CHOICE-BASED CURRICULUM

FOR

BACHELOR

OF

ARCHITECTURE

DEPARTMENT OF ARCHITECTURE & PLANNING

BIRLA INSTITUTE OF TECHNOLOGY MESRA

RANCHI, INDIA

Effective from academic year 2026-27 onwards

Institute Vision

To become a Globally Recognized Academic Institution in consonance with the social, economic, and ecological environment, striving continuously for excellence in education, research, and technological service to the National needs.

Institute Mission

- To educate students at Undergraduate, Post Graduate Doctoral and Post-Doctoral levels
- To perform challenging engineering and managerial jobs in industry.
- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching and learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education, and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

Department Vision

The underlying vision for the Department of Architecture is to make the department an academic knowledge hub that will actively contribute in the contemporary domain, by

- Providing innovative professionals who will contribute wholesomely to nation building.
- Providing individuals who can make significant contribution to the advancement of the society.
- Preparing students for leadership roles in the fields of Architecture

Department Mission

The mission of the Department of Architecture is to foster a student-centered educational program in architecture and urban planning. The programmes through its pedagogy which is heuristic and responsive to technological, cultural, and social environments, seeks to offer a diverse, inter-disciplinary and rigorous curriculum that will promote personal development and professional excellence. The Department is committed in:

- Imparting strong fundamental concepts to students and motivate them to find innovative solutions to architectural and planning problems independently
- Developing architects and planners with managerial attributes capable of applying latest technology with responsibility
- Creation of congenial atmosphere and excellent research facilities for undertaking quality research by faculty and students

Programme Educational Objective (PEO)

1. To provide high quality education that prepares students to assume professional roles in architecture by imparting sound knowledge in design theories and applications, building technologies, social cultural, environmental factors and applications of computer aided design.
2. To Prepare students to work in multi- disciplinary teams within the building industry by providing knowledge in built environment related disciplines relevant to professional ethics and obligation.
3. Prepare professionals to tackle and manage resource constraints in professional situations through appropriate project management and real estate interventions.

4. Engage in lifelong learning, additional and continual formal education, professional development, research activities and self-study to provide high quality service to the public, employees, client and other professionals.

Program Outcomes (PO)

A graduate shall

a) Be competent in applying basic knowledge of architecture, building science, and technology for the purpose of obtaining solution to a multi-disciplinary problem.
b) Gain skilful knowledge of complex architectural problems and its analysis
c) Be able to design components of the built environment by applying relevant building bye-laws and regulations.
d) Be proficient in arriving at innovative solution to a problem with due considerations to society and environment
e) Be capable of undertaking appropriate research methods to solve an architectural problem to arrive at valid solution based on appropriate interpretations of data.
f) Continually upgrade his/her understanding and become adept at modern architectural knowledge, tools and techniques to apply them relevantly.
g) To demonstrate consciousness of societal and environmental issues relevant to professional architectural practice and contribute to sustainable development.
h) Be committed to professional ethics, responsibilities, and economic, environmental, societal, and political norms.
i) Demonstrate appropriate inter-personal skills to function effectively as an individual, as a member or as a leader of a team and in a multi-disciplinary setting
j) Be able to comprehend and write effective reports and design documentations; give and receive clear instructions; make effective presentations and communicate effectively and convincingly on architectural issues with architectural community and with the interest of society at large.
k) Be conscious of financial aspects of all professional activities and shall be able to undertake projects with appropriate management control and control on cost and time.
l) Recognize the need for continuous learning and upgrade their architectural knowledge for growth in their professional career.

Graduate Attributes

1. **Engineering Knowledge**: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis**: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/ Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
4. **Conduct investigations** of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

1. Apply architectural design principles, context-specific and climate-responsive strategies, social-economic aspect and sustainable technologies to create functional, inclusive, and environmentally responsible built environments.
2. Utilize modern architectural software, digital visualization tools and emerging technologies to support design development, analysis, documentation, and decision-making
3. Demonstrate professional competence in architectural practice through effective project planning, interdisciplinary collaboration, regulatory compliance, entrepreneurship, and lifelong learning to address contemporary societal needs.

Mapping of POs and PSOs with PEOs

	PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
PO1	3	2	1	1	1	2
PO2	3	2	1	2	1	2
PO3	3	2	2	1	1	1
PO4	3	2	1	2	2	2
PO5	2	1	1	3	2	3
PO6	2	2	1	3	2	3
PO7	2	2	1	2	2	3
PO8	1	3	2	2	2	1
PO9	1	3	2	2	3	1
PO10	2	2	2	3	2	2
PO11	1	2	3	2	3	2
PO12	1	1	1	3	2	3
PSO1	3	2	1	2	2	3
PSO2	3	2	1	3	2	3
PSO3	2	3	3	2	3	2

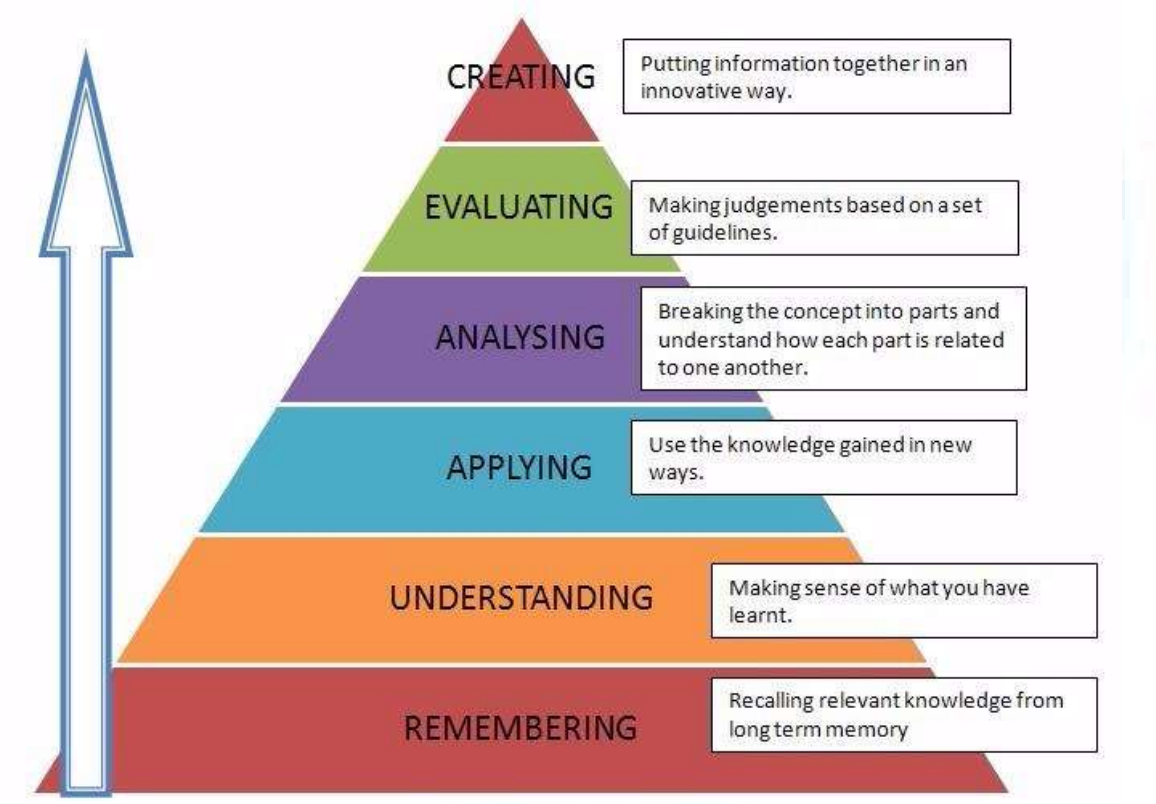
Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

