CLO2	To understand the principles of building with brick, lime, timber
CLO3	To learn brick bonds and timber joineries
CLO4	To learn to represent details of brick and timber construction in architectural drawings
CLO5	To understand composite construction using brick, lime, timber and other materials

Course Outcomes

Code	Outcome
CO1	Understanding of properties of brick, lime and timber as a building material
CO2	Knowledge of brick bonding, arches and masonry construction methods
CO3	Knowledge on timber joineries and its application for various building components like post and frames, panelling, partitions, staircase, door and windows
CO4	Ability to select suitable paint finishes for buildings
CO5	Ability to detail composite construction using brick and timber in conjunction with other materials

Course Content

BRICK & CLAY PRODUCTS- Manufacture of bricks, types and sizes of bricks, Brick masonry construction, types , principles of bonding and types of brick bonding, pointing, Brick masonry foundation, wall, spanning of openings, vaults, coping, domes, decorative cornices, brick paving, stairs, Terracotta tiles for roofing and flooring, other building accessories, ceramic & vitrified tiles. Plastering and mortar for brickwork.

LIME- types of lime, lime cycle, slaking and hardening, testing and storage, lime putty. Application of lime for plastering and brickwork, finishing, etc

TIMBER- Classification and structure of trees, conversion and seasoning of timber, defects, diseases and treatment of timber, market forms of timber, industrial timber

Timber construction techniques for structural components- walls, floors, roof trusses- truss types for different spans, staircases with Timber Joinery details and non-structural uses like doors, windows, balusters, handrail, and their hardware.

Manmade timber products application for partitions, wall panelling, false ceiling

COMPOSITE- cavity wall construction and detail, Madras Terrace Roofing, Jack Arch roofing, Bengal lean to roof, Punjab Mud terrace, Maharashtra mud roof.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Punmia, B.C. & Jain, A.K. (2016), A text book of Building Construction, Laxmi Publications.
2. McKay, W.B. (2019), Building Construction, Vol -1,2 Pearson Education India.
3. Ching, F.D.K (2019), Building Construction Illustrated, Wiley.
4. Baker, L. (1993) Lime, COSTFORD Publication.
5. Goldstein, E.W (1998), Timber Construction for Architects and Builders, McGraw- Hill Education.
6. American Institute of Timber Construction, (2004), Timber Construction Manual, Wiley Publishers.
7. Wagner, W.H. & Bud, H (2003), Modern Carpentry, Good Heart -Wilcox publishers.
8. Maginnis, O.B (2018), Bricklaying, Createspace Independent Pub.
9. Cartwright, P (2002), Bricklaying, McGraw Hill Professional Pub.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	2	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	2	-	-	-
CO3	-	1	-	-	-	-	-	2	-	-	-
CO4	3	-	-	-	-	-	-	-	1	-	-
CO5	2	-	-	-	-	-	-	3	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
3	AR209	SURVEYING AND SITE PLANNING	3	1	0	2	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the basic principles and equipment used in surveying.
CLO2	Develop skills in taking field measurements and interpreting topographical data.
CLO3	Analyze site characteristics such as topography, vegetation, drainage, and access.
CLO4	Apply surveying data to the creation of site plans and sections.
CLO5	Evaluate the relationship between site planning and architectural design.

Course Outcomes

Code	Outcome
CO1	Perform basic surveying tasks using appropriate equipment.
CO2	Generate site plans and sections based on collected data.
CO3	Analyze the suitability of a site for a specific building project.
CO4	Propose initial design concepts sensitive to site conditions.
CO5	Articulate site analysis findings in a clear and concise manner.

Course Content

Introduction to surveying and site planning: Definitions of key terms such as plot, site, land, and region, as well as units of measurement. Focus on understanding the importance of reconnaissance and surveying including methods like chain survey, compass survey, plane table surveys, dumpy level, and theodolite surveys.

Topography and elevation analysis: Sessions on the characteristics of contouring, including contour intervals, slope, aspect, hill shade, and the application of contours in creating site profiles. Digital topographical mapping of land surface and topography using Google Earth, QGIS. Foundational understanding of ArcGIS (open access) for performing timeline and spatial analysis, digitization, and exporting maps to desired format such as JPEG, PDF, TIFF and PNG.

Site context and analysis: Importance of site analysis – factors involved include accessibility, site size and shape, conforming and non-conforming land uses, climate and topography, available infrastructure, sources of water supply, waste disposal systems, and architectural and visual aspects. Preparation of a site plan and profile.

Principles of site layout and development: Factors such as the lie of the land, contours, watershed, surface drainage, ayacuts, and irrigation lands are crucial for site analysis. Other considerations include water resources, vegetation, soils, climate, and landforms. Sewage disposal, irrigation systems, and ecological factors also play a key role. The preparation of maps and analyses, including matrix analysis, composite analysis, locality plans, and topographical analysis. Understanding man-made structures (built environment), sensuous qualities, cultural data, and the correlation of images

and data. Vegetation, plant associations, types, and spatial distribution. Ecological profile of the area for comprehensive planning.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Lynch, K., & Hack, G. (1984). Site planning. MIT press.
2. Ching, F. D. (2023). Architecture: Form, space, and order. John Wiley & Sons.
3. John Ormsbee Simonds, "Landscape Architecture: A manual of Site Planning and Design", McGraw Hill, 1961.
4. Ching, F. D. (2023). Architectural graphics. John Wiley & Sons.
5. LaGro Jr, J. A. (2011). Site analysis: A contextual approach to sustainable land planning and site design. John Wiley & Sons.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1				3					3		3
CO2	2			3					2	3	2
CO3				2	2				2	3	2
CO4	1			2			3		3		2
CO5	2			1	2					2	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
3	**AR211**	**ARCHITECTURAL DESIGN - III**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111, AR112

Course Learning Objectives

Code	Learning Objectives
CLO1	To analyse the design principles of multi-room, single-use buildings, and apply them in practical scenarios.
CLO2	To develop design solutions for simple buildings (e.g., small residences) and medium-sized structures (e.g., community halls, health centres), considering functionality and user needs.
CLO3	To evaluate the impact of factors such as privacy, comfort, circulation patterns, and aesthetics (e.g., furniture arrangement, texture, color) on the design of the built environment.
CLO4	To utilize locally available materials and apply appropriate construction techniques to design functional, sustainable buildings.
CLO5	To communicate design concepts and solutions clearly through appropriate media (e.g., sketches, models, digital presentations).

Course Outcomes

Code	Outcome
CO1	Ability to analyse and apply the design principles of multi-room, single-use buildings in practical design scenarios.
CO2	Capability to develop effective design solutions for simple buildings and medium-sized structures
CO3	Potential to evaluate the impact of various factors (e.g., privacy, comfort, circulation patterns, aesthetics) on the overall design of the built environment.
CO4	Ability to utilize locally available materials and apply appropriate construction techniques to create functional, sustainable architectural designs.
CO5	Competence to communicate their design ideas and solutions clearly through a variety of appropriate media, including sketches, models, and digital presentations.

Course Content

Developing designs for simple buildings like a small residence and medium sized buildings like community hall, health centre etc., small scale multi-use space like restaurant, bank, post office, art gallery, wellness centre in any setting using locally available materials and appropriate construction techniques. Students should be able to communicate their ideas and design effectively with appropriate medium. The students should be able to take into consideration the context in which the buildings are located and design the outdoor spaces appropriately. Understanding design forces, significance of various factors like privacy, convenience, comfort, circulation pattern, furniture

arrangement, texture, colour etc. in the built environment. The design should reflect the application of knowledge gained from courses on materials, structures, construction and theory of architecture.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Ching, F. D. K. (2007). Architecture: Form, space, and order. Van Nostrand Reinhold Company.
2. Pramar, V. S. (1973). Design fundamentals in architecture. Somaiya Publications.
3. Pandya, Y. (2007). Elements of space making. Mapin.
4. Graves, M. (1951). The art of color and design (2nd ed.). McGraw Hill Inc.
5. Mills, E. D. (1985). Planning the architect's handbook. Butterworth.
6. De Chiara, J. (1973). Time-saver standards for building types. McGraw-Hill.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2		2	3	1	3	3	3	3	3
CO2	3	2		2	3	1	3	3	3	3	3
CO3	3	2		2	3	1	3	3	3	3	3
CO4								3	3		
CO5						2					

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
3	**AR213**	**ARCHITECTURAL MODEL MAKING**	**3**	**0**	**0**	**3**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the relevance, importance and applications of a physical model in a digital era
CLO2	Learn to create three dimensional representations of buildings/site
CLO3	Learn to choose the right scale, materials and methods required for the specific purpose
CLO4	Learn to use architectural models to hone design thinking skills
CLO5	Learn to use architectural models to hone design communication skills

Course Outcomes

Code	Outcome
CO1	Demonstrate the ability to generate a physical three dimensional visualization from two dimensional drawings
CO2	Demonstrate the ability to choose the right type and scale of model for different applications
CO3	Demonstrate the ability to use the right mix of materials , tools and techniques to make an effective architectural model; demonstrate contemporary fabrication skills required for making architectural models
CO4	Demonstrate the ability to use the physical model as an aid for design development
CO5	Demonstrate the ability to use the architectural model as a tool for design communication

Course Content

Introduction to architectural model making – significance of making physical models in architecture – application areas – the architectural model as a visual thinking tool – the architectural model as a design communication tool

Types of architectural models – study models vs presentation models; block models vs detailed models; building models vs site models

Introduction to materials suitable for architectural model making – overview of materials, tools and techniques

Importance of scale, dimensional accuracy, material representation and precision in architectural model making

Introduction to different styles of architectural model making – from traditional, realistic to stylized and abstract versions

Exploring cutting and assembling techniques Exploring construction of solids from planar elements – from simple ones to complex ones Exploring construction of architectural building models – block / detailed; study/ presentation Exploring construction of architectural site models – representation of buildings, terrain and site elements to suitable scales using suitable materials
Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review
Learning Resources & References: 1. Werner, M. (2011), "Model Making" Princeton Architectural Press, New York 2. Mills, Criss B., "Designing with Models",John Wiley & Sons, New Jersey 3. Knoll, Wolfgang & Hechinger, Martin, "Architectural Models", J.Ross Publishing,2006. 4. DeMarco, Patricia & DeMarco, Guy. "Building Architectural models", Schiffer Pub, 2000 5. Sutherland, Martha, "Model making : a basic guide", WW Norton, 1999

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	-	-	-	2	1	1	2	2	2	-
CO2	3	-	-	-	2	1	1	2	2	2	-
CO3	3	-	-	-	2	1	1	2	2	2	-
CO4	3	-	-	-	3	1	1	3	3	3	-
CO5	3	-	-	-	3	1	1	3	3	3	-

SEMESTER – 4

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	AR202	Climate Responsive Architecture	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the fundamental concepts of climate, weather, and climatic variables, along with their impact on building design across different climatic zones in India.
CLO2	Analyze the geometry of solar movement and apply sun path diagrams, shadow angles, and shading device principles to optimize solar control in buildings.
CLO3	Evaluate wind movement, natural ventilation strategies, and the use of Mahoney Tables to develop climate-responsive architectural designs.
CLO4	Apply thermal comfort indices and environmental factors to design buildings that enhance occupant comfort in various climatic conditions. -
CLO5	Examine heat transfer mechanisms in buildings and integrate passive design strategies for energy-efficient thermal performance. -

Course Outcomes

Code	Outcome
CO1	Explain the fundamentals of climate, weather, and climatic variables, and their influence on building design in different climatic zones of India.
CO2	Utilize sun path diagrams, shadow angles, and shading devices to optimize solar control in architectural design.
CO3	Apply principles of wind movement and natural ventilation to improve indoor air quality and thermal comfort.
CO4	Assess thermal comfort indices and recommend design strategies for energy-efficient buildings in different climates.
CO5	Analyze heat transfer mechanisms in buildings and integrate passive design strategies for improved energy efficiency.

Course Content

Introduction to climate and weather, including an understanding of climatic scales—macro-climate, meso-climate, and microclimate. Exploration of key climatic variables such as temperature, humidity, precipitation, solar radiation, and wind. Overview of tropical climate characteristics and classification of India's climatic zones with their specific features.

Geometry of solar movement and its impact on building design. Understanding altitude and azimuth angles, sun path diagrams, and solar charts. Calculation and application of horizontal and vertical shadow angles using the shadow angle protractor. Design principles for shading devices and evaluation of their performance.

Wind movement and natural ventilation in buildings. Analysis of airflow around and through structures to optimize indoor comfort. Study of Mahoney Tables and their application in climate-responsive design. Development of climatic design strategies for different climatic zones in India.

Thermal comfort and its significance in building design. Examination of thermal comfort indices such as the Tropical Summer Index (TSI) and Effective Temperature (ET). Factors influencing occupant comfort, including thermal sensations and adaptive comfort models.

Heat transfer principles in buildings, including conduction, convection, and radiation. Understanding the thermal behaviour of materials and their role in heat gain and loss. Introduction to relevant units, terminology, and passive strategies for thermal regulation in buildings.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Givoni, B. (2017). Climate Considerations in Building and Urban Design. Routledge.
2. Hyde, R. (2019). Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates. Taylor & Francis.
3. Olgyay, V. (2015). Design with Climate: Bioclimatic Approach to Architectural Regionalism. Princeton University Press.
4. Szokolay, S. V. (2017). Introduction to Architectural Science: The Basis of Sustainable Design. Routledge.
5. Brown, G. Z., & DeKay, M. (2018). Sun, Wind, and Light: Architectural Design Strategies. Wiley.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		3			2						
CO2	3								3		
CO3					3				3		
CO4								2		2	
CO5				3					3		

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	**AR204**	**LIGHTING AND ELECTRICAL SERVICES**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the lighting fundamentals
CLO2	To comprehend the different daylighting concepts, daylighting analysis and design
CLO3	To know the salient features of various artificial light sources and luminaires, and design artificial lighting systems
CLO4	To gain insights into electrical systems/ installations of buildings and their design and planning
CLO5	To learn the architectural design requirements for electrical services and their integration with other services

Course Outcomes

Code	Outcome
CO1	Assessment of daylighting availability in existing buildings (Analysis)
CO2	Design of Fenestration for Daylighting of interior spaces
CO3	Artificial lighting design including supplementary artificial lighting (daylit spaces) for interior spaces of different types of buildings
CO4	Calculation of electrical load and electrical circuits design for buildings
CO5	Demonstrate integration of electrical services in architectural designs.

Course Content

Light - Electromagnetic radiation, Visual task requirements, Units of Light, Vision and Light, Colour perception, Standards of Lighting, Visual Comfort and principles of good lighting of interior spaces.

Daylight - Daylight factor, Components, Daylight spread and penetration, Daylighting concepts, Daylight and room proportions and other building elements, Calculation of daylight factor, and Design of fenestration.

Artificial lighting – requirements, Types of electrical lamps, Electrical fittings/equipment and Lighting systems. Design of general lighting schemes. Supplementary artificial lighting for buildings. Exterior lighting. Building facade lighting.

General distribution of electric power. Substation – requirements, layout, etc. Principles of electrical installation in buildings. Electrical load estimation, distribution and branch circuit design.

Electrical wiring design for buildings – Circuits, raceways, conductors and insulation, and elements of building wiring systems. Safety methods and measures to be adopted, and the study of relevant I.S. Codes. Integration of electrical systems with other building systems.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Winchip, S. M. (2011). Fundamentals of lighting. New York: Fairchild Books
2. Evans, B. H. (1981). Daylight in architecture. New York: Architectural Record Books, McGraw-Hill Book Company.
3. Tregenza, P. and Wilson, M. (2011). Daylighting: Architecture and Lighting Design. London: Routledge.
4. Innes, M. (2012). Lighting for Interior Design. London: Laurence King Publishing Ltd.
5. Rigby, B. (2005). Design of Electrical Services for Buildings. London: Spon Press.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	2	-	-	1	-	1	2	3	2	2
CO2	2	2	-	1	2	-	1	2	3	3	3
CO3	2	2	-	1	1	-	1	2	3	2	3
CO4	2	1	-	1	-	-	1	2	1	2	3
CO5	3	2	-	1	-	-	1	2	-	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	**AR206**	**CONTEMPORARY ARCHITECTURE**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the industrial revolution and its impact on architecture and art
CLO2	To introduce modernity and its impact in the realm of architecture
CLO3	To study how modern architecture was a result of industrialisation and socio-political conditions
CLO4	To understand the various ideologies and styles of art and architecture after Industrial revolution
CLO5	To comprehend the influences on the modern architecture in post-colonial India

Course Outcomes

Code	Outcome
CO1	Ability to relate and understand architecture w.r.t context of social socio economic and political background of the period and change and development through which human societies have evolved.
CO2	Demonstration of conceptual understanding of structural systems and the character and elements of the Modern Architecture from around the world
CO3	Ability to build a chronological framework for understanding the development of construction materials and techniques
CO4	Understanding of the character and key features and materials of 19^{th} to 21^{st} century
CO5	Ability to identify, interpret and apply a particular architectural style

Course Content

Post- Renaissance architecture of Europe in general and England in particular. Industrial revolution and its impact on architecture and urban settlement in particular. Arts and crafts and Art – Nouveau movements and their impact on architecture. The principles and works of Mackintosh and Antonio Gaudi. Developments in Germany: Deutschers work bund, principles and works of Peter Behrens, German expressionism and the works of Walter Gropius and Erich Mendelsohn. The Bauhaus Institute and its impact. Russian Architecture after revolution (1917 – 1934).

The futurism of Antonio Saint Elia, Outline idea of cubism and its impact on architecture, De stijl movement of Netherlands. Critics of modern movement: Robert Venturi, Christopher Alexander, Aldo Rossi and Jane Jacob. Emergence of later trends in modern architecture.

Rapid Urban growth in Europe and USA. The emergence of International style of architecture. Principles and works of Le Corbusier and Frank Lloyd Wright. Principles and works of Mies Van der Rohe, Louis Khan, Paul Rudolf and KenzoTange. The factors that contributed to their style of Architecture and their impact.

Brutalism, Archigram, Metabolism in architecture, Deconstruction in architecture and the emergence of rationalistic architecture.

The styles and trends of architecture brought by Britishers to India and their evolution. The impact of Hindu and Indo-Saracenic style on the British architecture in India. The characteristics of British colonial architecture with examples from the works of Edwin Lutyen. The impact of International style of architecture in India, Early public buildings such as Vigyan Bhawan Supreme Court building etc. The works of Le Corbusier and Louis Kahn in India with examples. Their impact on architecture of fifties and sixties. The trend in Indian architecture after 1970 Principles and works of the following architects: Balakrishna Doshi, Charles Correa, Anant Raje and Laurie Baker with suitable examples.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Radford, Antony, & Srivastava, Amit (2020) Elements of Modern Architecture: Understanding Contemporary Buildings, Thames and Hudson
2. Norberg – Schulz, Christian (1999), Principles of Modern Architecture, Andreas Papadakis Publishers
3. Jencks, Charles (1987) Modern Movements in Architecture, Penguin books
4. Frampton, Kenneth (2007), 'Modern Architecture: A Critical History', Thames and Hudson, London.
5. Le Corbusier (2023) , Toward a new Architecture, Digireads.com
6. Wright, Frank Lloyd (2017) Organic Architecture: The Architecture of Democracy, Lund Humphries Publishers Ltd
7. Venturi, Robert (1984) Complexity and Contradiction in Architecture, Thames and Hudson
8. Mehrotra , Rahul, (2011) 'Architecture in India since 1990', HatjeCantz,
9. Bhatt ,Vikram & Scriver, Peter (1996) " After the Masters -Contemporary Indian Architecture, Mopin Publishing Ltd., Ahmedabad.
10. Prashad, Deependra & Chetia Saswati, (2010) New Architecture and Urbanism: Development of Indian Traditions, Cambridge Scholars Publishing.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	2	1	-	-	1	-	-	-	-	-
CO2	-	2	-	-	-	-	-	1	-	-	-
CO3	-	3	-	-	-	-	-	1	-	-	-
CO4	-	3	1	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	1	-	-	-	-	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	**AR208**	**ARCHITECTURAL WORKSHOP**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the basic workshop tools and operations of carpentry and provide skills for carpentry joints.
CLO2	To understand the basic workshop tools and operations of masonry and enable the students to make brick masonry using various bonds.
CLO3	To understand the basics of the welding process.
CLO4	To gain knowledge and skills related to 3D printing technologies.
CLO5	To apply these techniques into various applications

Course Outcomes

Code	Outcome
CO1	Understanding the function and usage of various tools required in carpentry and woodworking.
CO2	Understanding the use of various masonry bonds.
CO3	To understand the load mechanism and strengths of various joints and joineries.
CO4	Select a 3D printing process for an application.
CO5	Produce a product using 3D Printing or Additive Manufacturing (AM).

Course Content

Carpentry: Introduction to various carpentry tools and production of simple joints used in joinery; Carpentry Exercises: Tenon Mortise Joint, Dovetail Joint, Butt Joint. Introduction to Laser Cutting on simple project models

Masonry Introduction to various masonry tools and production of simple bonds used in construction, Concepts used in Exercises Masonry Exercises: Header Bond and Stretcher Bond, English Bond, Flemish Bond, Arches, Vaults, Domes

Introduction of Welding, Gas Welding Equipment, Tools and Accessories, Various Types of Welding Processes and Their Applications - Arc and Gas Welding. Different Processes of Metal Joining Methods: Bolting, Riveting, Soldering, Brazing, Seaming, etc. Edge Preparation and Fit Up for Different Thicknesses, Surface Cleaning, Permanent and Temporary Joints. Metal-welded joints, nut-bolt joints. Types of welded joints and their applications.

3D Printing (Additive Manufacturing): Introduction, Process, Classifications, Advantages, Additive v/s Conventional Manufacturing processes, Applications.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. C.K. Chua, K. F. (2017). 3D Printing and Rapid Prototyping- Principles and Applications. World Scientific.
2. Duggal, S. (2012). Building Materials. Bengaluru: New Age International Pvt. Limited.
3. Joseph DeChiara, M. J. (2001). Time-Saver Standards for Building Types, 4th Edition. New York: McGraw-Hill Education.
4. Singh, R. (2006). Introduction to Basic Manufacturing Processes and Workshop Technology. Bengaluru: New Age International Pvt. Limited.
5. Soloman, S. (n.d.). 3D Printing and Design. New Delhi: Khanna Publishing House.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	1	1	1	1	1	2	1	1	1	1
CO2	2	1	1	1	1	1	2	2	2	1	1
CO3	1	1	1	1	1	1	2	2	1	1	1
CO4	1	1	1	1	1	1	2	1	1	1	1
CO5	1	1	1	1	1	1	1	1	1	1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	**AR210**	**BUILDING CONSTRUCTION AND MATERIALS – III**	**4**	**1**	**0**	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the strength and properties of cement and concrete
CLO2	To understand application of concrete in building construction for foundations, columns, beams, slabs, staircase, retailing walls, etc.
CLO3	To learn detailing required for joints, for water and damp proofing
CLO4	To understand advanced technologies like prestressed, prefabrication and shell structures
CLO5	To understand the temporary constructions like formworks, scaffolding raking and underpinning

Course Outcomes

Code	Outcome
CO1	Ability to understand the types and grades of cement and concrete
CO2	Understanding of construction of foundations, columns, beams and slabs using concrete
CO3	Ability to detail expansion joints and damp / water proofing
CO4	Understanding of latest advancements and trends in concrete
CO5	Ability to plan and execute temporary and renovation works onsite

Course Content

Manufacture and properties of cement, setting time, strength tests

Types of concrete blocks- solid, hollow blocks, FAL- G, light weight , aerated,etc

Plain cement concrete and Reinforced cement concrete and their details.

Understanding the concepts of foundations, its principles & construction of different types of foundations. Foundations using concrete- types of shallow and deep foundations using concrete, simple footings, pile foundations and retaining wall

Beams, Columns and Slabs – one way and two way slabs, coffer and waffle slab, reinforcement details, Staircase and its detailing.

Formwork, Scaffolding, Centering, Raking and Underpinning

Damp proofing and water proofing for foundations, tanks, swimming pools, terrace gardens, etc

Prefabricated concrete panels for walls and roofs, doors, windows and openings; cement boards for partitions.

Fibre reinforced concrete Prestressed concrete, folded plates, Shell structures, concrete vaults, domes, decorative concrete, insulated concrete forms (ICF), concrete

Purpose and functions of joints in Building construction, types of joints that occur in Buildings, expansions joints and its construction details.

Composite construction for floors, walls, stairs, etc, Fixing devices in walls and ceilings

Stone skin- veneering and cladding,

Paint composition, characteristics, preparation, application of primer, paint, enamel, varnishes.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Punmia, B.C & Jain, A.K (2016), A text book of Building Construction, Laxmi Publications
2. Shetty, M.S (2006), Concrete Technology- Theory and Practice, S. Chamd & Co ltd,
3. Arnold, R. (2004),Working with Concrete, Taunton Press Inc
4. Walshaw, E. (2017), Understanding Architectural Detailing
5. Emmitt, S. & Gorse, C.A (2006), Barry's Advanced Construction of Buildings, Wiley
6. Ching, F.D.K (2019), Building Construction Illustrated, Wiley
7. Arora, S.P. & Bindra, S. P., (1994), A Text Book of Building Construction", Dhanpat Rai & Sons, New Delhi.
8. Jha, J. & Sinha, S.K.(1997), "Building Construction", Khanna Publishers, New Delhi
9. Philips, D & Yamashita, M (2012) , Detail in Contemporary Concrete Architecture, Laurence King Publishing
10. Allen , E & Rand , P (2016) Architectural Detailing: Function, Constructability, Aesthetics

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	2	-	-	-	-	-	1	-	-	-
CO2	-	-	-	-	-	-	-	3	2	-	-
CO3	1	-	-	-	-	-	-	2	3	-	-
CO4	-	1	-	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	1	1	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	**AR212**	**ARCHITECTURAL DESIGN - IV**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111, AR112, AR211

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the built environment in relation to the context
CLO2	To analyse the spatial organisation based on the users' activities, function and needs
CLO3	To gain knowledge about the tools and techniques employed during field study
CLO4	To inculcate design thinking that integrates people and context
CLO5	To address the identified problems through design solutions

Course Outcomes

Code	Outcome
CO1	Understand the factors shaping built environment
CO2	Knowledge on the correlation between people, spaces and their activities.
CO3	Application of tools and techniques for the study and documentation of a rural settlement.
CO4	Problem solving abilities towards the identified issues
CO5	Designing a space that responds to people's needs and context.

Course Content

Study and documentation of the existing settlement and its built components.

Types, Evolution of built environment, Factors influencing built environment - Climatic, cultural, geographical, political and economic factors.

Documentation of settlement through historical background, demographics, data collection, preparations of maps, architectural documentation drawings, visual documentation through photography and sketches.

Analysis of the collected data, understanding the evolution pattern of the settlement, generation architectural typologies based on architectural characteristics, construction techniques and materials used, understanding various issues at settlement and infrastructure level. Understanding design forces, significance of various factors like privacy, convenience, comfort, circulation pattern, furniture arrangement, texture, colour etc. in the built environment.

Identification of issues and design proposals - issues deciphered through analysis may be addressed through proposals.

Developing designs and details for buildings, which are multi-room, single use, small span, multiple bay such as market, clinic, elementary school, art gallery, library, community hall and skill training centre. In addition to the design of a single or a small group of buildings, the

students should be able to take into consideration the context in which the buildings are located and design the outdoor spaces appropriately.

The design should incorporate the application of local/vernacular materials from the rural area or a previous study conducted during the semester. Demonstration of skills acquired from the Architectural workshop through models and prototypes.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Rapoport, A. (1969), 'House, Form and Culture', Prentice Hall, 1969.
2. Rudofsky, B. (1987) 'Architecture without Architects', University of New Mexico Press, 1987.
3. Tipnis, A. (2015) Vernacular Traditions: contemporary architecture, TERI, 2015
4. Lucas, R. (2020) Anthropology for Architects- Social Relations and the Built Environment, Bloomsbury Publishing
5. Buchli, V.(2013) Anthropology of Architecture, Bloomsbury Publishing
6. Sharma, R.K (2011) 'Rural Sociology', Atlantic.
7. Thorbeck D. (2012) 'Rural Design', Routledge,2012.
8. Ramachandran H. (1980) 'Village Clusters and Rural Development', Concept Publications.
9. Arora, R.C. (1979) 'Integrated Rural Development', S. Chand.
10. Thorbeck, D (2016) ‘Architecture and Agriculture: A Rural Design Guide’, Routledge

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	1	-	1	3	-	-	-	-	-	-
CO2	-	-	-	-	3	1	-	-	2	-	-
CO3	-	-	-	1	-	-	-	1	-	-	-
CO4	2	-	-	-	3	2	-	-	-	-	2
CO5	3	-	-	1	3	1	-	-	-	2	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
4	**AR214**	**STRENGTH OF MATERIALS LABORATORY**	**3**	**1**	**0**	**2**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To expose the students to know the building materials their properties and uses
CLO2	To understand the need of material sample testing in the laboratory and their importance before onsite construction work
CLO3	To study the behaviour of various construction materials on load application
CLO4	To import the knowledge of general laboratory experiments conducted for materials
CLO5	To test the samples physically in the laboratory for their strength and properties.

Course Outcomes

Code	Outcome
CO1	To make students to understand the materials testing and their importance
CO2	To expose students the materials testing laboratory for their need and necessity
CO3	To study the behaviour of samples on the load application before onsite application
CO4	To make students to do experiments for the materials as per standards
CO5	To examine the workability and strength characteristics of concrete and bricks, and test water quality through standard procedures.

Course Content

Laboratory exercises to be carried out by the students include:

Cement tests for fineness standard consistency and initial and final setting times

Tests on aggregates for bulking and crushing strength impact values - Deflection tests on beams - Water purity tests

Tension test on steel rod using UTM for behaviour of elastic material on load application

Tests on fresh concrete using slump cone for workability property

Tests on concrete cubes and bricks for their strength properties using load compression machine and percentage of water absorption quality of bricks

Deflection test on steel and timber beams for the rigidity

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Sample testing methods as per standard code references for different materials specified
2. Gambhir, M. L. (2013). Concrete technology (5th ed.). McGraw Hill Education.

3. Shetty, M. S. (2005). Concrete technology: Theory and practice (Revised ed.). S. Chand Publishing.
4. Duggal, S. K. (2017). Building materials (5th ed.). New Age International Publishers.
5. Punmia, B. C., Jain, A. K., & Jain, A. K. (2003). Strength of materials and mechanics of structures (Vol. 1). Laxmi Publications.
6. Neville, A. M., & Brooks, J. J. (2010). Concrete technology (2nd ed.). Pearson Education Limited.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		1									
CO2					2						
CO3							1	2			
CO4								2			
CO5								2	1		

SEMESTER – 5

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR301	PLUMBING SERVICES AND ARCHITECTURAL ACOUSTICS	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the principles of water supply, drainage, and sanitation systems in buildings, including multi-storied structures.
CLO2	Analyze acoustic principles, sound propagation, and noise control strategies for various built environments.
CLO3	Apply knowledge of sustainable water management, including rainwater harvesting and wastewater treatment, in architectural design.
CLO4	Evaluate sound insulation techniques, reverberation control, and acoustic optimization in different building typologies.
CLO5	Integrate water supply, drainage, and acoustic considerations into holistic, sustainable architectural solutions.

Course Outcomes

Code	Outcome
CO1	Explain the principles of water supply, drainage, and sanitation in buildings.
CO2	Analyze acoustic principles, noise control, and sound propagation in built environments.
CO3	Design sustainable water management solutions, including rainwater harvesting and wastewater treatment.
CO4	Assess and apply acoustic optimization techniques for different building types.
CO5	Integrate water supply, drainage, and acoustic design considerations for sustainable architecture.

Course Content

Sources of water, demand calculation, distribution methods, storage systems, and pipeline design. House service connections, hot water supply systems, and material selection. Sanitary appliances, drainage systems for buildings, septic tanks, and public drainage. Stormwater management, roof drainage, refuse disposal, and rainwater harvesting.

Sound properties, propagation, psychoacoustics, noise classification, and measurement. Geometric acoustics—reflection, absorption, diffusion, and acoustic materials. Acoustical design of auditoriums, seminar rooms, and public spaces. Speech intelligibility, noise insulation, soundproofing, and computational modeling. Sources of environmental noise, regulations, and control measures. Urban noise mitigation, passive and active control techniques, and integration into sustainable design.

Course Assessment Methods: Continuous Assessment and End Assessment

Learning Resources & References:

1. Long, M. (2014). Architectural Acoustics (2nd ed.). Academic Press.
2. Cavanaugh, W. J., Tocci, G. C., & Wilkes, J. A. (2009). Architectural Acoustics: Principles and Practice (2nd ed.). Wiley.
3. Egan, D. (1988). Architectural Acoustics. McGraw-Hill.
4. Papadakis, N. M., Garai, M., & Stavroulakis, G. E. (2022). Advances in Architectural Acoustics. Applied Sciences, 12(1728)
5. Birdie, G. S., and Birdie, J. S., Water Supply and Sanitary Engineering, DhanpatRai and Sons, New Delhi,2007.
6. Garg, S. K., Environmental Engineering, Vol. II, Khanna Publications, New Delhi, 2009.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	2	2	1		2				1
CO2	3	2	3	3		1	2				
CO3	2	3	3	2	2	2	3	1			2
CO4	3	2	3	3	1	1	2				2
CO5	3	3	3	3	2	2	3	1	1	1	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR303	DESIGN OF R.C.C. STRUCTURES	3	2	1	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the building structural elements their integrity and importance
CLO2	To design beams their types by limit state method of design(LSM) as per IS 456
CLO3	To classify the slab systems their boundary conditions and design the same
CLO4	To analyse the type of columns and reinforcement design as per classification
CLO5	To study the types of footing their design and application along with soil conditions

Course Outcomes

Code	Outcome
CO1	To learn the various structural elements and their connections and load distribution
CO2	Able to design beams and reinforcement arrangements for the types of problem
CO3	To study the slabs and their end conditions and the designing of various slabs
CO4	To understand the concept and configuration of stairs and their design principles
CO5	To design the columns and footings for the loads and reinforcement placements.

Course Content

Permissible stresses - limit states - characteristic strength and load - partial safety factor - deflection - modification factors. Design principles of limit state methods - design of singly reinforced, doubly reinforced, T & L beams by LSD method with IS code specifications - design for shear

One way and two way slabs for different edge conditions - continuous slabs – design of slabs as per IS code specifications

Columns - reduction factors - compression members and slender columns - Design of columns - columns with helical reinforcement IS code specifications.

Staircases - types - design as per IS code specifications.

Footings - design of isolated footings - square, rectangular and circular footings - strip footings - combined footings.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Ramamrutham, S. "Design of Reinforced concrete structures", Dhanpat Rai & Sons, New Delhi, 1996.
2. Sinha, N.C. & Roy, S.K., "Reinforced Concrete Structures", S. Chand & Company Ltd., New Delhi, 1983.

3. Ashok. K. Jain, "Reinforced concrete structures", New Chand & Bros Rourke, 1992.
4. H.J. Shah, "Reinforced concrete - Vol I", Charotor Publishing House, Annand, 1994, AR305

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2							3			
CO2								1			
CO3								2			
CO4								3			
CO5								3		1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	**AR305**	**LANDSCAPE ARCHITECTURE**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To learn about landscape elements like land, water & plants.
CLO2	To learn about structures & open spaces in landscape. Community development.
CLO3	To learn about factors influencing landscape design.
CLO4	To study some modern gardens & landscapes. To learn about topography & grading.
CLO5	To learn about some of the historical garden traditions.

Course Outcomes

Code	Outcome
CO1	Understand the role of landscape elements of land, water & plants.
CO2	Understand the role of structures & open spaces in landscape.
CO3	Learn the process & elements of landscape design.
CO4	Learn from the study of modern gardens & landscapes. Learn about topography.
CO5	Learn about some historical garden traditions.

Course Content

Introduction to Landscape Architecture. Introduction to major and minor landscape elements, natural and man-made elements. Land – as heritage, as resource, Land use implications. Water – Planning approach, as Resource, as Feature, Water related site design, Plants – in nature, introduced plantations, Planned & planted landscape.

Structures – Composition, Structures in landscape, Defined open space. Habitations – Dwelling-nature relationships, Human needs & habitat. Community – The group imperative, Form order, New directions. City – Cityscape, Possibilities, New urbanity.

Landscape design – Visual arts as ordering mechanism, Circulation as ordering mechanism, Spatial development, Architecture & site development.

Study of modern gardens & landscapes. Modification of site topography, Grading & drainage.

Japanese gardens: History, development, features, elements and types of Japanese gardens. Mughal gardens: History, influences, typical features and elements of Mughal gardens.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Land. Arch. - A Manual of Site Planning & Design - John O.Simonds, McGraw Hill Book Co., New York, 1983

2. Motloch, J.L., “Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991.
3. Kassler, E.B., "Modern Gardens and the Landscape", Museum of Modern Art, New York, 1984
4. Landphair H. C., “Landscape Architecture Construction”, Elsevier, 1979
5. Bring, M, "Japanese Gardens: "design & Meaning", McGraw Hill Book Co., New York, 1981

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1					3						
CO2							3				
CO3							3				
CO4					3						
CO5		2				2					

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	**AR307**	**BUILDING CONSTRUCTION AND MATERIALS – IV**	**4**	**1**	**0**	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand properties of steel, aluminium and glass as a building material
CLO2	To understand principles of construction using steel, aluminium and glass
CLO3	To understand methods of construction using steel for structural purposes and as building components
CLO4	To understand detailing of building construction using steel, aluminium, glass and plastic
CLO5	To understand the application of composite materials in construction using plastic & allied products

Course Outcomes

Code	Outcome
CO1	Ability to assess the suitability and strength of steel, aluminium and glass for a structure
CO2	Understanding of manufacturing process of steel, aluminium, glass, plastic
CO3	Ability to understand construction details of steel and aluminium in construction
CO4	Ability to make details for glass structures
CO5	Designing the details for composite structures using steel, aluminium, glass, plastic and concrete

Course Content

Introduction to steel as a building material, types and fixing details of steel trusses, structural steel properties, types of sections used in various building components – columns and stanchions, Steel doors and windows and its fixing details, steel composite construction. Steel staircases. Use of GI sheets, polycarbonate sheets.

Properties of aluminium and its uses in buildings, aluminium extrusions, aluminium doors and windows fixing details using extruded sections. Fixing details of neoprene rubber beading, glass panels, fixtures and fastenings.

Study of various types of Aluminium partitions, its extrusions & details of components for partitions, Different types of aluminium panels for partitions, cladding component for various structures, aluminium grill modules, roofing of industrial buildings.

Suspended ceilings and false ceiling using aluminium sections, construction details for providing thermal insulation and insulation of cold storages and study of insulation materials like glass wool,

insulating boards, gypsum boards, plaster of Paris, and various kinds of perforated boards. Fixing details of sound reflecting, absorbing and insulating materials, its properties and uses

Various techniques to use glass and glass blocks with fixing details; structures like pavilions, greenhouses, staircases, multi storied buildings, roofing, panels.

Curtain walling methods and techniques.

Design and construction details using plastic, UPVC as a secondary building component for windows, doors, skylight, domes, and handrails.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Christian Schittich, (2007), Glass Construction Manual, Institut fur Internationale Architecktur Dokumentation GmbH & Co, KG, Munich
2. Reichel Alexander, (2007), Building with Steel – Principles, Details, Examples, Birkhauser Verlag AG
3. Weller, B., Unnewehr, S., Tasche, S., & Härth, K. (2009). Glass in building: Principles, applications, examples. Birkhäuser Verlag GmbH.
4. Upadhyay, A.K. (2012). Steel structures (Design and Drawing). S.K. Kataria & Sons.
5. Walshaw, E. (2017). Understanding architectural details. First in Architecture.
6. Jha, J., & Sinha, S. K. (2020). Building construction (6th ed.). Khanna Publishers.
7. Arora, S. P., & Bindra, S. P. (2022). The text book of building construction (5th ed.). Dhanpat Rai Publications.
8. Emmitt, S. (2023). Barry's advanced construction of buildings (5th ed.). Wiley-VCH.
9. Punmia, B. C., & Jain, A. K. (2023). A text book of building construction (12th ed.). Laxmi Publications.
10. Ching, F. D. K. (2024). Building construction illustrated (7th ed.). Wiley.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	-	-	-	-	-	2	-	-	-
CO2	1	-	-	-	-	-	-	-	1	-	-
CO3	-	-	-	-	-	-	-	3	-	-	-
CO4	2	-	-	-	-	-	-	-	-	-	-
CO5	-	2	-	-	-	-	-	2	1	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	**AR309**	**ARCHITECTURAL DESIGN – V**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111, AR112, AR211, AR212

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand and apply campus planning principles.
CLO2	To explore the use of low-energy materials for sustainable construction.
CLO3	To explore and understand the correlation between building services and building design.
CLO4	To develop in the students an aptitude for designing time-bound solutions.
CLO5	To understand and design architectural spaces according to culture.

Course Outcomes

Code	Outcome
CO1	Analyse the relationship of multiple buildings on campus with each other in context to establish continuity of form, construction, materials, design theme, climate, etc
CO2	Investigate the application of low-energy materials in sustainable construction.
CO3	Incorporate building services into the design projects.
CO4	Integrate basic services and structural requirements.
CO5	Apply knowledge gained in given aspects of culture, in the design process.

Course Content

Projects emphasizing detailed studies and drawings of one or more of the following aspects - space analysis, climatic consideration, services and environmental issues, and site planning.

Analytical work on various issues specific to the project introduced will be carried out for the development of a link/connection between studio work and lecture courses. A high standard of graphical representation and verbal skills are expected from the students to present their design ideas.

Projects to include buildings with single or multi-use, multi-span such as Library, Institutional buildings (e.g., High School), Shopping Centre, Nursing Home & Low/Mid Rise Apartments, resort, convention centre, cultural centre etc.

Display of competence in the application of knowledge gained from the following will be an essential requirement for all the design projects: Materials, Construction & Structures, Theory of Architecture, Environmental /Architectural Science & Behavioural science.

Field Tour would be carried out to visit existing architectural projects that have been designed based on the climate, context and have effectively incorporated all the above services.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Lynch, K. (1962). Site Planning. MIT Press.
2. Kanvinde, A., & Miller, H. (1969). Campus Design in India. Topeka: Jostens/American Yearbook Co. .
3. White, S. (1995). Building in the Garden: Architecture of Joseph Allen Stein in India and California. Delhi: Oxford India Paperbacks.
4. Pandya, Y., & Foundation, V. S. (2007). Elements of Space Making. Ahmedabad: Mapin Publishing Pvt Ltd.
5. BIS. (2016). National Building Code of India 2016 Volume 1 & 2. New Delhi: Bureau of Indian Standards.
6. Joseph DeChiara, M. J. (2001). Time-Saver Standards for Building Types, 4th Edition. New York: McGraw-Hill Education.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	2	1	3	1	3	1	3	1	3
CO2	2	1	1	1	3	1	1	2	1	3	1
CO3	2	1	1	1	3	1	1	3	1	1	1
CO4	2	1	1	1	3	1	1	3	3	1	1
CO5	2	1	1	1	3	3	1	1	1	1	1

SEMESTER – 6

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	AR302	AIR CONDITIONING AND MECHANICAL SERVICES	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To give exposure to the science behind air-conditioning systems, the different types and applications
CLO2	To enable understanding of architectural aspects related to air-conditioning systems and take appropriate design decisions.
CLO3	To inform about mechanical transportation systems for buildings and how to plan for the same.
CLO4	To inform about fire protection, fire safety and fire fighting in buildings and how to plan for the same
CLO5	To educate active and passive fire precautions

Course Outcomes

Code	Outcome
CO1	Understand the science behind air-conditioning
CO2	Familiarity with different air conditioning systems, their context of use and basics of planning involved
CO3	Familiarity and integration of mechanical transportation system within building
CO4	An understanding of fire safety, firefighting, fire prevention and installations in buildings
CO5	Apply active and passive fire precaution in building design.

Course Content

Air conditioning - introduction. Comfort conditions within built environment. Basic refrigeration systems. Refrigeration system components. Vapour compression cycle. Concept of cooling load. Introduction to calculation of cooling load. Concept of zoning.

Air conditioning systems for buildings of different scales and their requirements-: window type, split system, package unit, direct expansion system, chilled water system, fan coil unit, district cooling systems. Schematic details of various systems. Comparison of various systems. Space data of A.C. equipment rooms. Design criteria for selection of air conditioning calculations, layout, and drawings.

Lifts and escalators - types and applications. . Lifts: types of lifts - Dimension of lifts. Traffic analysis, calculation of round trip time and selection of lifts. Hoist way/shaft/well, machine room &

pit. Design of lift lobby and vertical transportation core. Standards for all. Arrangement of lifts. Escalators - characteristics, dimensions and arrangements of escalators.

Causes of fire, Mechanism of fire spread in buildings, classification of fire. Grades of fire hazard – Personal hazard, internal hazard & exposure hazard classification of building based on occupancy. High temperature effects and combustibility of building materials and structure. Fire resistance of buildings.

Passive and Active fire precautions: Site planning, Heat/ fire/ smoke sensitive detectors, Fire alarm system, and means of escape. General guidelines for egress design for

Multi-story buildings. Firefighting installations: hose reel, internal hydrant system, CO2 system, wet risers, etc

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Szokolay, S. V. (2008). Introduction to architectural science. Taylor & Francis.
2. ASHRAE. (2020). ASHRAE Handbook: HVAC Systems and Equipment. ASHRAE.
3. Bangash, M. Y. H., & Bangash, T. (2007). Lifts, Elevators, Escalators and Moving Walkways/Travelators. CRC Press.
4. Jain, V. K. (2007). Fire safety in buildings. Taylor & Francis.
5. Stollard, P. (2014). Fire from first principles: a design guide to international building fire safety. Routledge.
6. William H. Severns and Julian R Fellows, 'Air conditioning and Refrigeration', John Wiley and Sons, London, 1988.
7. National Building Code - Bureau of Indian Standards.
8. 'ISHRAE Handbook for Refrigeration', 2015.
9. George R. Strakosch (Editor), Robert S. Caporale, 'The Vertical Transportation Handbook' 4th Edition, Wiley and Sons, 2010.
10. A.F.C. Sherratt, 'Air Conditioning and Energy Conservation', The Architectural Press, London, 1980.
11. Swenson S. Don, 'Heating, Ventilating and Air Conditioning', American Technical Publishers, 2003.
12. ISHRAE, 'All about AHUs- Air Handling Units'.
13. CIBSE Guide D, 'Transportation Systems in Buildings',2015.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	-	-	3	-	-	-	3	-	-
CO2	1	2	-	-	3	1	1	-	3	-	-
CO3	3	3	1	1	2	-	1	1	1	3	2
CO4	2	3	2	2	2	-	-	-	3	3	2
CO5	2	2	1	2	2	-	-	-	-	1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	**AR304**	**ESTIMATION AND SPECIFICATION**	**3**	**2**	**1**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To equip students with the necessary methods for calculating estimates and detailed costing for small to medium-scale building projects.
CLO2	To understand and apply the concept of quantification of works of construction and procedures to derive the estimated cost of construction work items
CLO3	To enable the students to prepare the bill of quantities and the bill of materials.
CLO4	To acquaint students with analyzing the rate of building items, making them conscious of the economy in construction.
CLO5	To be able to specify the specifications for materials and processes in the building construction.

Course Outcomes

Code	Outcome
CO1	To know the purpose, type, and procedure of estimation and costing; Recognize units of measurement of work items; and list out various construction work items.
CO2	To compute the quantities of items of load-bearing construction as well as R.C.C. framed construction
CO3	Analyze the rate of items of work to be executed.
CO4	To compare market rates and schedule rates.
CO5	The students will be able to ensure the construction quality and methods using specifications.

Course Content

Introduction, Types of Estimates, Detailed Estimate - Units of Measurements, Details of measurement and calculation of quantities of various items of work, Methods of Building Estimate - separate or individual wall method, Centre line method.

Preparation of detailed estimates manually and through BIM software for different types of building elements, viz., arches, steps, and polygonal rooms, as well as measurement of RCC work in slabs, beams, columns, staircases, etc.

Preparation of abstract of estimated cost/ Bill of Quantity (BOQ) and Bill of Materials (BOM), use of CPWD schedule of rates, Analysis of rates for main items of work in buildings, considering current market rates for building materials, labour wages, plants and tools, transportation, handling, storage, and contractor's profit.

Introduction, Main items of work, Importance of specification, Types of specifications - General and detailed specifications - methods of writing form and sequence of clauses, general and special clauses, Specifications for special finishes, advanced materials and different construction elements
Course Assessment Methods: Continuous Assessment, End Assessment
Learning Resources & References: 1. Chakraborti, M. (2021). Estimating, Costing, Specification & Valuation in Civil Engineering, 29th Revised Edition. Kolkata. 2. CPWD. (n.d.). Central Public Works Department Analysis of Rates for Delhi Volume 1 & 2, Latest Edition. New Delhi: Director General, CPWD, Nirman Bhawan, New Delhi. 3. CPWD. (n.d.). Central Public Works Department Delhi Schedule of Rates Volume 1 & 2, Latest Edition. New Delhi: Director General, CPWD, Nirman Bhawan, New Delhi. 4. Dutta, B. (2022). Estimating and Costing in Civil Engineering Theory and Practice, 28th Revised Edition. New Delhi: CBS Publishers & Distributors Pvt. Ltd. 5. Rangwala, S. (2020). Estimating, Costing and Valuation. Anand: Charotar Publishing House Pvt. Ltd.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	1	1	1	2	1	1	1	1	3	1
CO2	1	1	1	1	2	2	1	2	1	3	1
CO3	1	1	1	1	2	2	1	1	1	3	1
CO4	1	1	1	1	2	1	1	1	1	3	1
CO5	1	1	1	1	1	1	1	3	1	3	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	**AR306**	**ARCHITECTURAL WORKING DRAWING**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the process and sequence of preparing architectural working drawings for construction.
CLO2	To develop working drawing sets for residential and multi-storey buildings, focusing on execution details.
CLO3	To integrate structural, MEP (Mechanical, Electrical, Plumbing), and service coordination into architectural documentation.
CLO4	To familiarize students with industry standards, including layering, sheet composition, annotation, and revision control.
CLO5	To implement modern drafting methods, including BIM workflows, parametric detailing, and automation techniques.

Course Outcomes

Code	Outcome
CO1	Develop accurate, structured working drawings for residential and multistory buildings.
CO2	Follow the correct sequence of working drawings for different building typologies.
CO3	Coordinate architectural drawings with structural and MEP services to ensure design feasibility.
CO4	Apply modern digital tools like BIM and parametric modeling to enhance working drawing efficiency.
CO5	Compile a professional-quality working drawing set, aligned with industry standards and best practices.

Course Content

Introduces students to the critical role and importance of working drawings in architectural practice, emphasizing their function as essential tools for accurate communication between designers, consultants, and contractors during construction. It begins by distinguishing between conceptual drawings and working drawings, highlighting the shift from design intent to technical execution. Students learn about industry standards and conventions, including line types, symbols, annotation methods, and dimensioning practices, which ensure consistency and clarity across drawing sets. The organization of construction drawing packages is also covered, focusing on logical sheet sequencing and the integration of various components necessary for coherent project documentation.

The course delves into the essential components of a comprehensive drawing set, including site plans, center-line and foundation plans, structural grid plans, floor plans at various levels, elevations, and sections. Students develop detailed door-window schedules, finish schedules, and specialized

detail drawings for elements like stairs and kitchens. Building services are addressed through plumbing and sanitation layouts, electrical layouts, and HVAC systems, with emphasis on fixture positioning, drainage slopes, power circuits, ventilation shafts, and duct placements. Fire safety is covered through escape route planning and smoke extraction systems in compliance with building codes. The course briefly introduces advanced topics such as clash detection and interdisciplinary coordination using BIM workflows, particularly relevant for high-rise and complex projects.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Wakita, O. A., Bakhoum, N. R., & Linde, R. M. (2017). The Professional Practice of Architectural Working Drawings. Wiley.
2. Ching, F. D. K. (2019). Building Construction Illustrated (6th Edition). Wiley.
3. Zugay, A. (2023). Architectural Drafting & Design Using Autodesk Revit 2024. Goodheart-Willcox.
4. BIM Forum. (2021). Level of Development (LOD) Specification Guide. Available online.
5. Cousins, M. (2021). Architectural Working Drawings Handbook: Construction Documentation for BIM and CAD. Routledge.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	-	-	-	2	2	-	3	2	3	3
CO2	3	-	-	-	2	2	-	3	2	3	3
CO3	3	-	-	-	2	2	-	3	3	3	3
CO4	3	2	2	2	2	3	2	3	3	3	3
CO5	3	2	2	2	3	3	3	3	3	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	**AR308**	**BUILDING CONSTRUCTION AND MATERIALS – V**	**4**	**1**	**0**	**3**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the principles of modular co-ordination modules
CLO2	To understand the various types of space frames and their components
CLO3	To learn about the different types of prefabricated systems
CLO4	To learn about the materials and the technology involved in 3D printing
CLO5	To be cognizant of the different materials involved in tensile-fabric structures in digital printing

Course Outcomes

Code	Outcome
CO1	Application of modular space grids in designs
CO2	Select suitable space frames as per the project.
CO3	Employ prefabricated structures in design
CO4	Apply knowledge in the creation of 3D printed structures
CO5	Demonstrate the use of tensile fabric structures by digital printing

Course Content

Structural Systems for high rise buildings, Modular Co-ordination Module - basic module – multi modules - horizontal & vertical multi modules and submodules. Modular space grid. Modular dimensioning and modular drawing. Preferred sizes for horizontal and vertical coordinating and controlling dimensions. Controlling dimensions for heights of building components & controlling zones. Storey heights & room heights.