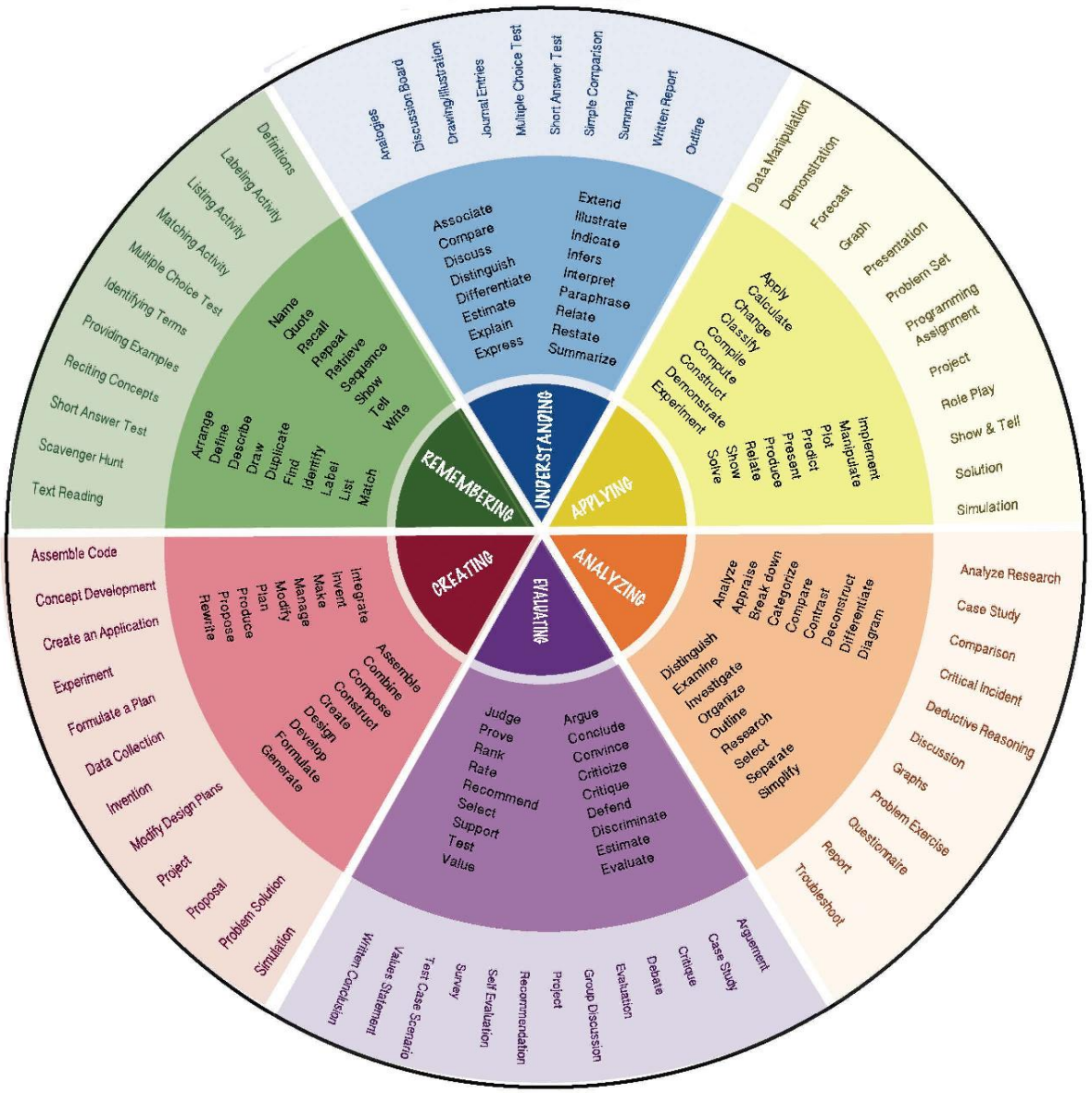
List of Non-Departmental Open Electives for Open Elective 1:

Semester	Subject Code	Subjects offered as Open Elective	L	T	P	Credit
Fourth						
Fifth						
Sixth						
Seventh						
Ninth						

Bloom'S Taxonomy For Curriculum Design And Assessment:

Preamble
The design of curriculum and assessment is based on Bloom's Taxonomy. A comprehensive guideline for using Bloom's Taxonomy is given below for reference.




REMEMBERING
UNDERSTANDING
APPLYING
ANALYZING
EVALUATING
CREATING
Name
Quote
Recall
Repeat
Retrieve
Sequence
Show
Tell
Write
Arrange
Define
Describe
Draw
Duplicate
Find
Identify
Label
List
Match
Definitions
Labeling Activity
Listing Activity
Matching Activity
Multiple Choice Test
Identifying Terms
Providing Examples
Reciting Concepts
Short Answer Test
Scavenger Hunt
Text Reading
Associate
Compare
Discuss
Distinguish
Differentiate
Estimate
Explain
Express
Extend
Illustrate
Indicate
Infers
Interpret
Paraphrase
Relate
Restate
Summarize
Analogies
Discussion Board
Drawing/Illustration
Journal Entries
Multiple Choice Test
Short Answer Test
Simple Comparison
Summary
Written Report
Outline
Apply
Calculate
Change
Classify
Compile
Compute
Construct
Demonstrate
Experiment
Implement
Manipulate
Plot
Predict
Present
Produce
Relate
Show
Solve
Data Manipulation
Demonstration
Forecast
Graph
Presentation
Problem Set
Programming Assignment
Project
Role Play
Show & Tell
Solution
Simulation
Analyze
Appraise
Break down
Categorize
Compare
Contrast
Deconstruct
Differentiate
Diagram
Distinguish
Examine
Investigate
Organize
Outline
Research
Select
Separate
Simplify
Analyze Research
Case Study
Comparison
Critical Incident
Deductive Reasoning
Discussion
Graphs
Problem Exercise
Questionnaire
Report
Troubleshoot
Argue
Conclude
Convince
Criticize
Critique
Defend
Discriminate
Estimate
Evaluate
Judge
Prove
Rank
Rate
Recommend
Select
Support
Test
Value
Argument
Case Study
Critique
Debate
Evaluation
Group Discussion
Project
Recommendation
Self Evaluation
Survey
Test Case Scenario
Values Statement
Written Conclusion
Integrate
Invent
Make
Manage
Modify
Plan
Produce
Propose
Rewrite
Assemble
Combine
Compose
Construct
Create
Design
Develop
Formulate
Generate
Assemble Code
Concept Development
Create an Application
Experiment
Formulate a Plan
Data Collection
Invention
Modify Design Plans
Project
Proposal
Problem Solution
Simulation