Space structures. Skeleton frame works (space frames) - single layer grids (two-way, three way & four way) and double layer grids (lattice grids & true space grids). Offset grids and differential grids. Study of prefabricated commercially available systems - Space Deck System, Triodetic System, Mero System & Nodus System. Geodesic Domes.

Introduction to System Building / Method Building. Closed System & Open System. Analysis of building elements / components for introduction of prefabrication in India context. Classification of prefabricated components.

Types of materials and its constitution/manufacturing, construction technology and

requirement for 3D printed building structure and extra-terrestrial printed structures.

Tensile fabric structure by digital printing - translucent fabric, thin-film photovoltaic, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and poly tetra fluroethlene, coated glass cloth etc

Integrated Building Systems- integration of various building systems and services including structural, mechanical, electrical, and plumbing, Building information modelling, Building management systems , Smart façade and envelope systems

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Makowski, 1981, "Analysis, Design and Construction of Double - Layer Grids", Applied Science, London,
2. Heki, K., (ed.), 1986, "Shells, Membranes and Space Frames", Elsevier, New York,
3. John E Fernandez, 2006, “Material Architecture: emergent materials for innovative buildings and ecological construction” 1st Edition.
4. Pat Guthrie, 2010, The Architects Portable Handbook, 4th Ed. The McGraw-Hill Companies Inc.
5. Francis Ching, 2014, Building Construction Illustrated, 5th Ed. John Wiley & Sons Inc.
6. Chilton, J. (2020). Space grid structures. Routledge.
7. Wallance, D. (2021). The future of modular architecture. Routledge.
8. Lyons, A. (2024). Modern methods of construction and innovative materials. Taylor & Francis Ltd.
9. Rangel, B. (Ed.), Guimarães, A. S. (Ed.), Lino, J. (Ed.), & Santana, L. (Ed.). (2024). 3D printing for construction with alternative materials. Springer International Publishing.
10. Alavi, H., Kookalani, S., Rahimian, F., & Forcada, N. (2024). Integrated building intelligence. Springer.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	2	1	-
CO3	1	-	-	-	-	-	-	-	2	-	-
CO4	3	-	-	-	-	-	-	1	1	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	**AR310**	**ARCHITECTURAL DESIGN – VI**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111, AR112, AR211, AR212, AR309

Course Learning Objectives

Code	Learning Objectives
CLO1	To analyse and respond to the physical environment and socio-cultural contexts of urban context in design.
CLO2	To integrate materials, construction techniques, structural systems, and environmental aspects into coherent design solutions.
CLO3	To apply knowledge from theory, technology and sciences for holistic and sustainable designs.
CLO4	To design complex multi-use public buildings with a spatial hierarchy, circulation strategies and structural efficiency.
CLO5	To state students with research skills and effectively communicate design concepts through graphical and written formats.

Course Outcomes

Code	Outcome
CO1	Critically analyse and integrate urban, environmental, and socio-cultural contexts into architectural design.
CO2	Apply materials, construction techniques, and structural systems for functional and sustainable solutions.
CO3	Synthesize theoretical, technological, and scientific knowledge to create holistic design approaches.
CO4	Develop innovative spatial and structural strategies to enhance user experience and environmental performance.
CO5	Conduct research and communicate design concepts effectively through graphical and written formats.

Course Content

Design of complex architectural projects within urban and suburban contexts - Integration of technology, materiality, and spatial organization. Architectural vocabulary development, responding to the physical, cultural, and environmental context of a given site.

Through design studio exercises, analysis of multi-functional public buildings or building complexes, such as courts, colleges, commercial complexes, and hospitals - Challenges to address issues of scale, user experience, circulation, structure, and sustainability - Ensure a coherent architectural language.

Special study on independent research and critical inquiry - analyse and document historical precedents, technological innovations, and contemporary design strategies.

Application of theoretical knowledge, including materials, construction, structural systems, environmental science, and behavioural sciences, in shaping design solutions.

At least one project can be entirely based on services integration. Example: Auditorium, cineplex, museum, hospital.

Exercises involving working drawings and estimation/specification can be made part of the design exercise.

The application of Parametric design principles may be encouraged. Explore the application of glass in design.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Alexander, Christopher. A Pattern Language: Towns, Buildings, Construction. Oxford University Press, 1977.
2. Ching, Francis D.K. Architecture: Form, Space, & Order. John Wiley & Sons, 2015.
3. Neufert, Ernst. Architects' Data. Wiley-Blackwell, 2012.
4. Rudofsky, Bernard. Architecture Without Architects: A Short Introduction to Non-Pedigreed Architecture. University of New Mexico Press, 1964.
5. Lynch, Kevin. The Image of the City. MIT Press, 1960.
6. Watson, Donald and Kenneth Labs. Time-Saver Standards for Architectural Design: Technical Data for Professional Practice. McGraw-Hill, 2004.
7. Francis D. K. Ching, “A Visual Dictionary of Architecture”, 2nd edition, John Wiley & Sons, 2012.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		2		1	3						
CO2								2	2	3	
CO3	1	3							3		
CO4	2				2			2		2	
CO5			2				2				2

SEMESTER – 7

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	AR401	BUILDING CODES, BYE-LAWS, AND UNIVERSAL ACCESSIBILITY	3	2	1	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
By the end of this course, students will be able to:	
CLO1	Understand the fundamental principles of building bye-laws, regulations, and development control rules.
CLO2	Analyse and interpret the National Building Code (NBC) of India and the local Building Bye-laws.
CLO3	Examine real-world architectural design projects for compliance with codes and bye-laws.
CLO4	Integrate regulatory requirements into architectural planning and design projects.
CLO5	Critically assess and propose improvements in existing bye-laws and regulatory frameworks.

Course Outcomes

Code	Outcome
After successful completion of this course, students will be able to:	
CO1	Interpret and apply building regulations and codes in architectural design projects to ensure legal compliance.
CO2	Demonstrate proficiency in zoning regulations, FSI/FAR calculations, setback requirements, etc. for architectural projects.
CO3	Assess case studies for regulatory violations and propose corrective measures to ensure code compliance.
CO4	Demonstrate ethical and professional responsibility in architectural practice by adhering to legal frameworks and best practices.
CO5	Recommend policy-level improvements in bye-laws and regulations to address building and urban level challenges.

Course Content

Key terms and the role of BIS - Meaning and significance of key terms with appropriate examples: Act, Rules, Regulations and Bye-laws. Overview of Bureau on Indian Standards (BIS) and its role in publishing standards relevant to architecture and construction in terms of specifications, codes of practice and handbooks.

Introduction to NBC - National Building Code (NBC) of India and its significance. Salient features of the various parts of NBC - integrated approach, definitions, administration, development control rules and general building requirements.

Chapters of NBC - Features of NBC covering Universal Accessibility, Fire and Life safety, Building materials, Structural design, Constructional practices and safety, Building services, and Landscaping, Signs and outdoor display structures.

Building Bye - Laws and Regulations - Examples of building bye-laws covering aspects such as setbacks, plot coverage, floor area ratio (FAR), height restrictions, parking norms and minimum standards for habitable spaces. Exposure to the contents of the various forms an architect is required to submit to the statutory authorities.

Various Acts - Overview of Municipal Acts, Corporation Acts, Consumer Act & their implications. Introduction to Heritage Act and its importance.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. 'National Building Code of India (NBC 2016)', Bureau of Indian Standards (BIS).
2. Development Control Regulations (DCR) of Various States & Cities.
3. 'The Handbook on Barrier-Free and Accessibility (2016 Edition)', CPWD.
4. Ministry of Housing and Urban Affairs. (2021). Harmonised guidelines and standards for universal accessibility in India. Government of India.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	3	-	1	3	3	2	3	2	3	3
CO2	3	2	-	2	3	3	3	3	2	3	3
CO3	3	3	-	2	3	3	2	3	2	3	3
CO4	3	-	-	2	3	3	2	1	-	3	3
CO5	2	2	-	3	3	3	3	2	1	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR403**	**ENERGY EFFICIENT BUILDINGS**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Explain the global energy crisis, energy consumption patterns in buildings, and the necessity of sustainable design.
CLO2	Assess the effectiveness of passive heating and cooling techniques, including solar orientation, shading, natural ventilation, and daylighting, in enhancing building energy performance.
CLO3	Examine the impact of functional, environmental, and envelope factors on energy use and assess the role of energy-efficient materials, insulation, HVAC systems, and electrical components.
CLO4	Interpret and implement compliance measures from the Energy Conservation Building Code (ECBC) and assess sustainability benchmarks in green rating systems like LEED and GRIHA.
CLO5	Develop site and landscape-based energy conservation techniques, incorporating vegetation, water bodies, and urban heat island mitigation.

Course Outcomes

Code	Outcome
CO1	Demonstrate an understanding of the global energy crisis, energy consumption in buildings, and sustainable design approaches.
CO2	Utilize passive cooling and heating techniques, including solar orientation, shading, natural ventilation, and daylighting, to improve building energy performance.
CO3	Evaluate the impact of functional, environmental, and envelope factors on energy use and apply energy audit techniques for performance assessment
CO4	Apply the Energy Conservation Building Code (ECBC) and assess compliance with green certification frameworks like LEED and GRIHA.
CO5	Integrate vegetation, water bodies, and urban heat island mitigation strategies in site planning for improved energy conservation.

Course Content

Global energy crisis, energy consumption in buildings, and the need for sustainability. Introduces energy-efficient design principles and regulatory frameworks for energy conservation.

Passive cooling and heating strategies including solar orientation, shading, evaporative cooling, earth cooling, natural ventilation, and daylighting.

Functional, environmental, and envelope factors influencing energy consumption. Energy-efficient materials, glazing, insulation, HVAC, and electrical systems. Building energy audits and performance assessments.

Energy Conservation Building Code (ECBC) and its compliance requirements. Green building certification systems such as LEED and GRIHA focus on sustainability benchmarks and rating criteria.

Landscape strategies for energy efficiency, including vegetation, water bodies, and urban heat island mitigation. Site selection, orientation, and planning techniques for improved energy performance.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Ghosh, S., & Dhaka, A. (2015). Green Structures: Energy Efficient Buildings. CRC Press.
2. Bauer, M., & Heiler, V. G. (2018). Energy Efficiency in Buildings. Springer.
3. Joseph, B. (2016). Renewable Energy in Buildings: A Guide for Professionals. Wiley.
4. Thorpe, D. (2016). The Energy Efficiency Handbook. Routledge.
5. Rael, B. L. (2018). Building Energy Modeling with OpenStudio. Wiley.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		3							3		
CO2	3								3		
CO3								2	3		3
CO4									3		3
CO5					3				3		

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	AR405	URBAN DESIGN: PRINCIPLES, EVOLUTION, AND CONTEMPORARY PRACTICES	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To introduce students to the fundamental principles of urban design.
CLO2	To explore the historical evolution and contemporary trends in urbanism.
CLO3	To understand urban form, public spaces, and streetscapes.
CLO4	To familiarize students with Indian and global urban design policies and guidelines.
CLO5	To examine case studies of successful urban design interventions.

Course Outcomes

Code	Outcome
CO1	Understand the fundamental principles and scope of urban design.
CO2	Analyze the historical evolution of urban form and contemporary urbanism trends.
CO3	Evaluate urban elements, spatial organization, and public spaces in urban environments.
CO4	Interpret policies, regulations, and governance frameworks influencing urban design.
CO5	Examine and critique urban design case studies, applying best practices to real-world scenarios

Course Content

Foundational introduction to urban design, defining its scope and emphasizing its crucial role in shaping livable, functional, and aesthetically engaging urban environments. It examines how urban design serves as an interdisciplinary bridge between architecture and urban planning. The evolution of urban form is studied through a historical perspective, tracing the development of cities from ancient civilizations to contemporary times. The course investigates how different historical periods—such as the medieval, Renaissance, and industrial eras—have influenced the structure and character of urban areas. Additionally, it explores the impact of modernist and postmodernist ideologies on urban design, while highlighting current trends including Smart Cities, New Urbanism, and Transit-Oriented Development as part of a broader understanding of urban transformation. Key theories from influential urban thinkers such as Kevin Lynch, Jane Jacobs, and Christopher Alexander are introduced, offering insights into the functioning of cities and the ways in which people experience and interact with urban spaces.

Fundamental elements and principles of urban design are explored through the study of urban morphology, spatial organization, and public space design. The course emphasizes spatial components such as streets, blocks, landmarks, nodes, and edges, drawing from Lynch's theoretical framework. It also examines how factors like scale, density, and human-centric design influence

spatial quality and user experience, encouraging students to analyze how these elements shape coherent and vibrant urban environments.

Role of public spaces and streetscapes in creating livable cities. Various typologies of public spaces—both formal and informal—are examined, with Indian case studies. Concepts like walkability, climate-responsive design, green and blue infrastructure, and tactical urbanism are introduced to highlight strategies that enhance accessibility, comfort, and community engagement in urban areas. Relevant policies, guidelines, and regulatory frameworks at both national and international levels. Topics such as the Smart Cities Mission, AMRUT, zoning regulations, and development controls like FSI and TDR are discussed in the context of governance and urban development. The role of emerging technologies—including digital twins and artificial intelligence—in shaping future urban design practices is also addressed. Responsibilities of architects and urban designers in contributing to sustainable, inclusive, and future-oriented cities.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Dovey, K. (2023). From place to assemblage. In H. Kamalipour, P. Aelbrecht, & N. Peimani (Eds.), The Routledge Handbook of Urban Design Research Methods (pp. 215–223). Routledge.Wikipedia
2. Dovey, K., & Pafka, E. (2020). Mapping the publicness of public space. In V. Mehta & D. Palazzo (Eds.), Companion to Public Space (pp. 234–248). Routledge.
3. Carmona, M., Tiesdell, S., Heath, T., & Oc, T. (2010). Public Places Urban Spaces:The Dimensions of Urban Design. Routledge.
4. Lynch, K. (1960). The Image of the City. MIT Press.
5. Jacobs, J. (1961). The Death and Life of Great American Cities. Random House.
6. Gehl, J. (2010). Cities for People. Island Press.
7. Cullen, G. (1971). The Concise Townscape. Architectural Press.
8. Ministry of Housing and Urban Affairs, Government of India – Smart Cities Mission Guidelines.
9. Alexander, C. (1977). A Pattern Language: Towns, Buildings, Construction. Oxford University Press.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	-	3	2	2	2	-	-	-	2
CO2	2	3	2	3	2	2	2	-	-	2	2
CO3	3	2	2	3	3	2	3	-	-	2	2
CO4	1	2	-	3	2	3	3	-	-	3	3
CO5	3	3	2	3	3	3	3	-	-	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR407**	**ARCHITECTURAL DESIGN – VII**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111, AR112, AR211, AR212, AR309, AR310

Course Learning Objectives

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

Code	Learning Objectives
CLO1	Develop advanced architectural design solutions for complex projects, including mixed-use developments, transportation hubs, and institutional buildings.
CLO2	Apply sustainable and energy-efficient design principles to ensure environmental responsibility in architectural projects.
CLO3	Demonstrate knowledge of construction techniques, structural systems, materials, and building services to ensure feasibility and efficiency in large-scale projects.
CLO4	Prepare complete sets of Working Drawings for Architectural Design Projects.
CLO5	Incorporate user experience and human-centered design principles to create inclusive and functional architectural spaces.

Course Outcomes

Upon successful completion of the course, students will be able to:

Code	Outcome
CO1	Design and develop innovative architectural solutions for mixed-use, transit, and institutional projects that balance functionality, aesthetics, and sustainability.
CO2	Develop sustainable building strategies by integrating passive cooling, renewable energy, efficient water management systems, etc.
CO3	Implement advanced construction methodologies and materials to enhance building efficiency, resilience, and environmental performance.
CO4	Prepare Working Drawings that effectively communicate design intent to stakeholders.
CO5	Apply building regulations, universal accessibility, and user experience and human-centered design principles in architectural design.

Course Content

Projects such as Mixed-use developments, transportation hubs, and institutional buildings to provide opportunities to understand and learn how to solve the built environmental needs for multi-faceted public activities in an urban context. Sustainability, net-zero design strategies, green certification requirements to be incorporated as components of design.

Large campuses, Cinema Multiplex, Multistorey Office buildings, Commercial complex, Mixed-use Development, Large span structures such as Indoor Sports complex using advanced building materials and techniques, Adaptive Reuse of underutilised and abandoned industrial, heritage buildings.

Complete set of Working Drawings are to be prepared for one of the Architectural Design Projects.

Display of competence in the application of knowledge gained from the following will be an essential requirement for all the design projects: Materials & Structures, Theory of Architecture, Building Services, Environmental Science and Behavioural Science.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Francis D.K. Ching, 'Form, Space, and Order', Wiley, 2014 (04th Edition).
2. Francis Ching & Mark Jarzombek, 'Architecture: Form, Space, and Meaning', Wiley, 2010 (02nd Edition).
3. Arvind Krishan, Simos Yannas, 'Climate Responsive Architecture', Tata McGraw-Hill, 2001 (01st Edition).
4. 'National Building Code of India (NBC 2016)', Bureau of Indian Standards (BIS).
5. 'The Handbook on Barrier-Free and Accessibility (2016 Edition)', CPWD.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	3	2	2	3	2	3	3	3	3	3
CO2	3	3	2	2	2	2	2	2	3	3	2
CO3	3	3	1	1	2	1	2	3	2	3	2
CO4	2	2	1	-	2	1	-	2	2	3	3
CO5	3	2	-	1	3	2	2	2	-	3	3

SEMESTER – 8

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
8	**AR402**	**PROFESSIONAL TRAINING**	-				17

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Gain knowledge of architectural office operations, project management, contracts, client interactions, and regulatory frameworks, including the National Building Code (NBC).
CLO2	Develop proficiency in architectural design, construction drawings, digital tools such as BIM, and the preparation of working drawings, reports, and specifications.
CLO3	Observe and assess site execution, material selection, structural systems, cost estimation, and construction coordination to enhance practical decision-making skills.
CLO4	Understand and assess the integration of sustainability principles, green building strategies, and environmental considerations in architectural projects.
CLO5	Improve written, verbal, and graphical communication skills while adhering to ethical responsibilities in professional practice through reports, presentations, and interactions.

Course Outcomes

Code	Outcome
CO1	Demonstrate understanding of architectural practice and professional responsibilities, including project management, contracts, and legal aspects.
CO2	Apply architectural design and technical documentation skills in a professional setting, including working drawings, specifications, and BIM tools.
CO3	Analyze construction processes and site management techniques, including material selection, cost estimation, and quality control.
CO4	Evaluate sustainability and energy-efficient design strategies in professional practice, integrating green building concepts and environmental considerations.
CO5	Demonstrate effective professional communication and ethical conduct through reports, presentations, and teamwork in an architectural office environment.

Course Content

The students are required to undergo Practical Training in a qualified, registered and competent Architect's Office. Students will be trained in the various practical aspects of Architecture, Construction & Professional practice.

Maintenance of personal diary, recording important observations, architectural detail, technical data, site visit particulars, presentation of drawings and reports done during the training period are the essential submission requirements. Marks will be awarded on the basis of student's monthly progress reports, work diary, drawings & reports done during the training period and the Architect's certificate.

Course Assessment Methods: Continuous Assessment, End semester jury

Learning Resources & References:

1. Chudley, R., & Greeno, R. (2016). Building construction handbook (11th ed.). Routledge.
2. Pressman, A. (2017). Professional practice 101: Business strategies and case studies in architecture (4th ed.). Wiley.
3. Owen, G. (2015). Architect's legal handbook: The law for architects (10th ed.). Routledge.
4. McMorrough, J. (2018). The architecture reference & specification book: Everything architects need to know every day (2nd ed.). Rockport Publishers.
5. Patil, B. S. (2019). Legal aspects of architecture, engineering and construction (3rd ed.). CRC Press.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1						3					3
CO2	3							3			
CO3							2			3	
CO4				3					2		
CO5		2				3					

SEMESTER – 9

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	AR501	URBAN PLANNING	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To introduce students to the fundamental concepts and objectives of urban planning.
CLO2	To provide an understanding of the evolution and major theories of urban planning.
CLO3	To equip students with the skills to apply various planning processes and techniques.
CLO4	To familiarize students with the urban planning framework in India.
CLO5	To explore contemporary approaches and sustainable practices in urban planning.

Course Outcomes

Code	Outcome
CO1	Understand the need and objectives of urban planning and key planning terminologies.
CO2	Analyze the evolution of major planning theories and models through the contributions of prominent urban planners.
CO3	Apply various planning processes and techniques to investigate the requirements of any region.
CO4	Evaluate different types of urban plans in India and the impact of urban regeneration and redevelopment on overall development.
CO5	Ideate Urban Solutions by utilizing technology to explore innovative forms of development.

Course Content

Need and Objectives of urban planning; Urban Settlements - Characteristics and classifications; Planning Terminologies: Definitions and concepts, including FAR, coverage, land use, zoning classifications, CBD, nodes, suburbs, green belts, CRZ, rural-urban fringe, satellite towns, and outgrowths.

Evolution of planning and Key Theories: Overview of major planning theories and models. Role and contribution of the following towards contemporary town planning thought - Patrick Geddes, Patric Abercrombie, Daniel Burnham, Soria Y Mata, Frederick Olmstead, Henry Wright, Ebenezer Howard, Clarence Perry, Clearance stein, CA Doxiadis, Le Corbusier, Frank Lloyd Wright, Study of Planned cities in India throughout history.

Planning Process: Components and techniques; Identification of Planning Problems; Participatory and Inclusive Planning: Methods and importance; Planning Surveys: Basics of planning for various sectors, including physical, transportation, urban infrastructure, environmental, and housing.

Introduction to urban planning in India - Types of plans: Regional plan, Master plan, Zonal development plan, Structure plan and Transportation plan. Regional plan types and delineation of regions. Land use plan, local development plans and their components; Development control rules, urban renewal, redevelopment, rehabilitation, and conservation. Case studies of urban development projects.

Urbanization Trends: Global and Indian perspectives; Effects of globalization on urban areas; New Forms of Development: Self-sustained communities, SEZ, transit-oriented development (TOD), integrated townships, and smart cities; Case Studies. Overview of urban policies, laws, and regulations in India. Introduction to Urban Infrastructure and Services and Standards.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Jain, A. K. (2020). Town planning: Principles, process and practice (2nd ed.). Khanna Publishers.
2. Hiraskar, G. K. (2012). Fundamentals of town planning. Dhanpat Rai Publications.
3. Modak, N. V., & Ambedkar, V. N. (1971). Town and country planning and housing. Orient Longman.
4. Rangwala, S. C. (2023). Town planning (32nd ed.). Charotar Publishing House.
5. Ministry of Housing and Urban Affairs. (2014). Urban and regional development plan formulation and implementation (URDPFI) guidelines (2nd ed.). MoHUA.
6. Bureau of Indian Standards. (2016). National building code of India 2016 (3rd ed.). BIS.
7. Burns, S., & Williams, J. (1983). Cities of the world: World regional urban development. Harper & Row.
8. Keeble, L. (1972). Principles of town and country planning. The Estates Gazette Ltd.
9. Ratcliffe, J. (1981). An introduction to town and country planning. Hutchinson.
10. Gallion, A. B., & Eisner, S. (1993). The urban pattern: City planning and design (6th ed.). Van Nostrand Reinhold.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	3	-	3	-	-	-	-	-	-	-
CO2	-	3	-	3	-	-	-	-	-	-	-
CO3	-	-	-	3	1	-	1	-	-	-	-
CO4	-	-	-	2	-	2	1	-	-	-	2
CO5	2	-	-	-	-	1	1	-	-	-	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR503**	**ARCHITECTURAL DESIGN – VIII**	**9**	**0**	**0**	**9**	**9**

Prerequisites: AR111, AR112, AR211, AR212, AR309, AR310, AR407

Course Learning Objectives

Code	Learning Objectives
CLO1	To develop competency in urban-scale architectural design, addressing multi-functional developments that integrate residential, commercial, civic, and transportation spaces.
CLO2	To enhance understanding of urban planning principles, including zoning regulations, traffic management, and sustainable urban development strategies.
CLO3	To foster an interdisciplinary design approach, integrating structural systems, material innovations, environmental considerations, and behavioral sciences.
CLO4	To ensure design solutions are contextually appropriate and adaptable to future urban challenges.
CLO5	To strengthen critical thinking and problem-solving abilities, enabling students to create inclusive, efficient, and environmentally responsive urban spaces.

Course Outcomes

Code	Outcome
CO1	Analyze and interpret urban contexts, identifying key environmental, infrastructural, and socio-cultural influences on architectural design.
CO2	Design and develop comprehensive urban-scale projects, integrating planning principles, functional requirements, and sustainability strategies.
CO3	Apply structural, material, and environmental considerations to create resilient and adaptable urban environments.
CO4	Demonstrate an understanding of socio-cultural and behavioral aspects, ensuring inclusive and community-responsive design solutions.
CO5	Effectively communicate design proposals, using detailed drawings, models, and analytical reports that reflect urban design integration.

Course Content

Architectural design at urban and metropolitan scales with the complexities of multi-functional developments that encompass a diverse mix of residential, public services, commercial, industrial, transportation, cultural, and civic spaces - Explore urban spatial structures, infrastructure networks, and the socio-economic forces shaping contemporary cities. Responsive to the urban context, environmentally sustainable, and adaptable to evolving needs.

Integration of urban design principles into architectural solutions - ensuring that large-scale projects/ high-density development align with zoning regulations, planning policies, and traffic management frameworks. Analyse how movement patterns, accessibility, and land-use planning impact urban form and function, addressing the challenges of density, mixed-use integration, and sustainable

urban growth - Context-sensitive design approaches that respect historical, cultural, and ecological aspects of the built environment.