SEMESTER 1

FIRST YEAR [I SEMESTER]							
Subject Code	**Subject**	**L (Periods/ week)**	**T (Periods/ week)**	**P (Periods/ week)**	**Credit**	**Contact Hrs.**	**Category of Course**
PROGRAM CORE - THEORY SUBJECTS							
ARP 26101	Principles of Architecture	3	0	0	3	3	PC
ARP 26102	Introduction to Building Materials	3	0	0	3	3	PC
ARP 26103	History of Indian Architecture	3	0	0	3	3	PC
NON-DEPARTMENTAL THEORY SUBJECTS							
MA 26104	Mathematics for Architects	3	0	0	3	3	FS
PROGRAM CORE - SESSIONAL SUBJECTS							
ARP 26111	Architectural Design – I	0	0	6	9	6	PC
ARP 26112	Architectural Graphics - I	0	0	4	3	4	PC
ARP 26113	Model Making & Creative Workshop	0	0	4	3	4	PC
MANDATORY COURSE							
	Choice of NCC/NSS/PT & Games/ Creative Arts (CA)	0	0	2	1	2	MC
TOTAL CREDIT					**28**		
Total Contact hours						**28**	

COURSE INFORMATION SHEET

Course code: **ARP 26101**
Course title: **PRINCIPLES OF ARCHITECTURE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch
Semester / Level: I
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To identify design elements and architectural principles in the built environment and debate between forms and functions.
B.	To incorporate different grid patterns and scale functions in architecture.
C.	To develop an in-depth understanding of nature-influenced architecture, climate, and socio-cultural aspects.
D.	To analyze the role of an architect in implementing the above.

Course Outcomes

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

CO1	Define the domain of an architect, analysing design elements and principles in a built environment.
CO2	Understanding of concepts of nature influenced architecture and the diversity of regions.
CO3	Incorporating the above in Architectural Design.
CO4	Understanding architectural style through ages.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Architecture as a profession and the role of an architect**	Understanding the architect's role and the architectural design process. Interaction between client and architect, how projects are built, the need for the site, financing, design approvals, and the architect's contribution to cultural and social aspects.	8
Module 2	**Design Elements & Design Principles**	Basic elements of space design and their incorporation, such as point, line, plane, volume, size, colour theory, and texture in design. Visual principles of design like balance, dominance, hierarchy, proportion, datum in architecture. Studies of the organization of spaces, type of forms, the transformation of forms, and spatial organization, Gestalt law.	8
Module 3	**Concept of Grids and Scale**	Types of Common Grids: Orthogonal and Radial, and the type of scale – Generic and Human scale; proportioning systems like Le	8

		modular, the Ken. Theory of proxemics.	
Module 4	**Architecture influenced by nature**	A brief introduction to biophilic architecture and biomimicry concepts of architecture, including the concept of culture and space, material and climate.	8
Module 5	**Defining and Conceptualizing Architecture**	Development of Architectural style through Ages (Modern, Post-Modern, etc.), work of national and international renowned architects, their philosophy and buildings.	8

Textbooks:

1. Architect: A Candid Guide to the Profession, by Roger K. Lewis
2. Understanding Architecture: Its Elements, History, and Meaning by Leland M. Roth, Westview Press, Place publication.
3. Francis D.K. Ching Architecture: Form Space and Order; Van Nostrand Reinhold Co., (Canada), 1979.
4. Amjad Almusaed – Biophilic and Bioclimatic Architecture, Springer

Reference books:

Gaps in the syllabus (to meet Industry/Profession requirements): NIL

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: NIL

POs met through Topics beyond syllabus/Advanced topics/Design

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Industrial/guest lectures
Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Quiz I	✓			
Quiz II		✓	✓	
Mid-Semester Examination	✓	✓	✓	✓
End Sem Examination	✓	✓	✓	✓

Assignment			✓	✓

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO8	PO 9	PO 10	PO1 1	PO1 2
CO1	2	1	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1
CO4	3	2	1	3	1	2	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4
CD2	Tutorials/Assignments	CO3, CO4
CD3	Seminars	CO2, CO3, CO4
CD4	Industrial/guest lectures	CO2, CO4
CD5	Self- learning such as use of NPTEL materials and internets	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sudipto Chakraborty, ex-CA, CMPDIL Ar. Sandeep Jha, AXIS Architects, Ranchi	Prof. Dr. N.R. Mandal, SPA Bhopal	Ar. Anjali Pathak

COURSE INFORMATION SHEET

Course code: **ARP 26102**
Course title: **INTRODUCTION TO BUILDING MATERIALS**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch
Semester / Level: 01
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To classify the different types of building materials used primarily in building construction work.
B.	To identify the types of materials and their compositions.
C.	To list, label, and define the materials.
D.	To illustrate the use of materials and ascertain their application.
E	To identify the specific use and related technique for a required material.

Course Outcomes

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

CO1	Understand the different types of primary building materials used in the building Industry.
CO2	Choose proper building material and its application in the building Industry
CO3	Develop a sense of comparison between different building materials.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Foundations of Building Materials**	Definition and scope of building materials in architecture; Historical context of material use in construction, Categorization of materials (e.g., natural, manufactured, sustainable). • Material Properties and Performance • Factors Influencing Material Selection	8
Module 2	**Natural and Traditional Materials**	• **Stone:** Types of stone, properties, characteristics, processing and installation (igneous, sedimentary, metamorphic). • **Wood (Timber):** Types of wood, properties, application, preservation and treatment (hardwoods, softwoods); Engineered wood products (plywood, glulam, OSB). • **Earth/Soil:** Properties of soil relevant to construction (e.g., rammed earth, adobe, compressed earth blocks); Traditional and contemporary uses; Advantages and limitations.	8