Incorporate interdisciplinary knowledge from architectural theory, structural systems, material sciences, environmental studies, and behavioral sciences to create holistic and resilient urban spaces - Emphasize evidence-based decision-making, research-driven methodologies, and data-informed strategies to ensure well-balanced solutions - case studies, urban analyses, and iterative design development, critical thinking, problem-solving abilities, and an understanding of the socio-cultural dynamics of urbanism.

Course Assessment Methods: Continuous Assessment, Mid semester review, End semester review and End Assessment

Learning Resources & References:

1. Alexander, Christopher. A Pattern Language: Towns, Buildings, Construction. Oxford University Press, 1977.
2. Carmona, Matthew, et al. Public Places, Urban Spaces: The Dimensions of Urban Design. Routledge, 2010.
3. Lynch, Kevin. The Image of the City. MIT Press, 1960.
4. Gehl, Jan. Cities for People. Island Press, 2010
5. Watson, Donald. Time-Saver Standards for Urban Design. McGraw-Hill, 2003.
6. Bacon, Edmund N. Design of Cities. Penguin Books, 1974

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	3				2		1		
CO2	3	1	2	1	3	2	2		2	2	
CO3	1	2		2	1	2				1	
CO4		2		2		3	3	1		2	2
CO5		3		2				2	2	3	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR505**	**ARCHITECTURAL DISSERTATION**	**3**	**0**	**0**	**3**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To introduce students to the systematic study of architectural theories, concepts, and case studies.
CLO2	To enable students to conduct a literature-based investigation on a chosen architectural topic.
CLO3	To develop skills in analyzing and synthesizing secondary data from books, journals, and case studies.
CLO4	To understand the evolution of architectural ideas and contextual influences through theoretical discourse.
CLO5	To enhance students' ability to critically present and document their findings in a structured format.

Course Outcomes

Code	Outcome
CO1	Conduct a structured secondary study using literature, theories, and case studies in architecture.
CO2	Analyze and synthesize information from various academic sources.
CO3	Critically assess architectural ideas and their relevance to contemporary discourse.
CO4	Develop a coherent argument and conceptual framework for architectural discussions.
CO5	Present and document findings in a well-structured and scholarly manner.

Course Content

Understanding the significance of theoretical exploration in architecture. Selection of a specific topic based on architectural relevance and academic interest. Review of secondary sources such as books, academic journals, research papers, and reports. Study of architectural theories and discourses relevant to the chosen topic. Comparative analysis of key architectural texts, movements, and philosophies. Understanding frameworks for theoretical analysis in architecture. Developing a structured literature review with a critical perspective. Selection and study of relevant case studies based on secondary data. Comparative analysis of projects with similar design, functional, or theoretical aspects. Understanding design influences, spatial organization, and socio-cultural contexts. Derivation of key observations and principles from documented case studies. Connecting literature review and case study findings to establish key arguments. Development of a conceptual framework to analyze architectural issues. Identifying patterns, trends, and critical perspectives within architectural studies. Structuring the findings in relation to the chosen topic. Structuring the dissertation report: Introduction, Literature Review, Case Studies, Analysis, and Conclusion.

Course Assessment Methods: Continuous Assessment (Three internal reviews), End Semester Viva -Voce examination & Report submission

Learning Resources & References:

1. Nesbitt, K. (1996). Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965-1995. Princeton Architectural Press.
2. Lang, J. (1987). Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design. Van Nostrand Reinhold.
3. Groat, L., & Wang, D. (2013). Architectural Research Methods (2nd Edition). Wiley.
4. Borden, I., & Ruedi, K. (2000). The Dissertation: An Architecture Student's Handbook. Routledge.
5. Babbie, E. (2020). The Practice of Social Research (15th Edition). Cengage Learning.
6. Neuman, W. L. (2014). Social Research Methods: Qualitative and Quantitative Approaches. Pearson.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	3	2	2	2	2	3	1	1	2	2
CO2	2	3	2	2	2	3	3	1	1	2	2
CO3	2	3	2	2	3	3	3	1	1	2	2
CO4	2	3	2	2	3	3	3	1	1	3	2
CO5	2	2	2	2	2	2	3	1	1	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR507**	**HOUSING**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Remember theories and concepts related to housing
CLO2	Explain the developments in housing sector from the lens of five-year plans
CLO3	Simplify the critical framework of housing design, policies, and finance
CLO4	Organize the physical, administrative, and socio-cultural aspects of housing.
CLO5	Determine the existing housing gap and the forecast demand using mathematical tools.

Course Outcomes

Code	Outcome
CO1	Identify and recall the key concepts and theoretical foundations of housing.
CO2	Discuss housing policies and programs, highlighting their objectives and implications.
CO3	Applying housing design standards to effectively achieve sustainable housing solutions.
CO4	Analyze the current finance framework for housing development.
CO5	Evaluate the impact of physical, administrative, and socio-cultural factors on sustainable housing planning.

Course Content

Introduction to housing concepts, definitions, and key components Understanding qualitative and quantitative needs in the field of housing at a global level. Issues in housing in developing countries (particularly in India) with a focus on challenges faced in the context of the Third World. Housing characteristics and current housing situations. Housing in five-year plans and National Housing Policies. Overview of national housing schemes and programs. Key elements of housing policy. Housing surveys: Preparing a survey form and testing its credibility. Housing agencies and their roles. The housing process and the sequence of development."

Housing and socio-economic development- The role of housing in the socio-economic development of a nation. Housing needs, demand, and supply. Housing problems and inadequacies. The distinction between formal and informal housing. Peculiarities of urban housing: challenges related to land availability and possible solutions. The relationship between the place of work and home.

Housing standards Latest market trends in housing. Desirable and minimum design standards for housing. Low-cost housing, EWS (Economically Weaker Sections), and slums. Housing typology and residential gross and net density. Housing for All Mission (PMAY) and RERA. Understanding key concepts like FAR (Floor Area Ratio), FSI (Floor Space Index), ground coverage, and other development controls. Housing standards and the basic principles of formulating these standards. Community and neighbourhood factors influencing housing design. Assessing the housing deficit of a region, projecting the number of houses to be constructed, and planning for future periods to

eliminate the deficit. The role of public and private sector housing, the need for a housing policy, and the contributions of HUDCO and State Housing Boards.

Site planning and housing design- The form and structure of housing are influenced by socio-economic and physical parameters such as location, topography, development controls, and climate.

Slum and its definitions, causes, and consequences, along with the efforts made to address the problem of slums.

Current aspects and issues in housing Finance Agencies- obstacles in financing housing, and the role of banking and non-banking institutions in housing finance. Low-Cost Housing- methods for controlling housing costs, along with some low-cost construction techniques and materials used in India and other developing countries. Economically Weaker Sections (EWS)- to address the current income levels and housing challenges faced by economically weaker sections.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Stojanović, D. (2024). Architecture for Housing: Understanding the value of design through 14 case studies. Birkhäuser.
2. Parolek, D. G. (2020). Missing middle housing: Thinking big and building small to respond to today's housing crisis. Island Press.
3. Ram, P., & Harper, M. (2020). The affordable housing market in India: institutional constraints, informal sector and privatization. Routledge India.
4. Mukherjee, A. (2019). The legal right to housing in India. Cambridge University Press.
5. Rossl, S. (2018). Housing in India. Charles Correa, Balkrishna Vithaldas Doshi, Raj Rewal (pp. 1-192). Quodlibet.
6. King, P. (2015). The principles of housing. Routledge.
7. 'Sustainable Building Design Manual: Vol 1 and 2', The Energy Research Institute, 2015.
8. A.K.Lal, 'Handbook of Low Cost Housing', New Age International Private Limited, 2011.
9. Government of India (2007), "National Urban Housing and Habitat Policy", Ministry of Housing and Poverty Alleviation
10. Kukreja, C. P. (1982). Tropical Architecture. New Delhi: McGraw–Hill.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		2			2	3	2		3	3	
CO2					1	3	2		1	3	3
CO3	3	2	1	3	3	3	2		2	2	
CO4	2	3	1	2	2	3	2	2	3	3	2
CO5		3	1		3	3	2		3	1	

SEMESTER – 10

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	**AR502**	**BUILDING ECONOMICS AND CONSTRUCTION MANAGEMENT**	**3**	**2**	**1**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
By the end of this course, students will be able to:	
CLO1	Understand the fundamental concepts of economics and their application in the built environment.
CLO2	Understand the fundamental principles, processes, and techniques of Construction Project Management.
CLO3	Apply project planning and scheduling techniques such as CPM to construction projects.
CLO4	Analyse project costs, budgeting, and resource allocation in construction projects.
CLO5	Evaluate risk management strategies and quality control measures in construction projects.

Course Outcomes

Code	Outcome
After successful completion of this course, students will be able to:	
CO1	Explain the relationship between Economics and Construction & Real Estate projects in terms of cost, demand, and supply.
CO2	Explain the principles of construction project management and the roles of stakeholders.
CO3	Develop project schedules using CPM for efficient time management.
CO4	Prepare Site management and Construction Execution Strategies for Construction projects.
CO5	Identify risks in construction projects and implement mitigation strategies.

Course Content

Introduction to Building economics - Demand, Supply, and Market Equilibrium; Cost, Price and Value; Types of costs: Fixed, Variable, Direct, Indirect, and Overheads; Cost-Benefit Analysis (CBA) and financial feasibility studies; Value Engineering (VE) and cost optimization in design and construction.

Introduction to Construction Project Management - Definition, scope, and importance of project management in construction; Golden Triangle of Project Management; Project life cycle and phases; Roles and responsibilities of a project manager.

Project Planning and Scheduling - Work Breakdown Structure (WBS); Critical Path Method (CPM), and Program Evaluation & Review Technique (PERT), Float, Slack; Construction Strategy and Logic, Construction Site Management; Bar charts, Gantt charts; Resource allocation, Resource Levelling and Smoothing; Updating the network based on the project progress.

Project Cost and Contract management - Cost versus time; Types of contracts: Lump sum, Item rate, Cost-plus, and Turnkey; Dispute resolution and contract administration.

Risk Management and Quality Control - Identification and classification of risks in construction, Risk mitigation strategies; Quality control and safety management in construction projects; Lean construction and Six Sigma for process optimization.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. G.C. Maheshwari & Anil Kumar Gupta, 'Building Economics and Costing', Laxmi Publications, 2022
2. 'A Guide to the Project Management Body of Knowledge (PMBOK Guide) and the Standard for Project Management', PMI (Project Management Institute), 07th Edition.
3. B.C. Punmia & K.K. Khandelwal, 'Project Planning and Control with PERT and CPM', Laxmi Publications, 2016 (04th Edition).
4. K.K. Chitkara, 'Construction Project Management: Planning, Scheduling, and Controlling', McGraw Hill Education, 2019 (3rd Edition).
5. Peurifoy, R.L., Oberlender, G.D., 'Project Management for Construction', McGraw Hill Education, 2010 (04th Edition).

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	1	1	1	2	2	2	-	-	1	1
CO2	2	2	1	3	2	2	2	3	-	3	3
CO3	2	3	1	3	1	1	3	3	-	3	3
CO4	3	3	-	3	3	2	2	3	-	3	3
CO5	2	3	3	3	3	3	2	3	-	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	**AR504**	**PROFESSIONAL PRACTICE**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	The course enhances exposure to the various documents published by COA and IIA.
CLO2	Understanding Tender, Contract and other procedures involved and office management.
CLO3	Providing knowledge on Architect's responsibility to society.
CLO4	To enable thoughtful duties and ethics of Architects.
CLO5	To assess the legal, social, and ethical responsibilities of architects, including duties toward clients, statutory bodies, and employees under labour laws.

Course Outcomes

Code	Outcome
CO1	Understand the professional, vocational and legal aspects of architectural practice.
CO2	Understanding of the code of professional conduct related to Architectural Profession.
CO3	Students should become familiar with aspects of setting up and being part of an architectural office, including proficiency in communication for conducting everyday business.
CO4	To familiarise students with pitching for projects and applying for jobs through case studies.
CO5	Enabling students to familiarise with the social responsibility of an Architect and their legal responsibilities.

Course Content:

Architects ACT 1972 and its implications. Council of Architecture and its role. The Indian Institute of Architects and its role. Code of Professional conduct as laid down by Council of Architecture. Purpose of architectural competitions. Council of Architecture's Guidelines on Architectural Competitions. Types and classifications of competitions.

Comprehensive Architectural services. Conditions of Agreement. Scope of work and schedule of services - as per the Council of Architecture. Standard Terms for Urban Design work – Scope of work, Schedule of services – Preliminary evaluation stage, Concept design stage, detailed design stage and Implementation stage.

Tender - its meaning & significance. Invitation to tender – Private invitation, Public Notice and Negotiation. Tender Notice and its characteristics. Opening of Tender. Acceptance of Tender. Types of Tenders. Characteristics, advantages & disadvantages of various types of tenders.

Social Role / Social Responsibilities of Architects, Architect and Office- Office and its management, Architects duties to his employees under labour welfare provisions. Duties and Liabilities of an Architect. Legal responsibilities of architects towards Statutory Bodies.

General Conditions of the Contract as put forward by the Indian Institute of Architects. Prime cost. Materials & workmanship, Inspection. Defects. Damages for non- completion, Virtual completion and defects liability period, Determination by the owner and determination by the contractor.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Documents published by the Council of Architecture in their website **http://www.coa.gov.in.**
2. Apte, V.S. 2008. **Architectural Practice and Procedure**. Padmaja Bhide, Pune
3. **The Architect's Handbook of Professional Practice** (2011), American Institute of Architects, Wiley.
4. David Chappell, (2020), **Professional Practice for Architects and Project Managers**, Wiley.
5. Krishnamurthy, K.V. and Ravindra S.V. (2014) **Professional Practice**, (Eastern Economy Edition), Prentice Hall India, New Delhi.
6. **Architects Act, 1972**, Universal Law Publishing - An imprint of LexisNexis (2016)
7. Publications on **Handbook on Professional Practice by IIA**, Self-Published

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	-	-	1	-	3	-	-	-	-	-
CO2	1	1	-	-	3	3	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	3	2
CO4	-	1	2	-	-	-	-	3	-	3	-
CO5	3	-	-	-	-	-	-	-	3	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	**AR506**	**ARCHITECTURAL DESIGN THESIS**	**16**	**0**	**0**	**16**	**16**

Prerequisites: AR111, AR112, AR211, AR212, AR309, AR310, AR407, AR503

Course Learning Objectives

Code	Learning Objectives
CLO1	To enable students to develop an architectural thesis project demonstrating independent design thinking.
CLO2	To integrate research, functional requirements, and spatial planning into a comprehensive design solution.
CLO3	To apply structural systems, building services, sustainability strategies, and technical innovations in architectural design.
CLO4	To develop and communicate a strong design concept through drawings, models, and visual representation.
CLO5	To demonstrate critical evaluation and refinement of design solutions through iterative processes and faculty reviews.

Course Outcomes

Code	Outcome
CO1	Develop a self-directed architectural thesis project demonstrating conceptual clarity and originality.
CO2	Integrate research, site analysis, and programmatic requirements into an architectural design.
CO3	Apply structural and building service systems effectively in design development.
CO4	Communicate their design ideas through professional-quality drawings, models, and presentations.
CO5	Critically evaluate and refine their design through reviews, discussions, and feedback.

Course Content

This course guides students through the comprehensive process of developing an architectural thesis, beginning with the selection of a topic grounded in architectural relevance, societal needs, and personal interest. It emphasizes in-depth research on contextual, historical, environmental, and technological aspects to establish a solid foundation for the project. Students formulate a detailed architectural program with clear objectives and develop key design criteria informed by case studies and research insights. The course includes identifying and analyzing a suitable site, assessing factors such as topography, climate, infrastructure, and socio-cultural context, along with understanding zoning laws, building codes, and site constraints. Site planning strategies are developed with a strong emphasis on environmental integration and contextual responsiveness.

As the thesis progresses, students work through the spatial organization, circulation planning, and functional layout of the design, applying sustainable design principles, climate-responsive strategies, and innovative materials. An iterative design process, guided by faculty supervisor , leads

to the refinement of the architectural proposal, including integration of structural systems, services, and environmental considerations such as HVAC, lighting, acoustics, and fire safety. Emphasis is placed on the detailed resolution of key architectural elements, façade articulation, and material choices. Students utilize advanced digital tools to enhance design communication through drawings, high-quality 3D renderings, walkthroughs, and physical models. The course culminates in the submission of a comprehensive thesis portfolio and report that consolidates research findings, design rationale, and technical documentation in accordance with academic standards.

Course Assessment Methods: Continuous Assessment (Three internal reviews), End Semester Viva -Voce examination & Report submission

Learning Resources & References:

1. Ching, F. D. K., & Binggeli, C. (2021). Design Drawing (3rd Edition). Wiley.
2. Baker, G. (2019). Design Strategies in Architecture: An Approach to the Analysis of Form. Routledge.
3. Unwin, S. (2010). Analysing Architecture. Routledge.
4. Watson, D., & Crosbie, M. (2003). Time-Saver Standards for Architectural Design: Technical Data for Professional Practice. McGraw-Hill.
5. Borden, I. (2021). The Dissertation: An Architecture Student's Handbook (3rd Edition). Routledge

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	2	1	2	2	3	-	-	2	2
CO2	3	2	1	2	3	3	3	2	2	3	3
CO3	2	-	-	-	2	-	-	3	3	2	2
CO4	3	2	2	1	2	2	2	-	-	3	2
CO5	3	2	2	2	3	3	3	2	2	3	3

LIST OF ELECTIVES

PROGRAM ELECTIVE – 1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR351	SUSTAINABLE ARCHITECTURE	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understanding the various concepts of sustainability and energy scenario of the world
CLO2	Understanding of sustainable planning and design
CLO3	Understanding and exploring sustainable building materials and construction
CLO4	Understanding the role of recycling, reusing and conservation of natural resources
CLO5	Analysing and appreciating the ratings systems across globe

Course Outcomes

Code	Outcome
CO1	Students will acquire the basic knowledge about various concepts of sustainability and will be able to explain the same
CO2	Students will demonstrate a greater understanding of sustainable planning and design
CO3	Students will be able to comprehend, analyse and apply the sustainable building materials and construction in practice
CO4	Students will demonstrate an ability to realize the importance of recycling, reusing and conservation of natural resources
CO5	Students will have theoretical foundations on the ratings systems across globe that prepare them for leadership in the field

Course Content

Concepts of sustainability: Energy and Global environment, Energy use and Climate change – Its impact, Types of Energy systems, Concept of Sustainability - Principles of conservation -synergy with nature, Bioregionalism - community basis shelter technology within bioregional patterns and scales, Ethical- environmental degradation. Sustainable planning & Design: Sustainable Development -Sustainable approach to site planning and design - relationships between site factors - development impacts from one area of the site on the other areas - Model ecosystem of the site, environmental monitoring and testing during construction- Design facility within social and environmental thresholds. Sustainable Building Materials and Construction: Properties, Uses and Examples of Primary, secondary and Tertiary Sustainable Materials, Principles to improve the energy efficiency - siting and vernacular design, shade, ventilation, earth shelter, thermal inertia and air lock entrances. Techniques of sustainable construction - technologies, methods of effectiveness, and design synthesis – alternative materials and construction methods: solar water heating panels; photovoltaic electricity generation; use of local materials and on-site growth of food, fuel and

building materials. Recycling and Reuse: Pre-building, Building, Post building stages - Architectural Reuse, Waste prevention, Construction and Demolition recycling -Conservation of natural and building resources - Energy and material savings – types of wastes - Elimination of waste and minimize pollution- various Decomposing methods – Innovative reuse of various wastes Case Studies and Rating systems: Sustainable Development Case Studies: illustrated examples of the planning, development, and construction. Green architecture and various international and national rating systems for sustainability- EAM (UK), CASBEE (Japan), LEED (US), Green Star (Australia), etc. – Indian systems – TERI GRIHA rating, LEED India rating, IGBC

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Dominique Gauzin – Muller "Sustainable Architecture and Urbanism: Concepts, Technologies and examples", Birkhauser, 2002.
2. Slessor, Eco-Tech : "Sustainable Architecture and High Technology", Thames and Hudson 1997.
3. Ken Yeang, "Ecodesign : A manual for Ecological Design", Wiley Academy, 2006.
4. Arian Mostaedi , "Sustainable Architecture : Low tech houses", CarlesBroto, 2002.
5. Sandra F.Mendler&Willian Odell, "HOK Guidebook to Sustainable Design", John willey and sons, 2000.
6. Richard Hyder, "Environmental brief: Pathways for green design", Taylor and Francis, 2007.
7. Brenda Vale and Robert Vale, "Green Architecture: Design for a sustainable future", Thames and Hudson 1996.
8. Fuller Moore, "Environmental control systems Heating, Cooling, Lighting". McGraw Hill, Newyork.
9. Caring A.Langston, Grace K.C.Ding, "Sustainable practices in built environment", second edition, Butterworth-Heinmann Linacre House Jordanhill Oxford.
10. R.N.Trivedi, "Environmental Sciences", Anmol Publications Pvt Ltd, New Delhi

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		2			2	2			3	1	1
CO2				4				2	2	1	1
CO3	1			2	2	1		1	3	1	
CO4	1							1	2		
CO5			~~3~~		~~3~~	2	1		2	2	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR353	DISASTER MITIGATION AND MANAGEMENT	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To impart knowledge about various disaster causes and mitigation measures
CLO2	To understand and apply the concept of Disaster Management system
CLO3	To familiarise students with the role of various agencies in Disaster Management
CLO4	To develop the Disaster preparedness and mitigation plan at the community and city level
CLO5	To impart knowledge about the role of Remote sensing and GIS in Disaster Management

Course Outcomes

Code	Outcome
CO1	To prepare the students with knowledge of disaster-resistant design
CO2	To define the role of various agencies in Disaster Management
CO3	To ensure the Capacity building and other strategies for mitigation of casualties at ground level
CO4	To understand methods of Reconstruction and Rehabilitation post-disaster
CO5	To be able to use software and real-time monitoring systems like Remote sensing in Disaster Management

Course Content

Disaster – an overview; Disaster – the Indian Perspective; Typology of disasters and increased understanding. Hazard, Disaster, Risk, Vulnerability.

Natural Hazards and Disasters -Earthquakes, cyclones, floods, tsunamis, avalanches, droughts, landslides, and lightning. –Causes, hazardous effects, mitigation measures.

Man-induced hazards & disasters: - Terrorism, gas and radiation leaks, toxic waste disposal, oil spills, forest fires., soil erosion

Preparedness and mitigation - Preparing hazard zone maps, Predictability/ forecasting &warning, Community preparedness, design against disasters, retrofitting, Population reduction in vulnerable areas, Awareness, and Capacity building.

Disaster Management; Community health and casualty management; Disaster Management – the role of various agencies; Relief measures; Post-disaster- Recovery, Reconstruction, and Rehabilitation. Remote-sensing and GIS applications in real-time disaster monitoring.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. D. Guha-Sapir, D. H. (2004). Thirty Years of Natural Disasters 1974-2003: The Numbers. Belgium: UCL Presses universitaires de Louvain,.
2. Division, N. D. (2004). Disaster Management in India- A Status Report. New Delhi: Ministry of Home Affairs, Government of India.
3. Goel, S. (2010). Encyclopaedia of Disaster Management Volume 1, 2 & 3. New Delhi: Deep & Deep Publications Pvt. Ltd.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	1	1	2	1	3	3	3	2	1
CO2	1	1	1	1	1	2	1	1	1	1	1
CO3	1	1	1	1	1	2	1	1	1	1	1
CO4	1	1	1	2	1	2	1	1	1	1	1
CO5	1	1	1	2	1	2	1	1	1	1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR355	TRADITIONAL KNOWLEDGE SYSTEMS OF THE BUILT ENVIRONMENT IN SOUTH INDIA	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the Indian traditional knowledge systems in town planning
CLO2	To learn the key concepts of energy, body and building in ancient India
CLO3	To understand Indian architecture proportioning systems
CLO4	To learn about Indian sculpture, iconography and decorative details
CLO5	To understand the regional variations in Indian architecture

Course Outcomes

Code	Outcome
CO1	Insights on traditional thought, skills, practices and crafts
CO2	Understanding of relationship between energy and form in Sthapatya veda
CO3	Understanding of the proportioning systems in Indian architecture through old texts like Mayamatam, Manasaram, Kashyapam
CO4	Ability to make simple Ayadhi calculations for buildings
CO5	Ability to identify Dravidian iconography and appreciate its significance

Course Content

Origin of stapatya veda, Vaastu shastra concepts- time, space, rhythm, form, energy, Vedic Yajna: recreating the microcosmos, concept of sacred & profane, chakras, five elements, Vastu purusha mandala, cosmic symbols and spatial representation, determination of direction and orientation, site selection, analysis, and planning, orientation, building design, determination of sizes, Vastu in agamas and silpa texts, Padas- grid, Science behind vaastu - geobiology, lecher antenna, energy axes of the body, planetary systems and their relationship with the body, energy science, color radiations and impact of colours, sunpath and colour windows, electromagnetic radiations , Kirlian photography, magnetic grids of the earth, remedies.

Traditional town planning principles in India with examples, components of a typical Indian town Classification of ancient town planning, Land and Landscape suited to an ideal town, Road planning in ancient India, Arthashastra and Case studies from Harappa, Chattisgarh mud forts, Continuity of traditional town planning: Jaipur, Madurai, Srirangam, role and functional aspects of temples, Traditional knowledge systems related to built form and its landscape.

Sacred ecology- Sacred forest (Naimisaranya, Panchavati, Dandkaranya, etc), Sacred Groves (Aaramika, Devkunj, etc), Rain water harvesting system (vav, kund, talav, etc), Sacred hills and mountains (Kailash, Vindhyachal, Sahyadri, Satrunjay, Govardhan), Sacred trees, Sacred water bodies, Kumbha: assimilation of ritual, myth, symbology and cosmology.