Module 3	**Manufactured Inorganic Materials**	• **Bricks and Masonry Units:** Types of bricks (clay, concrete, calcium silicate), manufacturing processes, application, Mortars and their role, Concrete blocks, fly ash bricks. • **Cement and Concrete:** Types of cement and their properties. Mix design principles, RCC and PCC, Concrete constituents (cement, aggregates, water, admixtures), Mix design principles. • **Glass:** Types, properties and application of glass (float, tempered, laminated, insulated). • **Finishing Materials:** o Paints, coatings, and sealants. o Flooring materials (tiles, carpets, wood, vinyl). o Ceiling and wall finishes.	8
Module 4	**Metals and Polymers**	• **Metals:** Ferrous metals (iron, steel): types, properties, and applications (structural frames, cladding, reinforcement); Nonferrous metals (aluminium, copper, stainless steel): properties; Corrosion and protection methods. • **Polymers (Plastics):** Types of polymers and their characteristics (thermoplastics, thermosets) - Applications and Environmental considerations.	8
Module 5	**Sustainable and Advanced Materials**	• **Sustainable Building Materials:** Principles of sustainable material selection; Low-embodied energy materials. • **Emerging and Smart Materials:** Introduction to advanced materials like self-healing concrete, phase-change materials, transparent wood, and aerogels.	8

Textbooks:

1. B. C. Punmia; Building Materials and Construction.
2. Bindra & Arora; Building Materials and Construction.
3. Rangwala: Engineering Materials
4. W.B. Mckay, 'Building Construction', Vol. 1,2,3 Longmans, U.K. 1981.
5. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers
6. K.S. Jagadish, B.V. Venkatarama Reddy, and K.S. Nanjunda Rao; Alternative Building Materials and Technologies, 2023, Newage International publisher.
7. Aman Jain & Avinash Ojha; Sustainable Construction Materials - Innovations for a greener future, 2025, Wissenpress Innovations

Reference books:

1. Khanna: Civil Engineer's Handbook

Gaps in the syllabus (to meet Industry/Profession requirements): Addressed

POs met through Gaps in the Syllabus: Yes

Topics beyond syllabus/Advanced topics/Design: NIL

POs met through Topics beyond syllabus/Advanced topics/Design

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**
Quiz I	√	√	√
Quiz II	√	√	√
Mid-Semester Examination	√	√	√
End Sem Examination	√	√	√
Assignment	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty

2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO1 0	PO11	PO1 2
CO1	2	1	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4
CD2	Tutorials/Assignments	CO3, CO4
CD3	Seminars	CO2, CO3, CO4
CD4	Industrial/guest lectures	CO2, CO4

CD5	Self- learning such as use of NPTEL materials and internets	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sudipto Chakraborty, ex-CA, CMPDIL Ar. Sandeep Jha, AXIS Architects, Ranchi	Prof. Dr. N.R. Mandal, SPA Bhopal	Dr. Anuj Toppo

COURSE INFORMATION SHEET

Course code: **AR 26103**
Course title: **HISTORY OF INDIAN ARCHITECTURE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: I
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To explore and understand the historical and architectural development in ancient India, and study the chronological evolution and impacts of geographic, climatic, geological and social backgrounds of Indian architectural styles in all ages – in relationship to materials, techniques of construction.
B.	To analyse the diversity of imperial Indian Temple Architecture, Indian Mosques, Tombs, Forts, Cities, etc. including the buildings viewed as architectural masterpieces, and their urban settings.
C.	To apply the materials and patterns of construction and building techniques in each age befitting an application in contemporary times.

Course Outcomes

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

CO1.	To define and understand the basic principles of elements of historic design elements, materials and patterns of construction and building techniques in each age employing critical thinking in ancient India.
CO2.	To utilise visual and verbal vocabularies of Indian Architecture analysing the diversity of imperial Indian Temple Architecture, Indian Mosques, Tombs, Forts, Cities, etc
CO3.	To apply the materials and patterns of construction and building techniques in historic age befitting an application in contemporary times.

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Introduction to Indian Architecture**	Importance of the subject in the profession of architecture. Indus Valley Civilization: the various towns, town planning principles, house construction, and drainage systems. Vedic village settlement. Buddhist architecture – Evolution and golden age. Rock-cut Architecture – Stupas, Chaitya, Vihara, Pillars, Ajanta, Ellora, Kailasanath, Rathas, etc.	8
Module 2	**Hindu Temple Architecture**	Development of the Hindu temple form from early examples such as the Ladh Khan Temple, Temple at Deogarh, and the Bhittargaon Temple. North Indian Temple Architecture: architectural character of	8

		Gupta Temples; Orissan temple tradition with examples; Khajuraho group of Temples. Architectural character of South Indian Temple Architecture: Pallava, Chola, Pandyas, Madura, and Vijayanagar styles with representative examples.	
Module 3	**Indo-Islamic Architecture: Introduction and Typologies**	Introduction and rise of Indo-Islamic Architecture in India. Special features of the Mosque with examples. Special features of the Tomb. Influences of Indo-Islamic Architecture in India. Use of arches, vaults, domes, squinches, pendentives, jaalis, minarets, etc. Special features including use of landscape, water bodies, and gardens. Ornamentation in structures with interplay of materials – stones, mosaics, and gildings. Indo Islamic architecture in India- Imperial architecture of Delhi, including - Slave dynasty, Tughlaq and Sayyed/Lodhi dynasties.	8
Module 4	**Provincial and Mughal Indo-Islamic Architecture**	Provincial Styles of the Sultanate Period – Punjab, Bengal, Jaunpur, Gujarat, Malwa, Bijapur, and Golconda with representative examples. Mughal Style prevalent during the reigns of Babur, Humayun, Akbar, Jahangir, and Shah Jahan. Architecture during Sher Shah Sur's regime – Tomb of Sher Shah Sur.	8
Module 5	**Revival of Indian Architecture under British patronage/ Colonial India**	Revival of Indian Architecture under British patronage: Architecture in Colonial India – Monumental buildings including St. Paul's Cathedral, Kolkata; Victoria Memorial Hall, Kolkata. Contribution of Edwin Lutyens and Herbert Baker to the layout and architecture of New Delhi – Rashtrapati Bhavan and Parliament House etc. Emphasis should be on the use of structural techniques, stones, fine arts, special features, use of landscape, water bodies, and construction methods employed. Students are required to practise sketches, compile an album, and have it evaluated regularly.	8

Text books:

1. Brown, P. Indian Architecture (Buddhist Hindu) Vol. I; Taraporevala and Sons, Bombay 1983 & subsequent publications.
2. Brown Percy, Indian Architecture (Islamic Period) Vol. II; Taraporevala and Sons, Bombay, 1983; and subsequent publications.
3. Grover, S. The Architecture of India, Buddhist & Hindu, Sahibabad, 1980.
4. Grover, S. The Architecture of India (Islamic) , Sahibabad, 1980.

Reference books:

1. Asher Catherine, Architecture of Mughal India.
2. Fergusson, J.A. A history of Indian and Eastern Architecture, London 1876, revised 1891.
3. Hardy, A., “Indian Temple Architecture: Form and Transformation”, Abhinav Publication, 1995
4. Hillenbrand, Robert, Islamic Architecture, Form, Function and Meaning, Edinburgh University Press, 1994.
5. Michell, George; The Hindu Temple, London.

6. Michell, George; Architecture of the Islamic World — (its history and social meaning), Thames and Hudson, London, 1978.
7. Sir Banister Fletcher; A History of Architecture, University of London, the Antholone Press, 1986.
8. Sterlin Henry, Architecture of World, India, Germany, ISBN-38228-9658-6.
9. Sterlin Henry, Architecture of World, India (Islamic), Germany ISBN– 38228-9658-6.
10. Tadgell Christopher, The History of Architecture in India, London 1990.
11. Tillotson, G.H.R. – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Industrial/guest lectures
CD5	Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Components	**CO1**	**CO2**	**CO3**
Mid Sem Examination Marks	√	√	√
End Sem Examination Marks	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√
Assignment / Quiz (s)	√	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO1 0	PO1 1	PO 12
CO1	3	2	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1

CO3	3	3	1	1	1	1	1	1	1	1	1	1

CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO1, CO2, CO3
CD3	Seminars	CO1, CO2, CO3
CD4	Mini projects/Projects	CO1, CO2, CO3
CD5	Laboratory experiments/teaching aids	CO3
CD6	Industrial/guest lectures	-
CD7	Industrial visits/in-plant training	
CD8	Self- learning such as use of NPTEL materials and internets	
CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sudipto Chakraborty, ex-CA, CMPDIL Ar. Sandeep Jha, AXIS Architects, Ranchi	Prof. Dr. N.R. Mandal, SPA Bhopal	Ar. Ritu Agrawal and Ar. Apurv Ashish

COURSE INFORMATION SHEET

Course code: **MA 26104**
Course title: **MATHEMATICS FOR ARCHITECTS**
Pre-requisite(s): Basic Calculus
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch.
Semester / Level: 01
Branch: Architecture and Planning
Name of Teacher: Mathematics Department

Course Objectives

This course enables the students:

1	Basics concepts of matrices, including rank, eigenvalues and eigenvectors of the matrix
2	Determination of consistency and inconsistency of system of linear equations using rank of matrices
3	Application of single variable derivatives and integrals in determining different properties of a curve
4	Introduction to multi variable functions, partial derivatives and different properties associated with them their applications of multi variable calculus in determining maxima – minima and integrals for two variable functions
5	Analysis of data using different statistical techniques

Course Outcomes

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

CO1	to understand the basics of matrices, statistics, differential and integral calculus
CO2	to apply the mathematical skills to specific problems arising in architecture
CO3	to demonstrate the usage of calculus in determining shape, symmetry, pattern etc. of architectural designs
CO4	to gain an understanding to establish connectivity between mathematics and architecture.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Matrices**	Rank of a Matrix, Row – reduced Echelon form, Consistency and inconsistency for system of linear equations using rank method, Characteristic equation, Eigenvalues and Eigen vectors, Cayley – Hamilton Theorem.	8
Module 2	**Single Variable Calculus**	Differentiation, Leibnitz's Theorem, Indeterminate forms, Taylor and Maclaurin series for functions of one variable, Maxima and Minima for functions of one variable. Definite Integrals, Applications of definite integrals.	8
Module 3	**Multi Variable Calculus - I**	Function of several variables, Limit and Continuity for functions of two variables, Partial derivatives, Euler's Theorem for Homogeneous functions, Chain Rules, Total derivatives	8
Module 4	**Multi Variable Calculus -II**	Change of variables, Jacobian, Maxima and Minima for function of two variables, Use of double and triple	8

		integrals, Calculation of areas using multiple integrals.	
Module 5	**Statistics**	Measures of Central Tendency, Measures of Dispersion, Correlation, Regression, Linear and Nonlinear Regression, Curve fitting, Method of Least Squares.	8

Textbooks:
1. M.D. Weir, J. Hass and F. R. Giordano: Thomas' Calculus, 12th edition, Pearson Educations, 2008.
2. E. Kreyszig, Advanced Engineering Mathematics, Wiley International, 9th edition, 2006.
3. S.C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand Publications, 11th Edition, 2014.

Reference books:
1. M.R. Spiegel and L.R. Stephens, Schaum's outline of Statistics, 5th Edition, 2010.
2. H. Anton, I Brivens, S. Davis, Calculus, 10th Edition, John Wiley and Sons, Singapore Pvt. Ltd., 2013.
3. H. Schneider and G.P. Barker, Matrices and Linear Algebra, Dover's Publications, New York, 1973.

Gaps in the syllabus (to meet Industry/Profession requirements)
1. Making students solve architectural problems using the studied concepts.
2. Experimentally visualising the analytical concepts.
3. Difficult to produce extensive proves of the state-of-the-art definitions and theorems.

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: NA

POs met through Topics beyond syllabus/Advanced topics/Design: NA

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Quiz I	√	√	√	√
Quiz II	√	√	√	√
Mid-Semester Examination	√	√	√	√
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	1	2	2	1	1	1	1	1	2
CO2	3	3	2	1	2	2	1	1	1	1	1	2
CO3	3	2	2	2	2	2	1	1	1	1	1	2
CO4	3	2	3	3	2	2	1	1	2	2	1	3

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1
CD2	Tutorials/Assignments	CO2
CD3	Seminars	CO3
CD4	Mini projects/Projects	CO4
CD5	Laboratory experiments/teaching aids	
CD6	Industrial/guest lectures	
CD7	Industrial visits/in-plant training	
CD8	Self- learning such as use of NPTEL materials and internets	
CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Mathematics Faculty

COURSE INFORMATION SHEET

Course code: **ARP 26111**
Course title: **ARCHITECTURAL DESIGN I**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 09 L: 0 T:0 P:6
Class schedule per week: 06
Class: B. Arch
Semester / Level: I
Branch: Architecture & Planning
Name of Teacher:

Course Objectives:

This course enables the students:

A.	To introduce the fundamentals of design as a basic creative activity, and the basics of Architectural aesthetics.
B.	To learn about the basic elements of visual aesthetics through exercises aimed at experimentation.
C.	To become familiar with visual and verbal vocabularies of architecture and appreciating them.
D.	To develop and understand the basic principles of design in the context, purpose, time and technology.
E.	To evaluate the design theory and principles of design in compositions.

Course Outcome:

After the successful completion of the course, student will be able:

CO1	To understand the basic principles of design and appreciate design criteria of objects in everyday use.
CO2	To analyse, evaluate and make informed judgment on a wide range of visual and verbal vocabularies of architecture.
CO3	To comprehend basic elements of visual aesthetics and relevance to design.
CO4	To develop and employ critical and analytical thinking skills in the context of aesthetics and compositions.
CO5	To apply the principles of design and design theory in architectural compositions.

Syllabus

The understanding the elements and principles of design as the building blocks of creative design will be facilitated through exercises that will develop originality, expression, skill and creative thinking. The grammar of design and visual composition will be explored through two-dimensional compositions and three-dimensional models using various media for representation.