Indian Temple Architecture evolution, basic scriptures and texts like Mayamatam, Manasaram, Kashyapam, Science of building, proportioning system, Construction materials and methods, craftmanship, vernacular terminology, knowledge transmission and synthesis processes, Types and proportioning of the garbagriha, vimana, talas, according to the ancient texts, decorative elements with examples and case studies, sculpture, Symbolism and Iconography in Temple architecture. Dravidian proportioning tools and measurement system, construction techniques, selection of time, influence of astronomy, Vaastu shastra in Dravidian temples- Ayadhi calculation and proportioning, Regional adaptions of Indian temple architecture.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Stapati, V. Ganapati (2004), Building architecture of Sthapatya Veda, Dakshinaa Publishing House
2. Sthapati, V. Ganapati (2001), Indian Sculpture & Iconography: Forms & measurements, Pondicherry : Sri Aurobindo Society in association with Mapin Pub., Ahmedabad
3. Sthapati, V. Ganapati (2003), Ayadi calculations
4. Ananth,S (1999), The Penguin guide to Vaastu- The classical Indian Science of Architecture and Design, Penguin books India
5. Dagens ,B (2007), Mayamatam (Translation), IGNCA
6. Acharya, P.K (2023) , Manasara, New Bhartiya Book Corporation
7. Unni, N.P (2014), Tantrasamuccaya of Narayana, New Bharatiya Book Corporation Delhi
8. Berkes, F (2017), Sacred Ecology, Routledge
9. Vastu, Maharishi (2012) Vastu City Planning: Sustainable cities in Harmony with Natural Law, Createspace Independent Pub
10. Nitonde, R (2024), Introduction to Indian knowledge system, Notion Press

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	-	-	3	1	-	-	-	-	-	-
CO2	-	2	-	-	3	-	-	-	-	-	-
CO3	-	3	-	-	1	-	-	-	-	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	-	-	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	**AR357**	**SOCIETY, CULTURE AND ARCHITECTURE**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the attributes and importance of culture.
CLO2	To perceive the parameters of culture that differentiates the society from one another
CLO3	To decipher culture through spatial organisations, configurations in the architecture of a society.
CLO4	To analyse the role of socio-cultural parameters influencing architecture in different contexts
CLO5	To learn the principles of designing culturally sensitive built environment.

Course Outcomes

Code	Outcome
CO1	Gain knowledge on culture and its fundamental attributes
CO2	Comprehend the cultural differences in a society or different societies and appreciate it
CO3	Illustrate the place specific nature of architectural design
CO4	Recognise architecture to be approached as a cultural practice
CO5	Create a built environment that is culturally sensitive in design and planning

Course Content

Introduction to culture and cultural studies – aspects, characteristics, importance, approaches

Culture and Society – Understanding the relationship, parameters of culture - scales of culture- that influence architecture, fundamentals of sociology and its relationship to architecture, forms of social organisations – social order.

Society and Architecture - Case studies of different socio-cultural contexts –understanding underlying meanings – socio-cultural transformations, symbol of power, social identity. Signs and symbols.

Culture and Architecture – Relationship between context and built environment, role of resources and climate, Different house forms; spatial organisations and spatial configurations; role of socio-cultural factors in architecture.

Cultural sensitivity and sustainability- Consider the local context, Engaging with community, inclusive spaces and design, social sustainability.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Rapoport, A. (1969). House form and culture. Prentice Hall.
2. Rapoport, A. (1990). The meaning of the built environment: A Nonverbal Communication Approach. University of Arizona Press.
3. Stephen Kenney, F.B.S., (1994). Cultural Influences in Architecture, a Thesis in Architecture Master of Architecture, Texas, Tech University.
4. Rapoport, A. (2005). Culture, architecture, and design. Locke Science Publishing, Chicago.
5. Asquith, L., & Vellinga, M. (2006). Vernacular architecture in the 21st century: Theory, Education and Practice. Taylor & Francis.
6. Palsson G. (2015) Nature, Culture, and Society: Anthropological Perspectives on Life. Cambridge University Press.
7. **King, A. D. (2016).** *Buildings and society: Essays on the social development of the built environment*. Abingdon, UK: Routledge.
8. Roth, L. M. (2018). Understanding architecture: Its Elements, History and Meaning. Routledge.
9. Chakrabarti, V. (2024). *The architecture of urbanity: Designing for nature, culture, and joy*. New York

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	3	-	-	2	1	-	-	-	-	-
CO2	-	1	-	-	3	2	-	-	-	-	-
CO3	2	1	-	1	3	2	-	1	1	1	-
CO4	1		-		2	3	-	-	-	-	-
CO5	3	1	-	2	3	3	-	-	1	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	**AR359**	**DESIGN THINKING AND INNOVATION**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the fundamentals of design thinking and its role in innovation.
CLO2	Explore innovation and its impact on communities and sustainable development.
CLO3	Apply human-centered design approaches to solve real-world challenges.
CLO4	Develop critical thinking, problem-solving, and creativity to drive innovation.
CLO5	Prototype and test solutions, integrating local knowledge, sustainability, and user needs.

Course Outcomes

Code	Outcome
CO1	Analyze socio-economic and environmental challenges for grassroots innovation.
CO2	Apply design thinking frameworks for user-centered problem-solving.
CO3	Develop and test low-cost, scalable, and sustainable solutions for grassroots communities.
CO4	Collaborate across disciplines to address real-world issues through innovation.
CO5	Communicate and present their ideas effectively to stakeholders.

Course Content

Principles of Design Thinking – Definition and significance of design thinking in problem-solving and innovation; stages of the design thinking process – empathy, problem definition, ideation, prototyping, and testing; iterative design and user-centric approaches; case studies on successful design-driven solutions.

Human-Centered Research and Innovation – Research methodologies – empathy mapping, stakeholder analysis, and contextual inquiry; identifying and analyzing socio-economic and environmental challenges; grassroots innovation and its impact on community development; ideation techniques – brainstorming, mind mapping, and concept development; collaborative problem-solving methods.

Prototyping and Implementation – Rapid prototyping techniques – sketching, digital modeling, material exploration, and physical mock-ups; user feedback and iterative refinement of solutions; strategies for scaling and implementing design-driven innovations; entrepreneurship, business models, and policy integration; case studies on innovation impact and industry applications.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Brown, T. (2009). Change by design: How design thinking creates new alternatives for business and society. Harvard Business Press.

2. Digital Twin Hub. (n.d.). Case studies. Centre for Digital Built Britain. Retrieved from https://digitaltwinhub.co.uk/case-studies/
3. ESRI. (n.d.). Digital twin case studies: Real-world applications of GIS-enabled digital twins. Retrieved from https://www.esrith.com/en/blog-en/6-case-studies-on-digital-twins/
4. Kelley, T., & Kelley, D. (2013). Creative confidence: Unleashing the creative potential within us all. Crown Business.
5. Radjou, N., Prabhu, J., & Ahuja, S. (2012). Jugaad innovation: Think frugal, be flexible, generate breakthrough growth. Jossey-Bass.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		2		2	2	3	3				2
CO2	2	2		2	3	2	3			2	2
CO3	2	2			3					3	3
CO4	2	2			3	3	3				
CO5	2	2			2	3	3			3	3

PROGRAM ELECTIVE – 2 (S)

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR361	VERNACULAR ARCHITECTURE	3	0	0	4	4

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand how vernacular architecture is an intuitive response of the common man to his own needs and his community's needs and does not involve formal professional inputs
CLO2	To understand how architectural forms are shaped by geography, climate and socio-cultural factors
CLO3	To learn documentation skills to help preserve the knowledge for posterity; critical evaluation and analytical skils to help critically analyse the design elements and responses of the buildings to contextual factors
CLO4	To learn about the various features of the vernacular styles and the use of traditional materials and techniques
CLO5	To explore how some of the traditional planning principles and sustainable practices can be adapted and used in contemporary contexts

Course Outcomes

Code	Outcome
CO1	To demonstrate an understanding of the form and features of vernacular architecture as a response to various contextual factors
CO2	To be able to identify and appreciate salient features of various vernacular styles
CO3	To demonstrate the ability to document vernacular buildings/settlements and to perform a critical evaluation and analysis
CO4	To demonstrate an appreciation of traditional planning principles and the use of locally available materials and indigenous techniques and to be able to apply the knowledge gained, to contemporary contexts
CO5	To demonstrate an understanding of sustainable practices seen in vernacular architecture and to be able to apply those in contemporary contexts

Course Content

Introduction to vernacular architecture - factors that contributed to its evolution with examples.

Significance of the course - the advantages of studying it and possible application today.

Vernacular architecture – around the world -factors that contributed to their evolution. Few examples

Vernacular architecture in India - Factors that contributed to its evolution. Few examples

Vernacular architecture of Tamil Nadu - factors that contributed to its evolution. Few examples; Settlement planning strategies, Regional and occupation wise variation.

Adaptation and application of vernacular planning principles and sustainable practices to contemporary contexts

Documentation and analysis of vernacular settlements / buildings

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Oliver, Paul, "Encyclopedia of vernacular Architecture of the world (3 Vol. Set)", Cambridge University Press, U.K., 1997.
2. Tipnis, Aishwarya, “Vernacular traditions: contemporary architecture”, TERI publications, India, 2012.
3. Rappoport,Amos, “House, form and culture”, Pearson, 1969
4. Schonauer, Norbert, “6000 years of houses”, W.W. Norton and co., 2003
5. Schittich, Christian, “Vernacular architecture:Atlas for living throughout the world”, Birkhauser, 2019

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	3	1	2	3	2	2	3	3	2	1
CO2	1	3	3	3	3	1	1	3	3	2	1
CO3	1	3	3	3	3	2	1	3	3	2	2
CO4	3	3	3	3	3	1	1	3	3	2	1
CO5	3	3	3	3	3	1	1	3	3	2	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	**AR363**	**INTERIOR DESIGN**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To learn about stages & elements of interior design.
CLO2	To learn about comfort factors & role of services in interior design.
CLO3	To learn about the role of elements of applied decoration.
CLO4	To learn about the role & design of furniture.
CLO5	To learn about decorative materials & use of indoor plants and water in interiors.

Course Outcomes

Code	Outcome
CO1	Understanding the various stages & elements of interior design.
CO2	Understanding the role of comfort factors & services in interior design.
CO3	Learning about the elements & role of applied decoration.
CO4	Learning about the role and design of furniture.
CO5	Understanding the materials & role of decorative materials in interior design.

Course Content

Designing the size and form of interior spaces using user - activity analysis and anthropometrics. The effect of enclosure, fenestration, colour and lighting on perception of space. Application of scale, proportion to enhance the quality of space. Psychological effect of space.

Design for comfort - climatic comfort, natural and artificial lighting, air conditioning and acoustics, Services - air conditioning ducts, electrical wiring, water supply and removal of waste water. Elements of furnishing and surface treatment. their need and scope.

Applied decoration - colour, texture, plane and fixtures. Emphasizing space through change of levels and structural form. Modulation of interior spaces with art objects. Space modulation through artificial and natural lighting. Emphasis of focal points and unity in Interior Design.

Role of furniture, evolution of furniture style, economic factors of furniture design and materials - its characteristics and application. Functional classification of space. Barrier free design.

Decorative materials for ceiling, walls, floors. Drapery and upholstery for openings and furniture respectively and matching them with overall colour scheme and composition. Sources and collection of information. Elements of Indoor plants and Interior Landscape and use of water.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review.

Learning Resources & References:

1. Ching, Fransis, "Interior Design Illustrated", Van nostrand Reinhold, Lodon, 1987.
2. Designing Furniture, The New Best of Fine Woodworking
3. Jonathan Poore, “Interior Color by Design – A design tool for architects, interior designers, and homeowners”.
4. Sian Moxon, “Sustainability in Interior Design”, Laurence King Publishing.
5. Ed. Dr.Louise Jones, “Environmentally Responsible Design – Green and Sustainable Design for Interior Designers”, John Wiley & Sons, Inc. 2008.
6. Rosemary Kilmer, “Designing Interiors”, Second Ed., John Wiley & Sons, Inc. 2014

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3				3		3				
CO2									3		
CO3	1										
CO4	2	2	2								
CO5	3	3			3						

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
5	AR365	PARAMETRIC DESIGN LAB	4	0	0	4	4

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Comprehend the principles of parametric design, algorithmic thinking, and data-driven modeling in architectural applications.
CLO2	Apply computational design techniques, including generative and rule-based approaches, for form-finding and structural optimization.
CLO3	Develop algorithmic design workflows using scripting and simulation tools for performance-driven parametric architecture.
CLO4	Integrate digital fabrication methods such as CNC, 3D printing, and robotic manufacturing with parametric modeling.
CLO5	Explore emerging trends in computational architecture, including digital twins, interoperability, and immersive VR presentations.

Course Outcomes

Code	Outcome
CO1	Demonstrate proficiency in visual programming and parametric modeling to generate complex architectural geometries.
CO2	Optimize architectural designs by implementing computational analysis techniques for structural and environmental performance.
CO3	Develop algorithmic design scripts and integrate simulation tools for advanced parametric workflows in architecture.
CO4	Apply digital fabrication technologies to translate parametric models into physical prototypes using automated manufacturing processes.
CO5	Present parametric design solutions through immersive VR environments and explore future advancements in computational architecture.

Course Content

Fundamentals of Parametric Design – Introduction to parametric design principles in architecture; data-driven design approaches using points, curves, and surfaces; parametric geometries and algorithmic thinking; visual programming for generating complex forms; case studies of parametric architecture and computational design applications.

Advanced Computational Design & Optimization – Visual programming logic and data structures; form-finding techniques through generative and rule-based design; parametric control for structural and environmental optimization; integration of computational analysis for simulations in lighting, airflow, and structural performance.

Scripting & Algorithmic Design – Introduction to scripting in computational workflows; rule-based and generative design methodologies; simulation tools for digital twin applications in architecture;

interoperability between 3D modeling platforms and computational tools for enhanced parametric workflows.

Digital Fabrication & Architectural Applications – Parametric modeling for digital fabrication techniques including CNC, 3D printing, and robotic manufacturing; prototyping with advanced fabrication tools; final project development incorporating immersive visualization and virtual reality; exploration of future trends in parametric and computational architecture.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Menges, A. (2011). Computational design thinking: A practical guide to integrating design, computation, and fabrication. Wiley.
2. MIT Center for Bits and Atoms. (n.d.). Digital fabrication interfaces. Retrieved from https://cba.mit.edu
3. Pottmann, H., Asperl, A., Hofer, M., & Kilian, A. (2007*).* Architectural geometry. Bentley Institute Press.
4. Terzidis, K. (2006). Designing with algorithms: A foundation for parametric design. Architectural Press.
5. Zaha Hadid Architects. (n.d.). Parametric architecture precedents. Retrieved from https://www.zaha-hadid.com

	PROGRAM OUTCOME										
	1	2	3	4	5	6	7	8	9	10	11
CO1	3	2	2					3			2
CO2	3	2			2			3	3	2	2
CO3	3	2	2				1	3	3		3
CO4	2							3	3	2	3
CO5	2	2	3		2			2		2	2

PROGRAM ELECTIVE – 3 (S)

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	AR352	GRAPHIC DESIGN	4	0	0	4	4

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To be introduced to the discipline of graphic design, both as a career alternative and as a tool to enhance visual thinking and visual expression in the core architectural design process
CLO2	To understand the fundamental theories of graphic design such as elements and principles of design, colour theory, principles of visual composition etc
CLO3	To understand the history and evolution of graphic design and the various graphic design styles
CLO4	To learn to generate visual compositions composed of images and text for production in the print or electronic media
CLO5	To learn to generate visual content for various graphic design application areas

Course Outcomes

Code	Outcome
CO1	To demonstrate an understanding of design principles, visual composition and typography to generate creative visual content and to demonstrate an understanding of research methodologies and creative ideation as a means for problem solving and enhancing visual communication
CO2	To demonstrate an understanding of graphic design theories, history and styles
CO3	To demonstrate proficiency in the creative and technical skills required in the manual / digital generation of visual content for both print and electronic media
CO4	To demonstrate critical design thinking and creative design expression skills in the creation of visual content for various graphic design application areas
CO5	To demonstrate the ability to comprehend client requirements and work within the given constraints to generate viable design solutions

Course Content

Introduction to Graphic Design – its history, career options, works of prominent designers

Significance of a graphic design course in an architecture curriculum – graphic design as a career alternative; graphic design as a tool for visual thinking and communication in architecture

Overview of the graphic design process

Overview of graphic design styles

Fundamentals of Graphic Design: Overview of design basics – elements and principles of visual composition – visual perception & graphical thinking.

Fundamentals of Graphic Design: Image generation and transformation using manual / digital tools

Fundamentals of Graphic Design: introduction to lettering and typography – introduction to printing processes

Designing for print media - design of books, posters, promotional materials, stationery etc.

Designing for electronic media / multimedia - E books ; animation design; Web design; design for social media

Overview of major graphic design application areas – Branding; corporate identity programs; environmental graphics / signage; packaging design & ad-making

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Ambrose G. and Harris P., The Fundamentals of Graphic Design, BVA Publishing SA, 2019.
2. Ambrose G. and Harris P., The Fundamentals of Typography, BVA Publishing SA , 2019. James Craig (Author), Irene Korol Scala., Designing with type – the essential guide to typography, Watson-Guptill Publications Inc.,U.S., 2006
3. Inglis, T.,The Graphic Design Bible, Ilex press, UK, 2023
4. Dabner,D. Graphic Design School : a foundation course for graphic designers working in print, moving image and digital media, Thames and Hudson, 2023
5. Fletcher, M., Visual communication for architects and designers: constructing the persuasive presentation, Routledge, 2020
6. Lupton, E. and Phillips, J.C., Graphic Design, the new basics, Princeton Architectural press, 2015

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	3	-	-	1	2	-	-	1	-
CO2	2	3	3	-	-	1	1	-	-	1	-
CO3	2	2	3	-	-	1	2	-	-	1	-
CO4	3	3	3	-	-	1	2	-	-	1	-
CO5	3	2	3	-	-	1	2	-	2	1	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	AR354	BUILDING SCIENCE LABORATORY FOR ARCHITECTURE	4	0	0	4	4

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the influence of environmental factors such as climate, air quality, and natural light on building performance and occupant health through field studies. (Knowledge & Comprehension)
CLO2	Analyze the impact of sustainable building materials by assessing their properties, environmental footprint, and potential for reuse and recycling. (Analysis)
CLO3	Apply field survey techniques to evaluate the energy efficiency of buildings and propose eco-friendly design strategies. (Application)
CLO4	Integrate ecological considerations into architectural practice by examining real-world case studies and sustainability metrics. (Synthesis)
CLO5	Evaluate sustainable building materials and design interventions based on their environmental impact and long-term performance. (Evaluation)

Course Outcomes

Code	Outcome
CO1	Assess environmental factors influencing building performance and occupant well-being.
CO2	Conduct field surveys to analyse the sustainability of building materials.
CO3	Demonstrate the ability to measure and interpret energy efficiency in buildings.
CO4	Develop strategies to integrate ecological principles into architectural design.
CO5	Critically evaluate the environmental impact of construction materials and methods.

Course Content

Through field studies, the influence of environmental factors on building performance, occupant health, and energy efficiency is analysed. Emphasis is placed on hands-on learning, enabling the integration of ecological considerations into architectural practice effectively.

Through field surveys, the course explores sustainable building materials, examining their properties, environmental impact, and potential for reuse and recycling.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Thomas, R. (2006). Environmental design: An introduction for architects and engineers (3rd ed.). Taylor & Francis.

2. Kwok, A. G., & Grondzik, W. T. (2018). The green studio handbook: Environmental strategies for schematic design (3rd ed.). Routledge.
3. Calkins, M. (2009). Materials for sustainable sites: A complete guide to the evaluation, selection, and use of sustainable construction materials. Wiley.
4. Kibert, C. J. (2016). Sustainable construction: Green building design and delivery (4th ed.). Wiley.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	-	-	-	-	3	-	-	-	-
CO2	2	-	-	3	-	-	3	-	-	-	-
CO3	-	-	-	2	3	-	3	-	-	-	-
CO4	-	-	-	-	-	2	3	-	-	3	-
CO5	-	-	-	2	-	-	2	3	-	3	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	**AR356**	**METAVERSE ARCHITECTURE**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Analyze the fundamental concepts of the Metaverse, including VR, AR, MR, and Digital Twins, in the context of architectural design.
CLO2	Evaluate scale-feeling, immersive spatial awareness, and human interaction in virtual environments using VR modeling techniques.
CLO3	Apply AI-driven parametric design tools and algorithmic modeling to develop interactive and responsive Metaverse spaces.
CLO4	Explore virtual storytelling techniques and mixed reality design principles for enhanced user experience in digital architecture.
CLO5	Assess blockchain and NFT applications in digital real estate, ownership of virtual assets, and decentralized architectural ecosystems.

Course Outcomes

Code	Outcome
CO1	Demonstrate expertise in designing architectural spaces within the Metaverse using VR software, tools, and digital modeling techniques.
CO2	Develop immersive architectural experiences by integrating scale perception, environmental psychology, and human interaction in VR.
CO3	Implement AI-driven generative design and parametric modeling techniques for creating dynamic virtual environments.
CO4	Create interactive and experiential Metaverse-based urban spaces utilizing XR storytelling, real-time rendering, and mixed reality principles.
CO5	Innovate architectural workflows by incorporating blockchain technology and NFTs for virtual asset creation, trade, and ownership.

Course Content

Introduction to the Metaverse & Virtual Design – Fundamentals of the Metaverse and its impact on architecture; exploration of VR, AR, MR, and Digital Twins in virtual environments; case studies of virtual cities, digital real estate, and VR-driven architectural projects; introduction to VR modeling software and tools for spatial design.

Scale-Feeling & Immersive Spatial Awareness – Understanding scale and spatial perception in real and virtual environments; 1:1 VR modeling techniques for architectural exploration; investigating human interaction, environmental psychology, and behavioral responses in immersive digital spaces.

AI & Parametric Design in the Metaverse – Integration of AI-driven generative design tools for virtual spaces; algorithmic modeling techniques for immersive environments; materiality, lighting,

and environmental interactions within digital spaces; optimizing parametric workflows for real-time rendering and interactivity.

Virtual Storytelling & Mixed Reality Architecture – Designing user-centered immersive experiences in extended reality (XR); architectural storytelling in virtual urban environments; blockchain applications and NFTs for digital asset ownership in architectural design; developing interactive VR walkthroughs and real-time visualization techniques for Metaverse-based spaces.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Ceccarelli, U. (2024). Advancing digital architecture in the metaverse: A case study of Pini Group's Helmallery. Procedia Structural Integrity, 64, 2214–2221. https://doi.org/10.1016/j.prostr.2024.09.346
2. Hägen, S. (2019). Augmented reality in architecture. ARTech Publishing.
3. Jabi, W. (2011). Virtual reality and architecture. Routledge.
4. Sezer, C. (2019). Teaching virtual reality and immersive design (Vol. 1, p. 5).
5. Terry, Q. (2022). The metaverse handbook: Innovating for the internet's next tectonic shift. Wiley.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3		2		2			2			2
CO2	3	2	2		3			2			
CO3	2	2	3		2			2		2	2
CO4	3	2	3	2	3			2		2	2
CO5	3					2				3	3

PROGRAM ELECTIVE – 4 (S)

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	AR451	FURNITURE DESIGN WORKSHOP	4	0	0	4	4

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To learn the history of furniture design.
CLO2	To learn when to use different types of joinery.
CLO3	To understand the role of ergonomics in furniture.
CLO4	To understand the modular concepts in furniture design.
CLO5	To learn to design green furniture

Course Outcomes

Code	Outcome
CO1	Understand the design trends in the past & present.
CO2	Choosing the types of joinery for a given situation.
CO3	Designing furniture based on ergonomics.
CO4	Designing modular furniture.
CO5	Designing green or eco furniture.

Course Content

History of furniture design. Modern movements in furniture design

Different types of woodworking joinery and their characteristics.

Aspects of ergonomic & functional design of furniture

Modular concepts in furniture design, mass production, fabrication, codes, and specifications.

Eco design of furniture.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Fine Woodworking. (n.d.). Designing furniture. Taunton Press.
2. Schultz, A. (1999). Classic arts & crafts furniture you can build: Step-by-step projects for every room. Popular Woodworking Books.
3. Gibson, S. (Ed.). (2009). Fine woodworking design book 8: Original furniture from the world's finest craftsmen. Taunton Press.
4. Smardzewski, J. (2015). Furniture design. Springer. https://doi.org/10.1007/978-3-319-13954-8

5. Holman, W. (2015). Guerilla furniture design: How to build lean, modern furniture with salvaged materials. Storey Publishing.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1						2					
CO2	2										
CO3					3						
CO4	3									2	
CO5					2						

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR453**	**ENVIRONMENTAL CONTROL AND DESIGN WORKSHOP**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To reinforce theoretical knowledge of climatic and acoustic design principles through practical application.
CLO2	To develop an understanding of environmental issues in architecture using real-world or hypothetical project scenarios.
CLO3	To enable students to integrate passive design strategies into their architectural proposals.
CLO4	To introduce simulation and modeling tools for lighting, ventilation, and acoustics in architectural design.
CLO5	To promote critical thinking and problem-solving in climate-responsive and sound-sensitive design decisions.

Course Outcomes

Code	Outcome
CO1	Analyze the impact of environmental conditions (climate, light, sound) on architectural design.
CO2	Develop site-specific, climate-responsive strategies using passive design principles.
CO3	Apply basic simulation and analytical tools for evaluating environmental performance.
CO4	Resolve lighting and acoustic issues through integrated design solutions.
CO5	Prepare and present environmentally conscious architectural design proposals.

Course Content

This workshop-based course is designed to translate theoretical knowledge from Climatically Responsive Architecture and Architectural Acoustics into practical design application. Students will work in teams or individually on a small live or hypothetical architectural project that requires resolution of environmental challenges—such as thermal comfort, daylight optimization, ventilation strategies, noise mitigation, or acoustic quality improvement. These problems may be approached through analysis and redesign of their own previous studio projects or by selecting specific real-world case studies.

The course emphasizes iterative design processes using environmental simulation and modeling tools for evaluating daylight, airflow, energy performance, and acoustic behavior. Students will analyze site-specific climate data, generate climate-responsive strategies, and incorporate passive cooling, shading, daylight harvesting, and noise control in their proposals. Integration of green building standards (e.g., GRIHA, IGBC, LEED) and techniques such as courtyard modulation, stack ventilation, adaptive facades, and absorbent acoustical materials will be encouraged.

Final deliverables include a technical report, annotated environmental diagrams, passive design iterations, acoustic modelling results, and a comprehensive design proposal presented through drawings and models. A final jury will evaluate the environmental performance and design coherence of the proposals.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Szokolay, S.V. (2021). Introduction to Architectural Science: The Basis of Sustainable Design, 4th Edition, Routledge.
2. Brown, G.Z. & DeKay, M. (2014). Sun, Wind, and Light: Architectural Design Strategies, 3rd Edition, Wiley.
3. Givoni, B. (2022). Climate Considerations in Building and Urban Design, 2nd Edition, Routledge.
4. Kang, J. (2020). Urban Sound Environment, CRC Press.
5. Chadderton, D.V. (2020). Building Services Engineering, 6th Edition, Routledge.
6. Arup (2023). Designing for Sound – Acoustic Design Guide, Arup Group Ltd. (Available online)

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	-	-	2	2	2	2	2	3	1	2
CO2	3	2	-	2	2	1	2	1	2	1	2
CO3	2	1	-	1	1	-	1	1	3	1	2
CO4	2	1	-	1	1	-	1	1	3	1	2
CO5	2	1	-	1	1	-	1	1	3	1	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR455**	**LANDSCAPE DESIGN**	**4**	**0**	**0**	**4**	**4**

Prerequisites: AR306 Landscape Architecture

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the properties, usage, durability and maintenance of different materials (both hard and soft)
CLO2	To study and understand the different elements of landscape
CLO3	To understand the various stages and plans that are involved in landscape design
CLO4	To assess and evaluate the functional and aesthetic aspects of landscape design
CLO5	To create landscape designs that follow strategies contextual to the site, including social, environmental, material, and cultural factors.

Course Outcomes

Code	Outcome
CO1	Knowledge about the basic properties, characters and features of different materials in both softscapes and hardscapes
CO2	Apply the various elements of landscape in landscape design
CO3	Produce various maps related to landscape design – planting maps, irrigation maps etc.
CO4	Developing a comprehensive landscape design that is contextual to the site.
CO5	Evaluate basic landscape design aspects and resolve any design issues

Course Content

Introduction to planting design, plant selection, classification, and their role in landscape design through an extensive study of various landscape materials, including both hard and softscapes and market analysis. The information gathered through should be presented in the form of a catalogue.

Assessment and evaluation of the functional and aesthetic aspects of different elements (site planning, hardscape and softscape elements) used in the landscape design of diverse projects like residential, institutions, resorts etc.

Essential Landscape services like lighting, irrigation and drainage for various purposes, types and their considerations. Different types of landforms, Selection of materials based on the function and aesthetics needed.

Processes involved in landscape design – site documentation and analysis, concept formulation, landscape detailing, specifications, and the execution of the landscape design and the drawings associated with all these stages.

Comprehensive landscape design development for a project (based on the design provided in that semester), that creates lively ambience and to suit the function and should be a solution to utilize it to the maximum extent possible.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Simonds, J. O. (1978). Earthscape: a manual of Environmental planning.
2. Motloch, J. L. (2000). Introduction to landscape design. John Wiley & Sons.
3. Robinson, N. (2003). Landscape Architecture, Library of Congress Cataloguing in Publication Data, Bournemouth Colour Press, Parkstone, Poole, UK.
4. Reid, G. (2012). Landscape Graphics: Plan, Section, and Perspective Drawing of Landscape Spaces. Watson-Guptill.
5. Robinson, N. (2016). The Planting Design Handbook. Routledge.
6. NBC of India 2016- volume 2- Part 10, Landscape Development
7. Goudie, A. S. (2018). Human impact on the natural environment: Past, Present and Future. John Wiley & Sons.
8. Hubbard, H. V., & Hubbard, T. K. (2022). An introduction to the study of landscape design.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	3	2	-	-	-	-	-	-	-	-
CO2	3	2	2	-	1	-	-	-	-	-	-
CO3	-	-	-	1	-	-	-	1	-	-	1
CO4	2	-	-	-	1	-	3	-	-	-	1
CO5	3	-	-	1	1	-	1	-	-	1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR457**	**ADVANCED BUILDING INFORMATION MODELLING (BIM)**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To learn the concept of Building Information Modeling
CLO2	To understand the workflow followed in industry during creation of BIM 3D model which includes building the discipline-based model and create the federated models.
CLO3	To comprehend the various emerging trends of BIM & concept of digital twin
CLO4	To explain the process of creating the 4D & 5D BIM model
CLO5	To understand the role of BIM in the construction industry.

Course Outcomes

Code	Outcome
CO1	Comprehend the concept of BIM in the lifecycle of a project
CO2	Create the workflows of Design authoring, followed in industry during the creation of a 3D model
CO3	Develop a BIM model and check for clashes and resolve interferences
CO4	Evaluate the integration of schedule and cost in the BIM model using 4D and 5D
CO5	Illustrate the various emerging trends of BIM & concept of digital twin

Course Content

Evolution of Engineering, Introduction to BIM Concepts and Design Authoring Evolution of Engineering from 2D drawings to BIM Model, Isometric View, Limitation of Isometric views and concept of 3D-Modeling, Building Information Modeling – Introduction & Process, Design Authoring – Concepts and workflow, Fundamentals of Discipline Based Modeling, Introduction to stages of BIM Modeling process as per ISO 19650, Federated model- concepts and demonstrations, workflow of design coordination, Engineering Analysis – Concept and types of analysis, Process and workflow of Design Review in BIM.

Views in BIM Model, Visualization Modes, Walkthrough of the Model, Fly through the model, Layers & Properties, Concept of viewpoints, Sectioning and Visualization through Tablet and Mobile, Concept of BIM Kiosk & BIM Rooms, Visualization through Augment Reality (AR), Virtual Reality (VR) & Mixed Reality (MR) Clash Check – Types, Clash avoidance process, Clash Detection Process, Clash Detection Priority Matrix and Report generation, Clash Detection Rules, Report, Grouping, Clash Detection Process – Demo.

Documentation and CDE (Common Data Environment) -2D drawings generation from BIM Model, Computer Network types, Concept of Cloud Computing, Concept and Application of CDE: Traditional Information Sharing, Definition, Reference, and Concept, Setting up the workflow and process for CDE- File naming convention, Roles and Responsibilities, Request for Information and

Review Process Concept of LOD (Level of Development), preparation of LOD matrix and Progression matrix- Definition of LOD, Level of Detail and Information, LOD- Wall foundation, Precast Structural Inverted T-Beam, Domestic Water Piping, Plumbing Fixture, Packaged Generator Assembly, LOD- Chart, Matrix and Model Progression Matrix

Introduction to 4D / Field BIM: Concept of 4D, Introduction to construction sequence and project schedule, Project scheduling using Gantt Chart and its limitation, 4D BIM ModelingProject demo and workflow, Synchronization of 4D BIM Model with project schedule, Reviewing project progress w.r.t planned dates and actual dates, Generation of Reports Application of Field BIM/ 4D BIM: Understanding concept and usage of BIM in field for coordination- 3D Coordination and Visual Communication, Site utilization planning and Construction analysis, Application of wearables in coordination. 3D Control and planning Other Applications of Field BIM/ 4D BIM: Concept and usages of BIM in field for safety, disaster and risk analysis, digital fabrication and scan to BIM, Existing Condition Modeling, Phase Planning, As-built/ Record Models

5D BIM: Introduction concepts of 5D BIM, Quantity take off with UoM, Concept of QTO with UoM, 5D BIM with UoM with cost, Quantity take off exercise, Demo of Quantity take off: Understanding QTO for Wall, Plaster & Tile, BIM Maturity LOD and General Practice of QTO, Cost Breakup structures, 5D BIM and cost control AIM: Introduction to Asset Information Model (AIM), COBie structures and Asset Information Deliverables, Space Attributes and Asset Attributes- Examples with data, Asset requirement- Discipline wise Infrastructure System, Classification code and Information Exchange, Information Exchange with Facility Management Beyond BIM: Emerging Trends- Concepts of Industrialisation, IoT, Big Data, Data Analytics and their applications in BIM: Industrialisation of Construction through BIM- DfMA, IoT in BIM, BIM and Big data, Data Analytics using AI & ML Future scope of BIM Applications: Smart Infrastructure and the need for connected infrastructure, Digital twins- Concepts and benefits, National Digital Twin or a City level Digital Twin in a Smart City, Fundamental requirements for the success of a Digital Twin and its uses, Digital Twin applications in diverse industries

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Autodesk Revit & ArchiCAD
2. BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers **b**y Rafael Sacks, Charles Eastman, Ghang Lee, Paul Teicholz · 2018
3. Building Information Management: A Standard Framework and Guide to BS 1192 by Mervyn Richards
4. Building Information Modeling: Technology Foundations and Industry Practice by André Borrmann, Markus König, Christian Koch, Jakob Beetz
5. Building Information Modeling: A Strategic Implementation Guide for Architects, Engineers, Constructors, and Real Estate Asset Managers by Dana K. Smith, Michael Tardif

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	1	1	2	1	2	3	3	1	1
CO2	2	1	1	1	1	1	1	3	3	1	1
CO3	2	1	1	1	1	1	1	3	2	1	1
CO4	2	1	1	1	1	1	1	3	2	1	1
CO5	1	1	1	1	1	1	1	3	2	1	1

PROGRAM ELECTIVE – 5

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	AR459	FACILITIES PROGRAMMING	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Analyze project requirements. (Analysis, Application)
CLO2	Transform requirements into activity, functional and spatial programs as an initial stage of architectural design process. (Knowledge, Comprehension)
CLO3	Describe relevant issues, innovations and trends in facility design and facility planning. (Application, Synthesis)
CLO4	To develop and apply quantitative and qualitative solution approaches for facility design problems. (Analysis, Synthesis)
CLO5	Sketch a design for a facility, which includes deciding on the relevant design requirements to use. Describe, apply, and transform approaches for operational planning. (Application, Synthesis)

Course Outcomes

Code	Outcome
CO1	To understand the historical review of the development of facility programming and its importance.
CO2	Analysis of project requirements, and methods of transforming requirements into activity, and functional programs.
CO3	Transformation of the functional and activity programs into spatial programs and requirements, both quantitatively and qualitatively.
CO4	To familiarise students with physical limitation and the design constraints imposed on the project considering the socio-cultural, economic, technological and environmental factors.
CO5	Learn to evaluate concepts of sustainability and firmness factors in Architecture design projects.

Course Content

Facilities Planning Defined, Significance of Facilities Planning Objectives of Facilities Planning, Facilities Planning Process, Strategic Facilities Planning, Developing Facilities Planning Strategies, Examples of Inadequate Planning.

Facility Planning levels of details, Important factors to evaluate facility planning/programming. Product – Process and Schedule Design.

Flow systems, activity relationships between personal requirements and space requirements.

Material handling, material handling principles, and systems. Layout planning models and Design Algorithms. Multi Floor Facility layout.

Facilities Systems – Structural systems, enclosure systems, atmospheric systems, Electrical and lighting systems, life safety systems, sanitation systems, building automation systems, facilities maintenance management systems.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Jonathan Lian, Jonathan K M Lian,(2022) Facilities Planning and Design, An Introduction for Facility Planners, Facility Project Managers and Facility Managers, World Scientific Publishing. Co. Pte. Ltd.
2. Thomas Sawyer (2019), Facility Planning and Design for Health, Physical Activity, Recreation, and Sport, Sagamore Publishing, L.L.C.
3. Wolfgang Preiser (2015), Professional Practice in Facility Programming, Routledge Revivals.
4. Edward Finch (2011), Facilities Change Management, Wiley.
5. Tompkins, White, Bozer, Tanchoco (2010), Facilities Planning, Wiley.
6. Herman B. R. Wegen (2005) Architecture in Use an Introduction to the Programming, Design and Evaluation of Buildings, Architectural Press.
7. Robert R Kumlin (1993), Architectural Programming: Creative Techniques for Design Professionals, McGraw-Hill Education.
8. Palmer, A. (1981). The architect's guide to facility programming. American Institute of Architects.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	3	-	3	2	2	-	-	3	-	-
CO2	1	1	-	-	-	-	3	-	3	3	3
CO3	2	-	-	-	-	1	-	3	-	2	2
CO4	3	-	-	-	3	-	-	2	3	-	3
CO5	-	-	-	-	3	-	2	-	3	1	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR461**	**COST EFFECTIVE CONSTRUCTION TECHNIQUES**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the need for cost efficient techniques and sensitize towards issues related to providing roof for the roofless
CLO2	To make students familiar with alternatives to conventional materials and techniques which are particularly cost effective.
CLO3	To know about conventional and alternative materials and techniques for various building components like foundation, wall, roofs, etc and compare the cost of materials, equipment, skill of labour, etc
CLO4	To know about works of organisations working in alternative construction
CLO5	To explore and deconstruct the works of architects in alternative construction

Course Outcomes

Code	Outcome
CO1	Recognition of the need for cost efficient techniques
CO2	Ability to identify/ select appropriate/ suitable local cost-efficient materials and alternative techniques suitable to a context and project, materials and construction techniques
CO3	Understanding the process of manufacture of construction materials and their environmental impact
CO4	Ability to design and apply cost effective principles and techniques
CO5	Ability to analyze the cost of materials, techniques, labour involved

Course Content

Cost effective techniques: Need, Planning aspects, construction aspects, maintenance and longevity aspects. Significance of construction technology: Relevance of improving of traditional technology, relevance of innovative technology/alternate technology.

Choice of materials in Indian conditions, indigenous building materials, organic and inorganic building materials, alternative building materials, use of industrial and agricultural wastes - Survey of such materials and technologies developed by research institutes and organizations like CBRI, SERC, etc

Cost effective design principles and site planning principles. Alternatives for foundations, walls, openings, roofs, toilets, accessories, water and waste alternatives, recycled materials, off grid, etc

Works of architects like Laurie Baker, Hassan Fathy. Critical analysis (in terms of initial investment, maintenance cost and longevity of buildings) of the local adaptation of the innovative technologies by various agencies.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Mathew,G.C., (1993), 'Low cost housing in developing countries'
2. Hugo, H. and Hubert, G. (1986), Earth Construction Primer, Vol 8 ,International Colloquium on Earth Construction Technologies Appropriate to Developing Countries
3. Janssen, Jules J.A. (1988), Building with Bamboo- A handbook, Intermediate Techmology publications
4. Baker, L. (1999), A manual of cost cuts for strong and acceptable housing, COSTFORD
5. Piles, M(2021), Ferrocement Construction Manual
6. Elizabeth, L. (2005), Alternative construction: Contemporary natural building methods, Wiley
7. Publications of CBRI, SERC, RRL, NBO, COSTFORD, AVEI, HUDCO
8. Elizabeth, L & Adams, C (2007), Alternative Construction, Wiley
9. Jagadish, KS, Reddy, B.V.V, Rao, K,S,N (2014) Alternative Building Materials and Technologies, New Age International
10. Khoshoo, TN & Moolakkattu, J.S (2010) Mahatma Gandhi and the Environment, TERI

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	1	1	3	-	-
CO3	-	1	-	-	-	-	-	1	-	-	1
CO4	-	-	-	-	-	-	2	-	-	-	3
CO5	-	-	-	-	-	-	-	-	-	3	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	**AR463**	**EARTHQUAKE RESISTANT BUILDING DESIGN**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Explain the seismology including causes and effects of earthquakes
CLO2	To analyze and design single storey RC framed building subjected to an earthquake
CLO3	To introduce architectural features of buildings to resist earthquakes
CLO4	Assess various irregularities in buildings
CLO5	Apply the provisions of IS:13920 and IS: 4326 to building structures

Course Outcomes

Code	Outcome
CO1	Learn the earthquake ground motion characteristics
CO2	Able to calculate the lateral forces on a building using equivalent static method
CO3	Can analyse and design a single storey RC framed building
CO4	Know the architectural features of buildings to resist earthquakes
CO5	Understand the behavior of soil beneath a foundation during an earthquake

Course Content

Seismic-resistant building architecture: Introduction; Lateral load resisting systems- moment resisting frame, Building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyperstaticity/redundancy, non-structural elements, foundation soil/ liquefaction. Foundations: Quality of construction and materials – quality of concrete, construction joints, general detailing requirements

Building Configurations: Introduction – Regular and Irregular Buildings. Plan Irregularities – Torsion Irregularity – Re-entrant corners - Floor slabs having excessive cut-outs or openings- Out of plane offsets in Vertical Elements – Non-parallel Lateral Force system. Vertical Irregularities – Stiffness Irregularity (soft storey) – Mass Irregularity – Vertical Geometric Irregularity – In-plane discontinuity in Vertical Elements resisting lateral force – strength Irregularity (weak storey) – Floating or stub columns – Irregular Modes of Oscillation in two Principle Plan Directions

Ductility considerations in earthquake resistant design of RCC buildings: Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility– Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920, Review of Latest IS: 4326 provisions

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. A.K., C. (2007). Dynamics of Structures, Fifth Edition. New Delhi: Pearson Education.
2. BIS. (2007). IS 456: 2000 Indian Standard Plain and Reinforced Concrete – Code of Practice, Fourth Revision or latest. New Delhi: Bureau of Indian Standard.
3. BIS. (2013). IS 4326: 2013 Indian Standard "Earthquake Resistant Design and Construction of Buildings - Code of Practice, Third revision or latest. New Delhi: Bureau of Indian Standard.
4. BIS. (2016). IS 13920: 2016 Indian Standard "Ductile Design and Detailing of Reinforced Concrete Structures, subjected to Seismic forces - Code of Practice, First revision or latest. New Delhi: Bureau of Indian Standard.
5. BIS. (2016). IS 1893 (Part 1): 2016 Indian Standard "Criteria for Earthquake Resistant Design of Structures, Part 1, General Provisions and Buildings, Sixth revision or latest. New Delhi: Bureau of Indian Standard.
6. Paz, M. (2005). Structural Dynamics - Theory and Computations, Sixth Edition. New Delhi: Pearson Education.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	1	1	1	1	1	1	3	1	1	1
CO2	2	1	1	1	2	1	2	3	1	2	1
CO3	3	1	1	1	2	1	2	3	1	2	1
CO4	2	1	1	1	2	1	2	3	1	1	1
CO5	2	1	1	1	1	1	2	3	1	1	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	AR465	ARCHITECTURE FOR THE EXTREME BUILT ENVIRONMENT	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Analyze the socio-economic and environmental factors influencing design in restrictive environments in India.
CLO2	Integrate environmental protection, efficient land use, water conservation, waste management, and energy efficiency into the design and planning for constrained spaces.
CLO3	Remember the regulatory standards for safety and environmental protection.
CLO4	Apply innovative spatial configurations to optimize functionality within constraints.
CLO5	Explore innovative spatial configurations to optimize functionality within constraints.

Course Outcomes

Code	Outcome
CO1	Describe the challenges of designing for restrictive environments in India.
CO2	Assess the impact of environmental, socio-economic, and political constraints on architectural design.
CO3	Analyze the unique environmental challenges of high-security, and energy-intensive environments.
CO4	Integrate sustainability into the practical design responses for restrictive environments.
CO5	Propose and defend site-specific design and architectural solutions for the constrained spaces through drawing, models, and research-based derivations.

Course Content

This course examines architectural solutions for restrictive environments, particularly in the Indian context. It focuses on how constraints such as space, climate, resources, and socio-economic conditions affect design. Students will analyze and propose innovative design approaches for high-density urban slums, disaster-prone regions, informal settlements, and institutional settings like prisons and refugee camps. The course emphasizes sustainable, cost-effective, and culturally responsive architectural strategies tailored to India's unique challenges. The semester will take up any one module out of enlisted 5 for the project.

Introduction to Restrictive Environments: - Definition and classification of restrictive environments. Understanding constraints: physical, socio-economic, regulatory, and environmental. It includes relevant case studies on industries, prisons, urban slums, disaster-relief housing, and dwellings in extreme climates.

Module 1- Design for High-Density Urban Environments: - Micro-housing and compact living solutions. Fundamentals of vertical urbanism. Focused studies on Mumbai Dharavi, Delhi unauthorized colonies, Tokyo micro apartment, Hong Kong capsule hotels.

Module 2- Architecture for Disaster-Prone areas: - Resilient deign principles for flood, earthquake, and cyclone-prone areas. Temporary and emergency solutions. For example, post-cyclone housing in Tamil Nadu and Odisha, earthquake-resistant structures in Gujarat.

Module 3- Extreme Climate Architecture: - designing for arid, tropical, and Himalayan regions in India. Passive design strategies for climate adaptability. Case references from Rajasthan Ladakh, Meghalaya, Manipur.

Module 4- Institutional and constrained spaces: - Architecture for prisons, refugee camps, healthcare facilities, and low-income housing, emphasizing ethical and social considerations in restrictive environments. Case examples include UNHCR's refugee housing solutions, rehabilitation housing in Mumbai, and disaster relief shelters in Kerala.

Module 5- Energy industry, power plant, industrial campus, or other high security industry. Introduction to the concept of campus design, focusing on integrating architecture with environmental sustainability within high-security and energy-intensive power plant facilities. Site Planning and Regulatory Compliance in the campus: Importance of choosing a suitable site the campus, considerations of environmental impact assessments, topography. Climate, and proximity to communities with a focus on minimizing risks. Campus layout and security measures for discussing the challenges of balancing campus design with in a controlled zone, fencing, access point, and monitoring. Learning the architectural layout in relation to both function and safety in such high security facilities. Compliance with safety and environmental regulations will also be covered, adhering to national and international standards and guidelines.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Banham, R. (2022). Architecture of the Well-tempered Environment. University of Chicago Press.
2. de Rooij, L. L., Wascher, D. M., & Paulissen, M. P. C. P. (2016). Sustainable design principles for refugee camps. Wageningen Environmental Research.
3. Coulson, J., Roberts, P., & Taylor, I. (2014). University Trends: Contemporary Campus Design (1st ed.). Routledge. https://doi.org/10.4324/9781315757209
4. Aitchison, M. (Ed.). (2014). The architecture of industry: Changing paradigms in industrial building and planning. Ashgate Publishing, Ltd.
5. Crockett, J. B., & Kauffman, J. M. (2013). The least restrictive environment: Its origins and interpretations in special education. Routledge.
6. Cahill, J. (2013). Architecture for Extreme Environments: Design Challenges in the Realm of the Uncommon. Spaces & Flows: An International Journal of Urban & Extra Urban Studies, 3(4).
7. Fairweather, L., & McConville, S. (2013). Prison architecture. Routledge.
8. Yanni, C. (2007). The architecture of madness: Insane asylums in the United States. U of Minnesota Press.

9. Dober, R. P. (1996). Campus Architecture: Building in the Groves of Academe. McGraw-Hill, PO Box 548, Blacklick, OH 43004-0548.
10. Kanvinde, A., & Miller, H. J. (1969). Campus design in India: experience of a developing nation. Jostens/American Yearbook Company.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2			3	3	3	2	3	3	3	3
CO2		2		2	3	3	1	2	3	3	3
CO3						3	2		2	2	3
CO4	3	1			2		3		3	2	3
CO5				3		3	2		1	3	3

PROGRAM ELECTIVE – 6 (S)

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	AR551	PRODUCT DESIGN	4	0	0	4	4

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the fundamental concepts and significance of product design in architecture.
CLO2	Analyze user needs and ergonomic considerations to inform design decisions.
CLO3	Apply design thinking methodologies to develop innovative product solutions.
CLO4	Utilize appropriate materials and manufacturing processes in product development.
CLO5	Create detailed prototypes and effectively communicate design ideas through various presentation techniques.

Course Outcomes

Code	Outcome
CO1	Demonstrate a comprehensive understanding of the product design process.
CO2	Interpret real life situation into a product design.
CO3	Explain the contemporary design process and prototyping for manufacturing.
CO4	Develop and refine product concepts through iterative design and prototyping.
CO5	Effectively present and defend design solutions to peers and professionals.

Course Content

Introduction to Product Design- principles and practices of product design, emphasizing the integration of functionality, aesthetics, and user experience. Overview of Product Design- A brief introduction to product design will cover various elements, including its history, definition, purpose, and the role of product designers.

Design Process and Methodology- Outline of the stages of the product design process: research, ideation, development, and implementation. Students will explore design thinking approaches and problem-solving techniques, emphasizing user-centered design and ergonomic principles. Key aspects of product design will include visual, auditory, tactual, and olfactory human mechanisms, as well as considerations for physical space and arrangement. Topics such as visual display, the process of seeing, visual discrimination, quantitative and qualitative visual display, alphanumeric displays, visual codes, and symbols will also be addressed.

Materials and Manufacturing Techniques- Overview of materials—such as metals, plastics, ceramics, composites, and sustainable options—will be provided. The manufacturing processes covered will include casting, molding, machining, 3D printing, and assembly. Students will learn material selection criteria based on functionality, aesthetics, and sustainability. Additional topics will explore aspects of product design, such as form, color, symbols, user-specific criteria, material choices, technology, recyclability, and packaging, with a focus on a multi-utility oriented approach.

Design projects will encompass household elements, tools and devices, furniture, and industrial products, with special attention to designing for individuals with physical and mental disabilities.

Understanding Human Factors- The course will define human factors and discuss the application of human factors data in design. Topics will include the nature and effects of human activities, man-machine systems, and the physical environment. Students will examine human performance, system reliability, information input and processing, and human control systems, along with applied anthropometry in relation to human responses to climate.

Studio Project- Focus on concept development, prototyping, testing, and presentation. Students will compile their work into a professional portfolio. Students will engage in assignments that apply theoretical lectures and hands-on studio work to explore the design process, from conceptualization to prototyping such chairs, lamps, storage units, and modern tools and appliances.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Charalampous, P., Kladovasilakis, N., Pelekoudas, T., Kostavelis, I., Ioannidis, D., & Tzovaras, D. (2025). Product Design of Customized 3D Printed Knives Using Artificial Intelligence and Numerical Simulation Technologies. *Procedia Computer Science*, *253*, 1770-1779.
2. Li, W. (2024). The Impact of Apple's Digital Design on Its Success: An Analysis of Interaction and Interface Design. *Academic Journal of Sociology and Management*, *2*(4), 14-19.
3. Robinson, D. E. (2024). Fashion theory and product design. In *Fashion Marketing* (pp. 433-450). Routledge.
4. Cross, N. (2021). *Engineering design methods: strategies for product design*. John Wiley & Sons.
5. H. G. Greet and R. R. Kostellow (2002).'Elements of Design and the Structure of Visual Relationships', Architectural Press, NY.
6. K. Critchlow. (2000). 'Order in Space: A Design Source Book', Thames and Hudson.
7. C. Akner-Koler. (1994). 'Three-dimensional Visual Analysis, Institution for Industrial Design', Konftfack, Sweden.
8. Mike Baxter. (1995). 'Product Design: Practical Methods for the Systematic Development of New Products', Chapman and Hall.
9. Roozenburg and Eekels. (1995). 'Product Design: Fundamentals and Methods', John Wiley and Sons Inc; New Ed edition.
10. Ching, D. K. (1987). Interior Design Illustrated, VNR Publications, New York.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	2								
CO2		2									
CO3	3		2								
CO4	3	2	3		2						
CO5	2		2		2						

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR553**	**ARCHITECTURAL DESIGN LAB WITH AI AND PROMPT ENGINEERING**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand AI Principles and Technologies
CLO2	Apply AI Tools in Architectural Design
CLO3	Integrate AI for Design Optimization
CLO4	Leverage AI for Code Compliance and Regulations
CLO5	Develop AI-Driven Architectural Programming and Simulation

Course Outcomes

Code	Outcome
CO1	Proficiency in AI-Driven Architectural Design
CO2	Ability to Use AI for Sustainability and Energy Efficiency
CO3	Expertise in Prompt Engineering for Architectural Solutions
CO4	Capacity to Ensure Code Compliance and Legal Standards
CO5	Knowledge of AI-Driven Program Development and Analysis

Course Content

Introduction to Artificial Intelligence, Basic concepts: machine learning, neural networks, and generative design. AI technologies: data-driven design, pattern recognition, and decision-making systems. Generative Design: parametric design and AI in form creation. AI-Assisted Design, AI-Driven Visualization, basic generative design principles, and AI-generated building forms.