Topic	Focus	Key Exercises	Number of sheets
Point and Line	Understanding the expressive qualities of a single mark (point) and the dynamics of line (direction, weight, type, character). Exploring rhythm, movement, and tension.	Stipple/Dot Compositions, Freehand Line Studies (Hatching/Cross-hatching), Exploring different drawing instruments (pen, charcoal, brush).	01
Plane, Shape, and	Defining 2D shapes (geometric vs. organic) and their transformation	Collage and Paper-cutting for figure-ground exploration. Form	01

Form	into 3D forms (mass, volume, void). Understanding the figure-ground relationship.	Analysis: Drawing/Modeling simple objects to understand their core geometry.	
Colour Theory	Introduction to the Colour Wheel (primary, secondary, tertiary). Concepts of hue, value (light/dark), and chroma (intensity). Basic colour psychology and harmony (analogous, complementary schemes).	Colour Swatch Studies, Abstract compositions using limited colour palettes to achieve specific mood/depth.	01
Texture and tone	Differentiation between visual texture (implied) and tactile texture (real). Understanding tone (shades of grey) for modelling form and creating depth.	Rubbings (Frottage) and Collage to explore real textures. Pencil/Charcoal shading exercises to render simple forms (sphere, cone).	01
Space	Introduction to pictorial space (flat vs. deep) through overlapping, perspective, and scale change.	2D compositions exploring illusion of depth. Layering exercises in mixed media.	01
Balance and Harmony;	Achieving visual stability (Symmetrical, Asymmetrical, Radial Balance). Exploring how elements relate to create a sense of unity (Harmony).	Abstract compositions (2D) where elements must be balanced only by visual weight (e.g., size vs. darkness).	01
Rhythm and Repetition	Creating visual movement through the recurrence and variation of elements. Understanding concepts like alternation and progression.	Modular designs and patterns explored through grid systems, emphasizing flow and continuity.	01
Proportion and scale	Introduction to universal systems like the Golden Ratio and basic anthropometry to govern the relationship between parts and the whole.	Compositional studies applying formal systems like the Golden Section or rule of thirds.	01
Datum and Axis	Understanding underlying structures (invisible lines, central points) that anchor and organize complex compositions.	Analyzing and drawing the underlying axis/datum of complex historical and natural compositions	01
Conceptual Translation	Translating non-visual concepts (e.g., *Chaos, Silence, Growth, Conflict*) into pure abstract visual compositions (2D). Fostering originality in expression.	Mixed Media Collage, Ink/Wash, Digital tools (if applicable). Final presentation board with accompanying text explaining the conceptual translation.	01
3D Modelling: Form and Space	Creating simple volumetric models that articulate specific design principles	Model Making using mounting board, wire, paper, clay. Emphasis on craftsmanship and detailing.	01
Material Expression	Designing a small, abstract 3D object where the choice of material (color, finish, texture) is the primary expression of the concept.	Model using specific material types (e.g., polished wood vs. rusted metal) to convey mood or message.	01

Importance should be given on sketching and communicating the design / study through effective two and three-dimensional drawings / sketches and models.
Viva-voce: Final Viva-vice on all the design assignments to be conducted at the end of the semester by experts from the field.

Reference Books:

1. C. D. Joseph and Callender John; Time Saver Standards for Building Types.
2. Christopher Alexander; A Pattern Language.
3. Francis D.K. Ching; – Architecture: Form Space and Order; Van Nostrand Reinhold Co., (Canaa), 1979.
4. A. George, Covington & Bruce Hannah," Access by Design", Van Nostrand Reinhold, 1996.
5. Pearce Peter; Structure in Nature – Strategy for Design.
6. Peter Fawcett A.; Architecture Design Notebook. http://www.scribd.com/doc/45018090/Architecture-Design-Notebook
7. Pickering, Ernest; Architectural Design, John Wiley and Sons Inc., Canada, 1949.
8. Marjore Elliott Bevin, "Design through Discovery", Holt Rinehart and Winton, NewYork,1977.
9. Neufert's Architect's Data.
10. Snyder, James C and Catanese, Anthony, J, Introduction to Architecture, Mc-Graw Hill, 1980. V.S. Paramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi – 1973.
11. Von MeissPieree; Elements of Architecture.
12. Francis D K Ching, A Visual Dictionary of Architecture, John Wiley & Sons, Inc.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Seminars
Mini projects/Projects
Industrial/guest lectures
Site visits/ case study documentations

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**

Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Progressive Evaluation	√	√	√	√	√
End Sem Evaluation	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty

2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO8	PO 9	PO1 0	PO1 1	PO 12
CO1	2	1	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1
CO4	3	2	1	3	1	2	1	1	1	1	1	1
CO5	3	3	2	2	1	3	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Seminars	CO1, CO2, CO3,
CD2	Mini projects/Projects	CO2, CO3,
CD3	Laboratory experiments/teaching aids	CO3, CO4, CO5
CD4	Industrial/guest lectures	CO2, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sudipto Chakraborty, ex-CA, CMPDIL Ar. Sandeep Jha, AXIS Architects, Ranchi	Prof. Dr. N.R. Mandal, SPA Bhopal	Dr. Satyaki Sarkar and Ar. Ritu Agrawal

COURSE INFORMATION SHEET

Course code: **ARP 26112**
Course title: **ARCHITECTURAL GRAPHICS-I**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 0 T:0 P:4
Class schedule per week: 04
Class: B. Arch
Semester / Level: I
Branch: Architecture & Planning
Name of Teacher:

Course Objectives:

This course enables the students:

A.	To develop basic understanding of 3D space and preparing analytical drawings and its application in architectural field.
B.	To cultivate student's skills of geometric drawing, develop their capability of ideation of Descriptive geometry along with drawing instrumental sketching.
C.	To analyze and solve various problems involving graphics and spatial relationship to represent the possible forms of the same object.
D.	To expose the technical understanding of views

Course Outcome:

After the successful completion of the course, student will be able to:

CO1	Understand the various aspects of preparing architectural drawings
CO2	Understand the different methods of representing the same object, with the help of suitable drawing instruments
CO3	Exposure to technical understanding of preparing views, along with shades and shadows, which will be applied in all architectural projects.

Syllabus

Ch. No.	Aspects of the assignments	Topics to be Covered	A1 size sheet
1	Lettering	Single stroke letters, Uppercase and Lower-case letters, Times Roman Font and any other suitable architectural font.	1
2	Dimensioning	Dimensioning terms and notations, Placing of dimensions, General rules of dimensioning and dimensioning of various objects.	2
3	Scale	Introduction of scales in architecture, drawing of simple shapes, reduction and enlargement of drawings on different scales	1
4	Geometrical Construction	Bisecting a line, drawing perpendiculars, parallel lines, divide a line, divide a circle, construct equilateral triangles, squares regular polygons, polygon inscribed in a circle, draw tangents.	3
5	Involutes	Draw involute of a circle, square triangle and polygon	1
6	Orthographic Projection	Plane of projection, First angle projection, Third angle Projection. Projection of lines, planes and solids. Projection on auxiliary plane. Study of section of solids to include representation of such groups in these projections	3
7	Development of surfaces	Development of lateral surfaces of solids: cubes, prisms, cylinder, Pyramids and cones. Development of transitional	2

		pieces for a sphere.	
8	Isometric and Axonometric views of solids	Isometric axes, lines and Planes. Isometric scale, Isometric drawing of planes and cubes, prisms, cylinder, Pyramids and cones.	3
9	Perspective Projection	Techniques of drawing 1 point, 2 point and 3-point perspective views of blocks and buildings.	3

Reference Books:

1. Agarwal, B. and Agarwal, C.M., Engineering Drawing, Tata McGraw-Hill.
2. Bhattacharya, B. and Bera, S.C., Engineering Graphics, I.K. International.
3. Bhatt, N.D. and Panchal, V.M., Engineering Drawing, Charotar Publication.
4. Venugopal, K., Engineering Drawing and Graphics, New Age International
5. Arthur L. Guptill, Watson; Rendering in Pen and Ink, - Guptill Publications, New York.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Explanation by use of boards/LCD projectors
Problem solving in the class
Final presentation, with all drawing sheets at the end of semester, to assess the overall understanding

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

_Assessment Components	CO1	CO2	CO3
Progressive Evaluation	√	√	√
End Sem Evaluation	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty

2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO8	PO 9	PO1 0	PO 11	PO 12
CO1	3	1	1	1	1	3	1	1	2	1	1	2
CO2	3	3	1	1	1	3	1	1	2	1	1	2
CO3	3	2	1	1	1	3	1	1	2	1	1	2

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Seminars	CO1, CO2, CO3,
CD2	Mini projects/Projects	CO2, CO3,
CD3	Laboratory experiments/teaching aids	CO3,
CD4	Industrial/guest lectures	CO2, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sudipto Chakraborty, ex- CA, CMPDIL Ar. Sandeep Jha, AXIS Architects, Ranchi	Prof. Dr. N.R. Mandal, SPA Bhopal	Dr. Rajan Chandra Sinha and Dr. Prashant Prasad

COURSE INFORMATION SHEET

Course code: **ARP 26113**
Course title: **MODEL MAKING & CREATIVE WORKSHOP**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L:0 T:0 P:4
Class schedule per week: 04
Class: B.Arch
Semester / Level: I
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	Familiarise with different types of materials and manufacturing techniques for creating art forms/ models.
B.	Use different kinds of tools and machinery to produce design models.
C.	To learn about the basic elements of visual grammar through exercises aimed at visualizing the form in terms of physical parameters (material, colour, texture, structure).
D.	To develop and represent the forms in terms of models

Course Outcomes

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

CO1.	To understand the fundamentals of construction and transformation from two dimensions to three-dimension forms through model making.
CO2.	To develop skills in the context of architectural construction and compositions
CO3.	To apply the art of model making in architectural compositions.

Syllabus

Module No.	***Detailed Contents***	***No. of Lecture***
Module 1	Use of standard materials in model making- paper, boxboard, thermocol, foam core board, wood, acrylic, etc., use hand tools and hand-held power tools, innovative representational mimicry	8
Module 2	Model-making techniques such as surface development, paper folding, origami, hand cutting, laser cutting, and 3D printing.	8
Module 3	Making of block models and detail models. Simple workshop practice with machines: basic woodworking and fabrication equipment for model construction.	8
Module 4	Use of advanced Tools and materials; painting model surfaces with various finishes; development of topography and landscape elements; use of materials such as cork and polyurethane foam; and use of lasers for the development of building envelopes.	8
Module 5	Presentation modeling skills: using tools with precision and techniques for preparing presentation models. General information and practice with different finishing materials. To be coordinated with the Architectural Design and Building Construction studios	8

Text books:

1. Matt Driscoll, Model Making for Architects, Publisher- Crowood

2. Nick Dunn, Architectural Modelmaking, Publisher-Thames & Hudson
3. Roark T. Congdon, Architectural Model Building: Tools, Techniques and Materials, Publisher- Fairchild Publications
4. Wolfgang Knoll & Martin Hechinger, Architectural Models: Construction Techniques, Publisher- J. Ross Publishing

Reference books:

1. Ansgar Oswald, Architectural Models, Publisher - DOM Publishers
2. David Lund, A History of Architectural Modelmaking in Britain: The Unseen Masters of Scale and Vision , Publisher - Routledge

Gaps in the syllabus (to meet Industry/Profession requirements): None

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: NA

POs met through Topics beyond syllabus/Advanced topics/Design: NA

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Mini projects/Projects
Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**
Lab Quiz-1	√	√	√
Lab Quiz-2	√	√	√
Lab Viva	√	√	√
Day-to-Day Progressive Evaluation	√	√	√
End-Sem Performance	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	3	3	2	2	1	1	1	1
CO2	3	3	2	3	3	3	2	1	1	1	1	1
CO3	3	3	2	3	2	2	2	1	1	1	1	3

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1,CO2,CO3
CD2	Tutorials/Assignments	CO3
CD3	Mini projects/Projects	CO2,CO3
CD4	Self- learning such as use of NPTEL materials and internets	CO1

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sudipto Chakraborty, ex- CA, CMPDIL Ar. Sandeep Jha, AXIS Architects, Ranchi	Prof. Dr. N.R. Mandal, SPA Bhopal	Dr. Shama Parween

SEMESTER 2

First Year (2nd Semester)							
Subject Code	**Subject**	**L (Periods /Week)**	**T (Periods/ Week)**	**P (Periods/ Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26151	Building Construction & Codes	3	0	0	3	3	PC
ARP 26152	History of Architecture- Western	3	0	0	3	3	PC
ARP 26153	Statics & Strength of Materials	3	0	0	3	3	PC
Non-Departmental Theory Subjects							
CE 24101	Environmental Sciences	2	0	0	2	2	FS
Program Core - Sessional Subjects							
ARP 26161	Architectural Design - II	0	0	6	9	6	PC
ARP 26162	Building Construction - I	0	0	4	3	4	PC
ARP 26163	Architectural Graphics - II	0	0	4	3	4	PC
Non-Departmental Sessional Subjects							
HS 24131	Communication Skills - I		0	3	1.5	3	FS
Mandatory Course							
	Choice of NCC/NSS/PT & Games/ Creative Arts (CA)	0	0	2	1	2	MC
	Total Credit				**28.5**		
				Total Contact Hours		**30**	

COURSE INFORMATION SHEET

Course code: **ARP 26151**
Course title: **BUILDING CONSTRUCTION AND CODES**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: II
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students to:

A.	To understand the relationship between soil and the application of different types of foundations.
B.	To understand the construction techniques for RCC and other construction in multistorey buildings.
C.	To develop a state-of-the-art understanding of construction materials, techniques, and waste valorisation.
D	To apply the various building byelaws and codal provisions in the design of the built environment.