Architectural design prompting - Prompt Engineering in Architectural Design - text-based prompts- different prompt strategies in architecture - prompt engineering to generate material palettes and building forms. - creating AI- prompt for architectural design program integrating context. AI-driven creative automated Design processes

AI-driven Building design processes - AI in Optimizing Design Factors - optimizing building forms and materials selection - AI to optimize space layout, accessibility, comfort, client desires and ergonomics in architectural design - AI interprets and respond to design briefs

AI for Building Code Compliance- with design standards (e.g., ASHRAE, local building codes) - for daylighting, thermal performance - AI to check and optimize building designs for code compliance (zoning, energy codes, energy efficiency, etc.).

AI for Architectural Design programming - Applying AI tools and prompt engineering - Informed Decision-Making in design programming / modelling / building optimization - Compliance with net zero building.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Reas, C., Fry, B. (2014). Processing: A Programming Handbook for Visual Designers and Artists. United States: MIT Press.
2. Ford, M. (2018). Architects of Intelligence: The Truth about AI from the People Building it. Germany: Packt Publishing.
3. Leach, N. (2021). Architecture in the Age of Artificial Intelligence: An Introduction to AI for Architects. India: Bloomsbury Publishing.
4. The Routledge Companion to Artificial Intelligence in Architecture. (2021). United Kingdom: Taylor & Francis.
5. Steenson, M. W. (2022). Architectural Intelligence: How Designers and Architects Created the Digital Landscape. United States: MIT Press.
6. Bernstein, P. (2022). Machine Learning: Architecture in the Age of Artificial Intelligence. United Kingdom: RIBA Publishing.
7. Sourek, M. (n.d.). Artificial Intelligence in Architecture and the Built Environment: The Revolution Yet to Come. (n.p.): CRC Press.
8. Ko, J., Steinfeld, K. (2018). Geometric Computation: Foundations for Design. United Kingdom: Taylor & Francis.
9. Gross, B., Bohnacker, H., Laub, J., Lazzeroni, C. (2018). Generative Design: Visualize, Program, and Create with JavaScript in P5.js. United States: Princeton Architectural Press.
10. Hunter, N. (2023). The Art of Prompt Engineering with ChatGPT: A Hands-on Guide. United Kingdom: Nathan Hunter.
11. Chaillou, S. (2022). Artificial Intelligence and Architecture: From Research to Practice. Germany: Walter de Gruyter GmbH.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	3	3	-	-	3:	-	-	-	-	-
CO2	3	-	3	-	3	-	-	-	3	-	3
CO3	-	-	-	-	3	-	3	-	3	3	
CO4	-	-	-	-	3	-	3	-	-	3	3
CO5	-	-	-	-	-	3	-	-	3	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR555**	**PEOPLE, PLACE, AND URBAN EXPERIENCE STUDIO**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the emotional and psychological dimensions of urban spaces and how people form attachments to places.
CLO2	Analyze human interactions in public spaces using behavioral mapping, spatial analysis, and participatory observation.
CLO3	Develop urban design strategies that enhance people-place connections through sensory elements, memory, and cultural identity.
CLO4	Apply human-centered design strategies to improve public satisfaction, accessibility, and inclusivity in urban environments.
CLO5	Integrate participatory design approaches, allowing users to shape public spaces based on their needs, emotions, and activities.

Course Outcomes

Code	Outcome
CO1	Analyze the emotional and psychological dimensions of urban spaces, understanding how people form attachments to places.
CO2	Evaluate human behavior in public spaces using spatial analysis techniques such as behavioral mapping, observational studies, and user surveys.
CO3	Develop urban design interventions that enhance comfort, safety, inclusivity, and social engagement in public spaces.
CO4	Apply human-centered and participatory design approaches to create responsive urban environments that reflect cultural identity and user needs.
CO5	Synthesize research insights and urban analysis into a final design proposal, demonstrating experiential qualities through models, visuals, and interactive presentations.

Course Content

Exploration of place identity, emphasizing how individuals and communities form a sense of belonging and emotional attachment to urban spaces. To understand how physical environments influence human perception, memory, and engagement. Through theoretical grounding and case examples, students examine how urban environments contribute to or detract from personal and collective identities, offering insights into the formation of emotional connections to space.

To build a deeper understanding of these themes, the course trains students in empirical research methods such as observational studies, interviews, and surveys. These methods are used to capture the lived experiences, perceptions, and interactions of diverse user groups across urban contexts.

The documentation of how different people use and interpret public spaces helps students grasp the layered meanings embedded in urban settings.

Key concepts introduced include placemaking, urban memory, and user satisfaction, which serve as foundational tools for analyzing and evaluating urban experiences. Students engage in multisensory analysis of public spaces, focusing on elements such as visual aesthetics, soundscapes, thermal comfort, and spatial legibility. Crititcal assessment of the overall quality and coherence of public environments.

The psychological dimensions of urban form are explored, highlighting the influence of walkability, active street edges, and spatial enclosures on user behaviour and well-being. The course emphasizes the application of urban comfort principles to design spaces that are not only functional but also foster safety, social interaction, and relaxation. Attention is paid to integrating human-centered design features such as seating, shading, lighting, and interactive elements into the urban fabric. Cultural practices, heritage, and everyday activities are examined as essential components in shaping urban identity. Field-based public engagement and documentation of spatial narratives and collective memory culminate in a final project, where students propose context-sensitive urban interventions that reflect their understanding and research findings.

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Gehl, J. (2013). Cities for People. Island Press.
2. Montgomery, C. (2013). Happy City: Transforming Our Lives Through Urban Design. Farrar, Straus, and Giroux.
3. Carmona, M. (2021). Public Places Urban Spaces: The Dimensions of Urban Design (3rd Edition). Routledge.
4. Mehta, V. (2020). The Street: A Quintessential Social Public Space (2nd Edition). Routledge.
5. Relph, E. (2016). Place and Placelessness. Pion.
6. Project for Public Spaces (PPS) (2022). Placemaking and the Future of Public Spaces.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	3	2	3	3	2	3	-	-	2	2
CO2	2	2	1	3	3	3	3	-	2	2	2
CO3	3	2	2	3	3	3	2	2	2	3	2
CO4	3	3	3	3	3	3	3	2	2	3	3
CO5	3	2	3	3	3	2	3	2	2	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR557**	**ALTERNATIVE CONSTRUCTION TECHNIQUES AND PRACTICES**	**4**	**0**	**0**	**4**	**4**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To gain first hand knowledge in traditional and alternative construction by hands on practice
CLO2	To select and identify good soil / bamboo / brick and properties of the material from field tests
CLO3	To learn to use basic tools and equipment used for earth construction, lime preparation, bamboo cutting, ferrocement fabrication
CLO4	To learn the steps involved in construction of mud walls, manufacturing CSEB, laying brick work and fabrication of ferrocement by hands on methods
CLO5	To construct small built forms in actual scale

Course Outcomes

Code	Outcome
CO1	Selection of suitable material for construction
CO2	Experience and handling the equipment and tools required for various building materials and methods
CO3	Demonstration of the process of simple construction using traditional materials and methods
CO4	Application of new innovations and alternative technologies like CSEB, Ferrocement, recycled materials
CO5	Planning and execution of a mini demonstration/ construction project

Course Content

This course will consist of demonstrations of alternative materials, techniques and constructions using mud, bamboo and brick to make small built forms like seating, furniture, security cabin, pavilion, etc..

Traditional methods of construction using soil- Testing of soil on site, preparation of mix, mortar, mud plasters, Simple foundations for mud walls, Hands on demonstration and application of Cob, adobe, rammed earth and wattle and daub wall techniques for a small structure. Methods of spanning openings in mud walls. Introduction to CSEB block making.

Demonstration of lime mortar/ plaster, lime cycle

Construction using bamboo, Selection, treatment methods, bamboo working tools, various joints using bamboo, Application of bamboo for simple structures like benches, furniture, pavilion

Brick sizes, bonding, rat trap bonding, simple seating using bricks, Spanning of openings using brick, demonstration of brick arches, vaults, domes, corbelling construction using CSEB / burnt brick. Brick Jaali making. Filler slab, madras terrace demonstration

Simple prefabrication on site using ferrocement, moulds for ferrocement, mix ratio, mesh sizes, Making a small demonstration ferrocement door or channel or shell.

Simple Construction using plastic bottles or glass bottles or any other recycled material

Course Assessment Methods: Continuous Assessment, Mid semester review and End semester review

Learning Resources & References:

1. Publications of CBRI, SERC, RRL, NBO, COSTFORD., AVEI, HUDCO
2. Hugo, H & Hubert G, Earth Construction Primer, Vol 8, International Colloquium on Earth Construction Technologies Appropriate to Developing Countries
3. Janssen, J.J.A (1988), Building with Bamboo- A handbook, Intermediate Technology publications,
4. Baker, L (1993), Mud, COSTFORD Publication
5. Baker, L., Lime, COSTFORD Publication
6. Evans ,I., et al (2013), The Hand-Sculpted House: A Practical and Philosophical Guide to Building a Cob Cottage, Chelsea Green Publishing Co
7. Bryce, K. & Weismann, A (2015), Clay and lime renders, plasters and paints: A how-to guide to using natural finishes, Green books
8. Minke, G (2022), Building With Earth: Design and Technology of a Sustainable Architecture, Birkhauser Architecture
9. Elizabeth, L (2005), Alternative construction: Contemporary natural building methods, Wiley

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	-	-	-	-	-	1	-	2	-	-
CO2	-	1	-	-	-	-	-	2	2	-	-
CO3	-	3	-	-	-	-	-	3	3	-	-
CO4	-	3	-	-	-	-	-	3	3	-	-
CO5	-	-	-	-	-	1	-	2	-	-	-

PROGRAM ELECTIVE – 7

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	AR559	ENVIRONMENT AND BEHAVIOUR	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the significance of this course in designing people environment.
CLO2	Acquire knowledge in addressing behaviour issues in built environment.
CLO3	Develop strategies based on theories that could be applied in design decisions.
CLO4	Apply the knowledge in wide range of people-environment deign endeavour
CLO5	Synthesize the practical approach toward architectural design.

Course Outcomes

Code	Outcome
CO1	Understand the importance of environmental behaviour studies within the design process.
CO2	Develop the ability to address behavioural issues in design problems through effective capacity building.
CO3	Analyze the relevance and application of theoretical concepts to solve practical design problems.
CO4	Apply contextual research for the development of theories in environmental studies.
CO5	Evaluate the design of a residence, community neighbourhood and similar built environments.

Course Content

Introduction to environmental psychology Introduction – Nature – Characteristics – Research – Research methods in environmental psychology – Data collection methods. Introduction to the discipline environmental psychology, its importance in the field of architecture, understanding the principles of psychology, the roots and Edges of environmental psychology- Theories and approaches in Environmental Psychology. Arousal theories. Stimulus load theories. Environmental stress theory.

Environmental perception Process of creativity, Visual and creative thinking. Types of thinking. Memory and built environment- theories on different types of memories, articulation of masses and spaces, sense, and sensation modalities- language of architecture and its role in creativity. Theories of environmental perception. Gestalt Theory. Perception and cognition of natural and built environment.

Cognition and attitudes Cognitive maps and way finding in larger built environment. Concept of perception, visual perception, theories on environmental perception environmental perception and design. Concepts of cognition. Environmental cognition and design. Environment and human

response in relation to different environmental variables. Knowledge on the components of cognitive maps –Familiarity, gender, and socioeconomic class – Functions of cognitive maps – Memory and cognitive maps – Cognitive organization of the environment. Environmental attitudes predict environmental behaviour.

Exercise in site surveying and planning Concept of personal spaces, personal space, and human behaviour. Personal space and environmental design. Concept of territoriality, territoriality and human behaviour & territoriality and environmental design. Behaviour Relationships: Nature and function of theory in environmental psychology.

Approaches to environmental design Residential environment- Concept of Home. Neighbourhood concept & Neighbourhood satisfaction. Place attachment theory, Work place environment and behaviour. Application of the knowledge in design of a residence, community neighbourhood and other built environments.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Sandaratu, S., Nagi, L. A. L., Tanesib, C. N. V., & Mangmah, Y. (2025). Dimensions of human Behavior: Person and environment (the 7th edition) Hutchison, Elizabeth D., & Wood, Leanne (Eds.).(2023). California: Sage Publications,(896 pp., 183.00-pb,ISBN9781071831458, 58.00-eBook, ISBN 9781071831496).
2. Borooah, I. P., Das, B., & Choudhury, S. A. (Eds.). (2024). Environmental Intimacies from India's North East: Psycho-Social Implications for Pro-Environment Behaviour. Taylor & Francis.
3. Pol, E. (2024). Environmental psychology in Europe: From architectural psychology to green psychology. Taylor & Francis.
4. Walmsley, D. J., & Lewis, G. J. (2014). People and environment: Behavioural approaches in human geography. Routledge.
5. Cassidy, T. (2013). Environmental psychology: Behaviour and experience in context. Psychology Press.
6. Gifford, R. (2007). Environmental psychology: Principles and practice
7. Bonnes, M., & Secchiaroli, G. (1995). Environmental psychology: A psycho-social introduction.
8. Zeisel, J. (1984). Inquiry by design: Tools for environment-behaviour research (No. 5). CUP archive.
9. Kayem, S. M. (1973). Psychology in relation to design. Dowden, Hutchinson and Ross.
10. Morgan, J. J. B., & Gilliland, A. R. (1927). An introduction to psychology. Macmillan.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	2	2	3	3	2	2	3	3	3	2
CO2	3			2	3					3	2
CO3		2	2	3	2	3	2	2	3	3	1
CO4				3	2		2			3	1
CO5				3	3	3	3			3	2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	AR561	INDUSTRIAL ARCHITECTURE	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the role of architects in designing functional and efficient industrial buildings across different types and categories of industries.
CLO2	Analyze planning parameters for industrial master planning, including site selection, circulation, and operational zoning.
CLO3	Apply structural, service, and lighting integration principles in designing flexible and adaptable industrial spaces.
CLO4	Evaluate the ergonomic, environmental, and psychological factors affecting worker well-being in industrial settings.
CLO5	Design welfare facilities and implement safety and security measures in industrial environments.

Course Outcomes

Code	Outcome
CO1	Demonstrate a clear understanding of the architect's responsibilities and design contributions in modern industrial building projects.
CO2	Critically assess site selection and master plan development strategies to optimize functionality and expandability.
CO3	Develop industrial designs that integrate structure, services, and circulation systems to support efficient operations.
CO4	Propose spatial solutions that enhance worker comfort, health, and performance using ergonomic and environmental considerations.
CO5	Formulate designs incorporating restrooms, cafeterias, lockers, and other support facilities while ensuring worker safety and security.

Course Content

Introduction to Industrial Architecture: Definition, scope, and evolution of industrial architecture. Role of the architect in the planning and design of industrial facilities. Overview of different types and categories of industries and their unique functional needs.

Master Planning and Site Design: Key considerations in industrial site selection and land use planning. Development of industrial master plans including zoning, expansion, circulation, and integration of loading/unloading areas.

Design Principles for Industrial Buildings: Design for flexibility and adaptability. Structural systems for industrial buildings. Integration of architectural design with mechanical, electrical, and plumbing (MEP) services. Design of efficient lighting and internal circulation for people and materials.

Workplace Environment and Ergonomics: Industrial workplace design focusing on ergonomic principles, workspace dimensions, and user comfort. Environmental parameters including thermal comfort, illumination, acoustics (noise and vibration), ventilation, colour psychology, and landscape integration.

Welfare, Safety, and Support Facilities: Design of worker-centric amenities like restrooms, locker rooms, changing rooms, cafeterias, and recreation areas. Safety considerations such as fire escape, emergency response, security controls, and hazard mitigation in industrial settings.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Adam, J., Hausmann, K., & Juttner, F. (n.d.). A design manual – Industrial buildings.
2. Blum, M. L., & Naylor, J. C. (n.d.). Industrial psychology. CBS Publishers, Delhi.
3. Drury, J. (n.d.). Factories: Planning, design and modernization.
4. Munce, J. F. (n.d.). Industrial architecture: An analysis of international building practice. F. W. Dodge Corporation.
5. Philips, A. (n.d.). The best in industrial architecture.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	2				1					2
CO2	1			1	1		2			1	2
CO3	1				2			1	1	1	1
CO4	2				1				1		
CO5	2				1	1			1	1	

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR563**	**NET ZERO BUILDINGS**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Be able to guide clients in setting appropriate energy use targets & metrics and tracking those targets through occupancy.
CLO2	Be able to optimize the building envelope and systems relative to energy targets, life cycle cost and environmental considerations.
CLO3	Demonstrate knowledge of both passive strategies and high-performance methodologies and how each contributes to achieving net zero energy use.
CLO4	Demonstrate understanding of energy fundamentals, heat flow, human comfort principles, passive design strategies, and building science.
CLO5	Study case examples of successful net zero buildings and understand best practices.

Course Outcomes

Code	Outcome
CO1	Define net zero buildings and their significance in combating climate change and explain the role of the building sector in global carbon emissions.
CO2	Analyse building load profiles and energy consumption patterns and assess climate and site conditions for optimized energy efficiency.
CO3	Evaluate the feasibility of solar photovoltaic (PV) and thermal systems and assess geothermal heat pumps and wind energy potential for building applications.
CO4	Develop strategies to minimize carbon emissions throughout the building lifecycle.
CO5	Analyze real-world net zero building projects and their performance outcomes.

Course Content

Introduction to Net Zero Buildings: What is a net zero building, Climate change and the building sector's role, Global trends and policy drivers for net zero buildings, Key principles of net zero design

Building Energy Analysis: Building energy modeling (BEM) tools and applications Understanding building load profiles, Energy consumption breakdown (heating, cooling, lighting, appliances), Climate analysis and site considerations

Active Energy Efficiency Measures high-efficiency HVAC systems, demand-controlled ventilation, smart lighting controls, appliance selection, and energy efficiency. On-Site Renewable Energy Integration Solar photovoltaic (PV) systems, Solar thermal collectors, Geothermal heat pumps, and Wind energy potential analysis.

Life Cycle Assessment (LCA): Embodied carbon in building materials,Carbon footprint calculation for buildings,Strategies to reduce carbon emissions throughout a building's life cycle

Case Studies and Design Exercises: Analyzing real-world net zero building projects, Applying design principles to different building types, Integrating design decisions with energy modeling tools
Course Assessment Methods: Continuous Assessment, End Assessment
Learning Resources & References: 1. Attia, S. (2018). Net Zero Energy Buildings (NZEB): Concepts, Frameworks and Roadmap for Project Analysis and Implementation. Oxford, UK: Butterworth-Heinemann An Imprint of Elsevier. 2. Brad Liljequist, F. M. (2016). The Power of Zero: Learning from the World's First Net Zero Energy Buildings. Portland, Oregon: Ecotone Publishing . 3. Maclay, B. (2014). The New Net Zero: Leading-Edge Design And Construction of Homes And Buildings For A Renewable Energy Future, First Edition. Vermont: Chelsea Green Publishing Co; (18 July. **4.** Reeder, L. (2016). Net Zero Energy Buildings Case Studies and Lessons Learned. New York: Routledge Taylor & Francis Group.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	2	1	1	2	1	1	1	2	1	1
CO2	1	1	1	1	1	3	1	1	3	1	1
CO3	1	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	1	1	1	1

PROGRAM ELECTIVE – 8

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	AR565	CONSTRUCTION TECHNOLOGY	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To explain pre-stressed and precast concrete technologies and prefabrication systems in construction.
CLO2	To describe the manufacturing, handling, and erection of modern construction materials and components with appropriate safety measures.
CLO3	To select and justify the use of construction equipment based on site-specific requirements.
CLO4	To prepare construction schedules and simulate typical floor cycles for high-rise projects.
CLO5	To apply principles of construction management, including budgeting, safety, legal compliance, and quality assurance.

Course Outcomes

Code	Outcome
CO1	To understand the methods and planning involved in pre-stressed and pre-cast concrete construction, prefabrication, and modular coordination.
CO2	To identify and analyze the use of modern construction materials, erection techniques, and safety protocols.
CO3	To evaluate various construction equipment used in site operations and choose suitable equipment for specific construction tasks.
CO4	To plan and schedule construction processes for high-rise buildings using floor construction cycles and simulations.
CO5	To demonstrate an understanding of essential construction management practices such as estimating, cost and quality control, safety, productivity, and legal aspects.

Course Content

Planning - pre-stressed, concrete constructions pre-cast concrete and pre- fabrication system - Modular coordination. Modern Construction Materials - Manufacture, storage, transportation and erection of pre-cast component forms, moulds and scaffoldings in construction - safety in erection and dismantling of constructions. Construction equipment's: Tractors, bulldozers, shovels draglines, cableways and belt conveyors, batching plants - Transit mixers and agitator trucks used for ready mix concrete pumps, Guniting equipment's - Air compressors - welding equipment - cranes and other lifting devices Choice of construction equipment for different types of works. Planning and scheduling for high rise building: Scheduling- Simulation – Typical Floor Construction Cycle –

Appropriate working schedule. Overview of construction management topics including estimating, cost control, quality control, safety, productivity, value engineering, claims, and legal issues.
Course Assessment Methods: Continuous Assessment, End Assessment
Learning Resources & References: 1. R. Chudley, Construction Technology, Pearson, 2005. 2. R. Barry, The Construction of Buildings, The English Language Book Society and Crosby Lockwood, Staples, London, 1976. 3. Construction Planning equipment and Methods by RL Peuriboy Tata McGraw Hill, 1979 4. Modern Construction and Management. Frank Harris John Wiley and Sons, 1983.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	2	-	-	-	-	2	3	3	2	2
CO2	3	-	-	-	2	-	-	3	3	2	2
CO3	3	-	-	-	-	-	-	3	2	3	3
CO4	3	-	-	-	2	-	-	2	2	3	3
CO5	2	2	-	-	2	2	2	2	2	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR567**	**ENVIRONMENTAL PLANNING**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To impart knowledge about environmental planning and management concepts, impacts, sustainability, economics, standardization, and their relevance to projects.
CLO2	To know the role of Environmental legislation in shaping the built environment
CLO3	Planning techniques with the integration of the environment
CLO4	Evaluation Techniques for Town Planning
CLO5	To able to design environmentally conspicuous communities

Course Outcomes

Code	Outcome
CO1	Understand the various environmental laws and policy
CO2	Understand the impact of construction activities on the environment
CO3	Application of various planning techniques to design sustainable development
CO4	Understand multiple strategies for developing urban, coastal, and hilly ecosystems.
CO5	Application of the planning and development of the surrounding environment

Course Content

Environmental Impact Assessment (EIA); Methods of EIA; Cumulative EIA, EIA of building projects, EIA Case studies, Environmental Management Plan

Environmental Legislation: Significance of law and its relationship to development, the evolution of planning legislation. National environmental policy.

Planning Techniques: The essence of good planning, integration of environmental assessment and planning options, Priorities, and strategies for developing urban, coastal, and hilly ecosystems.

Planning for sustainable public health, natural areas, working landscapes, and built environment, The Planned Community: The legal Basis, community components, land use patterns, Planned community development, environmental quality controls

Evaluation Techniques: Cost-benefit analysis, planning balance sheet, and goal achievement matrix.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Daniels, T. (2019). The Environmental Planning Handbook for sustainable communities and regions, Second Edition. New York: Routledge Taylor& Francis Group.
2. Dober, R. P. (1969). Environmental Design. New York: Van Nostrand Reinhold Company.

3. Rubenstein, H. M. (1987). A guide to Site and Environmental planning, 3rd volume. New York: John Wiley & sons.
4. Rutledge, A. J. (1971). Anatomy of a Park. New York: McGraw Hill book Co.
5. Simond, J. O. (1978). Earth scape - A Manual of Environmental Planning and Design. New York: Van Nostrand Reinhold Company.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	1	1	1	2	1	1	2	1	1	3	1
CO2	1	1	1	1	1	1	1	1	1	3	1
CO3	1	1	1	2	2	1	1	1	1	3	1
CO4	1	2	1	2	1	1	1	1	1	3	1
CO5	1	1	1	2	2	1	1	1	1	3	1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR569**	**ARCHITECTURAL ENTREPRENEURSHIP**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To provide students with a comprehensive understanding of the meaning and concept of entrepreneurship, its history, and its role in economic development.
CLO2	To equip students with essential entrepreneurial skills such as leadership, creativity, self-motivation, and time management.
CLO3	To teach students how to generate business ideas, recognize opportunities, and develop comprehensive business plans, including market research, feasibility studies, and strategic planning.
CLO4	To familiarize students with the entrepreneurial ecosystem in India and the role of incubation centers and startup accelerators.
CLO5	To enhance students' communication, public speaking, personal selling, and negotiation skills, which are crucial for entrepreneurial success.

Course Outcomes

Code	Outcome
CO1	Identify and apply entrepreneurial skills to establish and manage an architectural practice or startup.
CO2	Analyse financial structures, funding options, and pricing strategies relevant to architectural firms.
CO3	Demonstrate an understanding of essential entrepreneurial skills such as leadership, creativity, self-motivation, and time management along with interpersonal and communication skills.
CO4	Develop branding, marketing, and networking strategies to position themselves in the industry.
CO5	Create a viable business plan and successfully pitch ideas to investors or clients.

Course Content

Meaning and concept of entrepreneurship, History, Role of entrepreneurship in economic development, Myths, Agencies in entrepreneurship management and future, Types of entrepreneurs, Skills and traits required, decision process, Skill gap analysis, Role models, mentors, and support systems, Entrepreneurial success stories

Generating business ideas and opportunity recognition, Significance and components of a business plan, Market research, business feasibility, and strategic planning, New venture financing, Types of ownership securities and venture capital, Financial institutions and banks, Strategic business model design, development of business plans and presentation, Budgeting, cash flow management, taxation - Investment models: Bootstrapping, angel investing, venture capital, crowdfunding - Pricing

strategies for architectural services & project feasibility analysis - Financial risk assessment and mitigation.

The entrepreneurial ecosystem in India, Government initiatives and support, Growing with the market and within the industry, Venture life patterns, Reasons for new venture failures, Scaling ventures, Leadership succession, Support for growth and sustainability of the venture, Role of incubation centres and startup accelerators in architecture

Public speaking, Importance of communication, personal selling, risk-taking, and resilience, Negotiation and organizational behavior, Innovative and competitive qualities, Redefinition of problems

Setting up and managing an architectural office, accounting, people skills, human resource management, Leadership skills, Creativity and innovation, Self-motivation, Administration and time management, Marketing and finance management

Branding principles and positioning for architects - Digital marketing, Website design, SEO, social media, and email marketing - Client relationship management & networking - Business pitching and negotiation strategies

IT practices, project delivery methods, Supervision for compliance with relevant laws professional indemnity, Consumer Protection Act and Copyright Act

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Portman, J. (2017). Designing a practice: The architect's guide to entrepreneurship. Wiley.
2. Maescher, T. (2016). The archipreneur concept: Architectural practice as an entrepreneurial venture. Archipreneur Books.
3. Reinholdt, E. (2015). Architect and entrepreneur: A field guide to building, branding, and marketing your startup design business. 30X40 Design Workshop Press.
4. Benninger, C. C. (2011). Letters to a young architect. Christopher Charles Benninger Architects Pvt. Ltd.
5. Drucker, P. F. (2006). Innovation and entrepreneurship: Practice and principles. Harper Business.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	1	-	-	-	3	-	-	-	2	2
CO2	-	-	-	-	-	3	-	-	-	2	2
CO3	-	2	-	-	-	3	1	-	-	1	2
CO4	-	1	2	-	-	2	1	-	-	-	3
CO5	-	1	1	-	-	3	1	-	-	2	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
9	**AR571**	**INTRODUCTION TO GEOSPATIAL TECHNIQUES**	**3**	**1**	**0**	**2**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To **understand** the principles of land use and land cover (LULC) classification and prediction.
CLO2	To **evaluate** the process involved in geospatial techniques, including remote sensing and GIS for analyzing the growth patterns and land transformation.
CLO3	To **assess** the impact of urban growth and develop strategies to detect unplanned land transformation
CLO4	To **synthesis** the data-driven methodologies for sustainable urban design and planning.
CLO5	To **comprehend** the relationship between land use changes, urbanization, and architectural planning, ensuring informed and sustainable design decisions.

Course Outcomes

Code	Outcome
CO1	**Understand** the different types of geospatial data sources and platforms, along with their processing methods.
CO2	Accurately **distinguish** and categorize various land use and land cover types in a region.
CO3	**Analyze** remote sensing imagery to produce detailed land transformation maps.
CO4	**Apply** acquired knowledge to effectively conduct urban impact assessments.
CO5	**Evaluate** the interrelationship between land use/land cover changes and urbanization within specific contexts.

Course Content

Geospatial Data Sources: Introduction to Geospatial Data- an overview of various geospatial data sources (satellite imagery, aerial photography, LiDAR, GPS data, etc.) and their formats (raster, vector, etc.). Geospatial Data Platforms for exploring key platforms like GIS and remote sensing tools, including Google Earth, ArcGIS, and QGIS.

Data Processing Techniques: Data Processing Techniques both preprocessing, and analysis- data cleaning, image classification, georeferencing, and transformation for different applications in land use and land cover analysis.

Land Use and Land Cover Classification: Define and distinguish between land use and land cover and their classification in remote sensing. Techniques such as visual interpretation and automated classification algorithms like supervised and unsupervised classification.

Remote Sensing Analysis: Explore how remote sensing technologies help in monitoring and mapping land transformations over time.

Urbanization, Land Use Changes, and Impact Assessment: Evaluate patterns and drivers of urbanization, including population growth, economic development, and infrastructure expansion. Analyze how land use changes interact with urbanization, examining examples where land cover alterations affect urban planning, infrastructure, and environmental quality.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Chettry, V., & Manisha, K. (2022). Assessing and Predicting Urban Growth Patterns Using ANN-MLP and CA Model in Jammu Urban Agglomeration, India. Smart Innovation, Systems and Technologies ((SIST,Volume 292)), 387-397Chettry, V., Manisha, K. (2022).
2. Manisha, K., & Chettry, V. (2024). Mapping Cyclone and Flood Hazard Vulnerability in Puri District, Odisha, India, Using Geoinformatics. Advances in 21st Century Human Settlements (ACHS), 595–603. https://doi.org/10.1007/978-981-99-8811-2_50
3. Manisha, K., & Pandey, R. U. (2024). Developmental Regulations to Conserve Catchment Area of an Urban Water Body: A Case of Upper Lake in the City of Bhopal, Madhya Pradesh, India BT - Sustainable Resilient Built Environments. In R. D. Nandineni, S. Ang, & N. B. Mohd Nawawi (Eds.), Advances in 21st Century Human Settlements (ACHS) (pp. 17–27). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-8811-2_2
4. Fenta, A. A., Yasuda, H., Haregeweyn, N., Belay, A. S., Hadush, Z., Gebremedhin, M. A., & Mekonnen, G. (2017). The dynamics of urban expansion and land use/land cover changes using remote sensing and spatial metrics: The case of Mekelle city of northern Ethiopia. International Journal of Remote Sensing, 38(14), 4107–4129. https://doi.org/10.1080/01431161.2017.1317936
5. Ebenezer, P. A., & Manohar, S. (2024). Land use/land cover change classification and prediction using deep learning approaches. Signal, Image and Video Processing, 18(1), 223–232. https://doi.org/10.1007/s11760-023-02701-0
6. Hussain, S., & Karuppannan, S. (2023). Land use/land cover changes and their impact on land surface temperature using remote sensing technique in district Khanewal, Punjab Pakistan. Geology, Ecology, and Landscapes, 7(1), 46–58. https://doi.org/10.1080/24749508.2021.1923272

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1				1		1					
CO2				2					1	1	
CO3				1		2				1	1
CO4						1					
CO5				1		1				1	

PROGRAM ELECTIVE – 9

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	AR552	BUILDING AUTOMATION AND MANAGEMENT SYSTEMS	3	3	0	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Analyze the historical evolution, key characteristics, and advantages of smart buildings in the context of architectural design.
CLO2	Evaluate the architecture, components, and integration methodologies of Building Management Systems (BMS) for efficient automation.
CLO3	Assess advanced automation technologies, including sensors, controllers, and communication protocols, for optimizing building functionality.
CLO4	Examine security, safety, and access control systems, including surveillance, fire safety automation, and cybersecurity measures.
CLO5	Develop comprehensive smart building automation strategies integrating IoT, BIM, AI-driven automation, and energy management solutions.

Course Outcomes

Code	Outcome
CO1	Demonstrate proficiency in designing intelligent building automation frameworks aligned with architectural principles.
CO2	Implement BMS solutions by integrating advanced automation technologies for operational efficiency and sustainability.
CO3	Design and optimize security and access control mechanisms ensuring safety, monitoring, and digital security compliance.
CO4	Develop and apply energy-efficient automation strategies, including HVAC and lighting automation, to enhance building performance.
CO5	Integrate smart automation workflows and urban-scale automation concepts to develop sustainable and interactive architectural models.

Course Content

Introduction to Smart Buildings and Automation – Evolution of smart buildings; characteristics and benefits in modern architecture; integration of automation for efficiency, sustainability, and occupant comfort; role of automation in energy conservation and intelligent building design.

Building Management Systems (BMS) Architecture – Core components of BMS; system architecture and integration methodologies; automation frameworks for HVAC, lighting, and energy management; communication protocols, interoperability, and data-driven decision-making.

Advanced Automation Technologies – Sensors, controllers, and actuators for intelligent control; IoT-based automation solutions; AI-driven analytics for predictive maintenance and energy optimization; role of BIM in integrated automation workflows.

Security, Safety, and Access Control – Surveillance and monitoring systems; fire safety automation and emergency response mechanisms; cybersecurity measures for protecting digital infrastructure; access control technologies for enhanced security and operational management.

Smart Building Strategies and Urban-Scale Automation – Integration of IoT, AI, and digital twins in automation; energy-efficient design solutions; automation-driven sustainability practices; urban-scale applications of automation in smart city frameworks.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Alshareef, H. A. (2023). Sustainability in construction: LEED Green Associate certification preparation (1st ed.). McGraw Hill. https://doi.org/10.1036/9781265012816
2. Casini, M. (2016). Smart buildings: Advanced materials and nanotechnology to improve energy-efficiency and environmental performance (1st ed.). Woodhead Publishing Ltd.
3. NJATC. (2008). Building automation: Control devices and applications. American Technical Publishers
4. Smeenk, H. G. (2023). Internet of things for smart buildings: Leverage IoT for smarter insights for buildings in the new and built environments. Packt Publishing.
5. U.S. Green Building Council. (n.d.). Case studies from LEED-certified smart buildings and AI-driven architecture. https://www.usgbc.org

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3				2		1	2	3	2	2
CO2	3				1		1	3	3	3	3
CO3					2			3	3	3	3
CO4	2				2			3	3	3	3
CO5	3			2	2			2	3	3	3

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	**AR554**	**ARCHITECTURAL CONSERVATION**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To understand the science of architectural conservation
CLO2	To know the principles, approaches & methods of conservation
CLO3	To understand the materials and methods of preservation
CLO4	To understand the legislative and organisational framework for conservation
CLO5	To understand the conservation practice and strategies in India

Course Outcomes

Code	Outcome
CO1	Appreciation of built and cultural heritage and importance of conservation
CO2	Ability to apply appropriate methodologies and tools for recording, documentation and inventorying of heritage structures
CO3	Demonstration of evaluation and assessment of heritage components
CO4	Understanding the issues, practices, strategies of conservation
CO5	Designing sensitively in the context of built and cultural heritage

Course Content

Understanding Heritage. Types of Heritage. Heritage conservation- Need, Debate and purpose. Defining Conservation, Preservation and Adaptive reuse. International agencies like ICCROM, ICOMOS, UNESCO and their role in Conservation. Venice Charter and other relevant charters. Principles and ethics of conservation.

Museum conservation. Monument conservation and the role of ASI, SDA, INTACH. Central and state government policies and legislations. Select case studies of sites such as Mahabalipuram, Hampi. Craft Issues of conservation.

Investigation techniques and tools. Behaviour of historic materials and structures. Problems with masonry, foundations, etc. Repair methods- traditional and modern. Seismic retrofit, services additions and universal access to historic buildings. Moisture and pollution problems.

Listing of monuments, documentation of historic structures, assessing architectural character, historic structure report. Guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies of Palaces in Rajasthan, Chettinad, Swamimalai, Pondicherry dwellings. seismic retrofit and disabled access/ services additions to historic buildings. Heritage site management.

Understanding the character and issues of historic cities, districts and precincts. Selected case studies. Conservation through planning. Heritage economics, financial incentives and planning tools

such as TDR. Heritage tourism, Community based approach to conservation Conservation Management, case studies of sites like Cochin, Pondicherry French town.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Fielden, B (2003), Conservation of Historic Buildings, Architectural Press,.
2. Fielden, B (1989), Guidelines for Conservation - A Technical Manual, INTACH,.
3. Mathews, M.S. (1998), Conservation Engineering, University at Karlsruhe.
4. Irwin, J. K(2003) Historic Preservation Handbook, McGraw Hill.
5. Appleyard, D. (1979) 'The Conservation of European Cities', M.I.T. Press, Massachusetts.
6. Stubbs, J.H & Makas, E.G (2011), 'Architectural Conservation in Europe and the Americas', John Wiley and Sons.
7. Publications of INTACH
8. Tyler , N (2000) Historic Preservation: an introduction to its history, principles and practice, New York: WW Norton
9. Bucher , W & Madrid, C (1996) Dictionary of building Preservation, New York: Preservation Press, John Wiley & Sons, Inc
10. Chalana, M & Krishna, A (2023), Heritage Conservation in Postcolonial India, Routledge

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	-	1	-	3	1	-	-	1	-	-
CO2	-		-	2	-	-	2	-	-	-	-
CO3	-	-	-	2	-	-	2	-	-	-	-
CO4	-	1	-	-	-	1	-	1	-	-	-
CO5	3	-	-	1	-	2	-	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	**AR556**	**ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY**	**3**	**2**	**1**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	To familiarize students with the field of architectural journalism, its significance, and its impact on public perception.
CLO2	To develop students' proficiency in various writing styles pertinent to architectural journalism, including news articles, feature stories, reviews, and project descriptions.
CLO3	To teach students the techniques of architectural photography and videography to effectively document and represent architectural works and the built environment.
CLO4	To enable students to critically analyze architectural writings, conduct thorough research, and understand the influence of journalism on architectural trends.
CLO5	To educate students on the ethical considerations, legal aspects, and professional standards in journalism, ensuring responsible and credible reporting in the architectural field.

Course Outcomes

Code	Outcome
CO1	Understand the landscape of journalism, focusing on architectural journalism's history, theory, and key figures.
CO2	Develop proficiency in architectural photography and videography techniques to effectively document and represent buildings and the built environment.
CO3	Produce well-structured and engaging written pieces about architecture, including articles, reviews, and project descriptions.
CO4	Critically analyze architecture and its influence on public understanding.
CO5	Utilize various media and digital platforms for presenting and disseminating architectural work, ensuring effective communication and engagement with diverse audiences.

Course Content

Introduction to Architectural Journalism: Definition, scope, and significance; History and Evolution: Key milestones and influential figures in architectural journalism; Types of Architectural Journalism: Print, digital, broadcast, and multimedia journalism; Ethics and Legal Aspects: Code of ethics, copyright laws, and press regulations.

Techniques for gathering information and conducting interviews; Writing Styles: News articles, feature stories, reviews, and opinion pieces; Editing and Proofreading: Techniques for refining and polishing written content; Storytelling in Architecture: Crafting compelling narratives about architectural projects and themes.

Architectural Photography: Techniques, equipment, and best practices for capturing buildings and spaces; Videography: Basics of video production, including shooting, editing, and storytelling; Graphic Design: Use of visual elements to enhance architectural journalism; Digital Tools and Software: Introduction to software for photography, videography, and graphic design.

Fundamentals of Architectural Criticism: Key concepts and methodologies; Analyzing Architectural Works: Techniques for evaluating and critiquing buildings and designs; Influence of Criticism: Impact of architectural criticism on public perception and architectural practice; Case Studies: Examination of notable examples of architectural criticism.

Online Journalism: Blogging, social media, and digital publications; Multimedia Storytelling: Combining text, images, and video for engaging content; Emerging Technologies: Virtual reality, augmented reality, and their applications in architectural journalism; Future Trends: Exploring the evolving landscape of architectural journalism and its future directions.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Lange, A. (2012). Writing about architecture: Mastering the language of buildings and cities. Princeton Architectural Press.
2. Goldberger, P. (2023). Why architecture matters (Rev. ed.). Yale University Press.
3. Wiseman, C. (2014). Writing architecture: A practical guide to clear communication about the built environment. Trinity University Press.
4. Al-Asad, M., & Musa, M. (2007). Architectural criticism and journalism: Global perspectives. Umberto Allemandi & Co.
5. Wang, W. (Ed.). (2023). On the duty and power of architectural criticism: Proceedings of the International Conference on Architectural Criticism 2021. Park Books.
6. Preiser, W. F. E., Davis, A. T., Salama, A. M., & Hardy, A. (Eds.). (2014). Architecture beyond criticism: Expert judgment and performance evaluation. Routledge.
7. Heindl, G., Klein, M., & Linortner, C. (Eds.). (2019). Building critique: Architecture and its discontents. Spector Books.
8. Schulz, A. (2015). Architectural photography: Composition, capture, and digital image processing (3rd ed.). Rocky Nook.
9. Hamilton Knight, M. (2022). *Photography for architects: Effective use of images in your architectural practice*. Routledge.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	-	2	3	1	1	1	2	-	-	-	-
CO2	-	2	3	-	1	1	1	-	-	-	-
CO3	-	3	3	1	1	1	2	-	-	-	-
CO4	-	3	1	1	2	2	2	1	1	1	1
CO5	-	1	2	-	-	1	1	-	-	-	-

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
10	**AR558**	**TALL BUILDINGS: ARCHITECTURE AND PERFORMANCE**	**3**	**3**	**0**	**0**	**3**

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Classify tall buildings and assess their unique design considerations
CLO2	Evaluate various structural systems and their effectiveness in resisting loads and environmental forces.
CLO3	Assess sustainable and energy-efficient solutions for tall building design and operation
CLO4	Design zoning and service layouts for optimal functionality and efficiency
CLO5	Apply knowledge of MEP, fire safety, and construction technologies to real-world skyscraper projects

Course Outcomes

Code	Outcome
CO1	Introduce fundamental principles and challenges in tall building design
CO2	Explore structural systems and their role in high-rise construction
CO3	Examine facade technologies for energy efficiency and innovation
CO4	Analyse mechanical, electrical, and plumbing (MEP) services essential for high-rise functionality
CO5	Investigate safety, emergency preparedness, and innovative construction techniques.

Course Content

Introduction to Tall Buildings: Definitions of high-rise, super tall, and mega tall buildings. Key design challenges—structural stability, load considerations, population density, and service requirements. Safety concerns in vertical expansion and environmental impacts.

Structural Systems: Shear core, tube structures, and hybrid systems like exoskeletons and diagrids. Damping mechanisms—TMDs, active control systems, and aerodynamic optimizations. Foundation design—pile and raft foundations, geotechnical considerations.

Facade and Curtain Wall Systems: Thermal performance—passive and active systems. Lightweight materials, energy-saving applications, and facade innovations. Smart materials, kinetic facades, and advanced glazing systems.

Energy and Efficiency in Tall Buildings: Energy demand and renewable integration—solar, wind, and geothermal. Eco-skyscraper concepts, green building certifications (LEED, WELL), water conservation, and waste management. Zoning strategies—movement, elevator efficiency, and core design.

Building Services, Fire Safety, and Construction: MEP systems—HVAC, electrical distribution, telecommunications, plumbing, and waste management. Fire safety—refuge floors, egress,

active/passive protection, and emergency response. Modern construction techniques—modular prefabrication, material handling, tower crane logistics, and site safety.
Course Assessment Methods: Continuous Assessment, End Assessment
Learning Resources & References:

1. Ali, M. M., & Al-Kodmany, K. (2022). Structural systems for tall buildings. Encyclopedia, 2(3), 1260-1286.
2. Fu, F. (2018). Design and analysis of tall and complex structures. Butterworth-Heinemann.
3. Sarkisian, M. (2016). Designing tall buildings: structure as architecture. Routledge.
4. Oldfield, P. (2019). The sustainable tall building. A Design Primer. Nueva York: Routledge.
5. Sustainable High-Rise Buildings - Design, Technology, and Innovation. (2022). (n.p.): Institution of Engineering and Technology.
6. Safarik, D. (2016). The other side of tall buildings: The urban habitat. CTBUH Journal, (1), 20-25.
7. Wood, A. (2008). Best tall buildings 2008: CTBUH international award winning projects. Amsterdam, Netherlands: Elsevier.
8. Aminmansour, A. (2023). Tall Building Sustainability. In Encyclopedia of Sustainable Management (pp. 1-12). Cham: Springer International Publishing.
9. Al-Kodmany, K. (2015). Eco-towers: Sustainable cities in the sky. WIT Press.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	3	-	3	3	-	-	-	-	-	3	3
CO2	-	3	-	3	-	-	-	3	-	-	3
CO3	-	-	-	-	3	-	-	-	-	-	3
CO4	-	-	-	-	-	-	3	-	3	-	3
CO5	-	-	-	-	-	3	-	-	3	-	3

OPEN ELECTIVE – 1

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
6	AROE02	INNATE INTELLIGENCE AND HOLISTIC WELL-BEING	3	2	0	1	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Differentiate between cognitive and emotional modes of awareness and practice engaging with emotional intelligence in personal experiences.
CLO2	Explore and reflect on the intuitive aspects of self beyond analytical thinking to deepen self-awareness and insight.
CLO3	Demonstrate increased self-awareness through identifying personal thoughts, emotions, and behavioral patterns.
CLO4	Analyse behavioural dimensions and apply them to cultivate personal, moral, social, and spiritual values.
CLO5	Develop emotional intelligence and demonstrate competencies essential for personal and social effectiveness in an AI-driven world.

Course Outcomes

Code	Outcome
CO1	Ability to differentiate between cognitive and emotional modes of awareness and apply emotional intelligence in real-life scenarios.
CO2	Potential to explore and reflect on their intuitive selves, moving beyond analytical thinking to gain deeper self-insight.
CO3	Capacity to identify and articulate personal thoughts, emotions, and behavioral patterns to demonstrate enhanced self-awareness.
CO4	Capability to analyze human behavior and apply their understanding to nurture personal, moral, social, and spiritual values.
CO5	Ability develop emotional intelligence and demonstrate the skills needed for effective personal and social functioning in the age of artificial intelligence.

Course Content

Ethical values & Character Formation: Concepts of essential values in individuals such as honesty, integrity, respect, empathy, responsibility, gratitude, cheerful acceptance, generosity, love and compassion. Understanding of individual vibrational frequencies and the development of strong characters. Meditation and individual vibratory state, evolution of consciousness. Critical thinking through contemplation: Critical thinking and reflecting on one's actions and belief. Decision making and problem solving in a constructive way. Choices, Challenges, will power and the concept of listening to the heart- innate intelligence. Emotions and stress management. Concepts of emotional intelligence and happiness. Science behind meditation and its benefits. Calming of the overactive

mind and its influence on mental health well-being. Positive Psychology and Designing destiny: Positive behavioural aspects such as right thinking, correct understanding and honest approach. Thought pollution, its adversities and cleansing methodology. Paradoxes of life and Designing one's destiny thorough a positive outlook. Social harmony and sustainability: Diversity, group cohesiveness, tolerance and togetherness, peace, trust, admiration and equity. Epigenetics and harmony between man and nature. Holistic personal growth and well-being: Relationship between mind body and spirit. self-awareness, self-esteem, self-worth, self-discovery and transformation. One's highest potential and the physical, mental, emotional and spiritual forms of well-being

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. Patel, K. D., & Pollack, J. (2018). The Heartfulness way: Heart-based meditations for spiritual transformation (1st ed.). Westland Publications.
2. Patel, K. D. (2021). Designing destiny: Heartfulness practices to find your purpose and fulfil your potential. Hay House, Inc.
3. Patel, K. D. (2024). The power of paradox: Insights and lessons from apparent contradictions. Ebury Press.
4. Vivekananda, S. (n.d.). *Powers of the mind*. Advaita Ashrama
5. Chopra, D. (1994). The seven spiritual laws of success: A practical guide to the fulfillment of your dreams. New World Library.
6. Covey, S. R. (1989). The 7 habits of highly effective people. Free Press.
7. Murphy, J. (2008). The power of your subconscious mind: Original classic edition. Prentice Hall.
8. Lipton, B. H. (2016). The biology of belief: Unleashing the power of consciousness, matter & miracles (10th anniversary ed., collector's ed.). Hay House, Inc.
9. Tolle, E. (1997). The power of now: A guide to spiritual enlightenment. New World Library.
10. Singer, M. A. (2007). The untethered soul: The journey beyond yourself. New Harbinger Publications.

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1					3						
CO2					3						
CO3					3						
CO4					3						
CO5					3						

OPEN ELECTIVE – 2

Sem.	Course Code	Course Title	Hrs/Week	Lecture	Tutorial	Studio	Credit
7	AROE03	DIGITAL TWINS FOR SMART CITIES	3	1	2	0	3

Prerequisites: Nil

Course Learning Objectives

Code	Learning Objectives
CLO1	Understand the concept of Digital Twins and their role in urban planning.
CLO2	Explore data integration techniques for real-time monitoring and decision-making.
CLO3	Analyse data integration techniques for real-time monitoring and decision-making.
CLO4	Develop models using Digital Twin technology for city planning and resilience.
CLO5	Examine case studies and emerging trends in Digital Twin applications

Course Outcomes

Code	Outcome
CO1	To explain the principles and framework of Digital Twins.
CO2	To apply Digital Twin technology in the simulation and management of smart city infrastructure.
CO3	To integrate data from IoT, GIS, and AI to create functional digital urban models.
CO4	To Evaluate case studies of Digital Twin implementation in global cities.
CO5	To propose Digital Twin-based solutions for urban challenges such as traffic, energy, and public safety.

Course Content

Introduction to Digital Twins – Definition and evolution of Digital Twin technology; differentiation between Digital Twins and Building Information Modeling (BIM); significance in smart city development; foundational principles and conceptual frameworks.

Components and Data Integration – Core technologies including IoT sensors, AI, and Big Data; GIS and spatial analytics for real-time urban monitoring; cloud computing, cybersecurity, and data management considerations; integration techniques for seamless city-wide operations.

Applications in Smart Cities – Practical implementations in urban mobility, transportation optimization, and energy management for climate resilience; infrastructure maintenance, disaster preparedness, and predictive analytics for city planning; policy frameworks and governance in Digital Twin applications.

Case Studies and Emerging Trends – Analysis of global smart city initiatives from regions such as Singapore, Dubai, and Europe; ethical concerns and data privacy challenges in Digital Twin deployment; future advancements, innovations, and the broader impact of urban digitalization.

Course Assessment Methods: Continuous Assessment, End Assessment

Learning Resources & References:

1. European Commission. (n.d.). Smart cities and communities. Digital Strategy. Retrieved May 8, 2025, from https://digital-strategy.ec.europa.eu/en/policies/smart-cities-and-communities
2. Grieves, M. (2022). Intelligent digital twins and the development and management of complex systems [version 1; peer review: 4 approved]. Digital Twin, 2(8). https://doi.org/10.12688/digitaltwin.17574.1
3. Grieves, M. (2023). Digital twins: Past, present, and future. In Digital twins: The next intelligent revolution. Springer. https://doi.org/10.1007/978-3-031-21343-4
4. IoT For All. (2022, October 6). How digital twins are enabling smarter urban planning. https://www.iotforall.com/digital-twins-smart-cities-urban-planning
5. Ministry of Housing and Urban Affairs, Government of India. (2021). *Smart city mission*. Retrieved May 8, 2025, from https://smartcities.gov.in/documents

	PROGRAM OUTCOME										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	2	2		2			1		2		
CO2		2		3	2		1	2	3	2	2
CO3		2		3	2			3	3	3	3
CO4		2		3				2	2	3	3
CO5				3	2			3	3	3	3