Course Outcomes

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

CO 1.	Acquire knowledge of construction safety practices and procedures and utilise this understanding in the design of substructures.
CO 2.	Build a foundational understanding of superstructure construction techniques and components, and apply this knowledge to building design and execution.
CO 3.	Demonstrate the ability to understand and apply advanced construction materials and techniques, including the valorisation of industrial waste in construction practices.
CO 4.	Understand the application of building byelaws and codes in design and construction;

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Building, Bearing Capacity of Soil and Foundation**	Components of a Building, Loads on a Building, Gross Bearing Capacity, Net Bearing Capacity, Ultimate Bearing Capacity, Safe Bearing Capacity, Methods of Estimating Bearing Capacity of Soil, Foundation Trenches, Excavation, Foundation: Types of Foundation, Different types of Shallow and Deep Foundation, Settlement of Foundations, Foundation Failures & Remedial Measures, Numerical Problems on Bearing Capacity & Design of Foundations.	8
Module 2	**Superstructures: Major Components**	Components of Super-structure, Temporary Supporting Structures: Formwork, Shuttering, Scaffolding, Underpinning. Damp Proof Course; Masonry Work: Different Types; Cavity Wall; Partition Walls; Slabs & Floors, including Terrace; Finishes: Walls & Floors; Types of High-Rise Building Structural Systems; Skin Sections	8

		and their significance: Understanding & Drafting.	
Module 3	**Value-Added, Secondary & Efficient Construction Material and Techniques:**	3D Concrete Printing, Role of Artificial Intelligence in the Construction, Modular/ Prefabricated Construction, Industrial Waste Valorisation in the construction industry to develop value-added products/elements, BMTPC Certified Materials and Techniques, Sustainable and Bio-based Materials, Construction & Demolition Waste Management.	8
Module 4	**Building Byelaws Application**	Terms in Building Byelaws, Carpet area, Super-Built-up area, Saleable area, Loading Factor, Building byelaws, Type of Buildings, Requirements of a complete set of building drawings, Sanction Drawing, Method of Municipal Approval, Preparation of Sanction Drawing of a Residence, Type of Drawings for Building Construction.	8
Module 5	**Building Codes**	Parking Norms: ECS, PCU. Introduction to NBC and its basics, Basics of Fire Prevention and Safety Measures, Energy Conservation and Building Codes, Different Types of Plans, and Land Use Classification.	8

Textbooks:

1. Building Construction by B. C. Punmia — B. C. Punmia, A. K. Jain, A. K. Jain; Laxmi Publications; 12th Edition, 2026
2. Building Construction by P. C. Varghese — P. C. Varghese; PHI Learning; 2nd Edition, 2016
3. Building Construction Vol I–IV by W. B. McKay — W. B. McKay; Pearson/Orient Blackswan; Vol. I–III (latest commonly used editions ~2013–2015)
4. Building Construction Illustrated by Francis D. K. Ching — Francis D. K. Ching; Wiley; 6th Edition, 2020
5. Building Construction by Sushil Kumar — Sushil Kumar; Standard Publishers; recent reprints (2010s–2020s)
6. Indian Practical Civil Engineer's Handbook by P. N. Khanna — P. N. Khanna; Engineers Publishers; latest revised editions (~2010s–2020s)
7. Construction Materials, Methods, and Techniques by William P. Spence — William P. Spence, Eva Kultermann; Cengage Learning; **4th Edition, 2016**
8. Fundamentals of Building Construction by Edward Allen — Edward Allen, Joseph Iano; Wiley; **7th Edition, 2022**; widely used architecture text covering materials, assemblies, and detailing.
9. Civil Engineering Materials by Shan Somayaji — Shan Somayaji; Pearson; **2nd Edition, 2001 (latest widely used)**

Reference books:

1. National Building Code of India 2016.
2. Important BIS (IS) Codes Used Alongside NBC
3. Local Building Bye-laws / Development Control Regulations
4. Energy Conservation and Sustainable Building Code 2024
5. Eco Niwas Samhita (ENS) 2024

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil
Topics beyond Syllabus / Advanced Topics / Design: Nil

POs met through Topics beyond Syllabus / Advanced Topics / Design: Nil

Course Delivery Methods

Course Delivery Methods	Description
CD1	Lecture by use of boards / LCD projectors / OHP projectors
CD2	Tutorials / Assignments
CD3	Seminars
CD4	Self-learning such as use of NPTEL materials and internet

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure
Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (2 nos. of 10 marks each)	20
Assignment	15

Assessment Components	CO1	CO2	CO3	CO4
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√
Quiz (2 nos. of 10 marks each)	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes
Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1
CO4	3	2	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcomes
CD1	Lecture by use of boards / LCD projectors / OHP projectors	CO1, CO2, CO4
CD2	Tutorials / Assignments	CO1, CO2, CO4
CD3	Seminars	CO2, CO3
CD4	Self-learning such as use of NPTEL materials and internet	CO1, CO2, CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Rizwan Kazmi

COURSE INFORMATION SHEET

Course code: **ARP 26152**
Course title: **HISTORY OF ARCHITECTURE – WESTERN**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: II
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

Architecture, at its broadest conceptual level, bifurcates into two broad intellectual traditions: the Oriental, or Eastern, and the Occidental, or Western. Students enrolled in this programme will have already encountered the former in the preceding semester, where the more spiritually inflected approaches to spatial production were examined at some length. This course shifts the analytical lens towards the materialistic, rationalist, and philosophical underpinnings of the Occidental architectural tradition. Rather than treating these two traditions as hermetically sealed categories, the course encourages students to consider how cross-cultural exchanges and contested inheritances have shaped what we now call Western architecture. This course enables the students to:

A.	Trace the chronological development of Western architecture across successive civilisations, situating specific buildings and spatial typologies within their broader cultural and historical contexts.
B.	Impart a substantive knowledge of the art and architecture of European, Egyptian, and Middle Eastern cultures, which have, in varying and sometimes contested ways, served as foundational points of reference for subsequent architectural thought.
C.	Examine and critically articulate the relationships between cultural formation, building art, and construction technique across different regions and periods, resisting simplistic cause-and-effect narratives in favour of more nuanced interpretive frameworks.
D.	Equip students to analyse the complex interplay of social, political, religious, climatological, and financial factors, and to evaluate how such forces have conditioned architectural decision-making across time.

Course Outcomes

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

CO 1.	Develop a critically informed appreciation of the diversity of cultures and their architectural productions, recognising these as expressions that are irreducibly unique to specific conditions of time, place, and social formation.
CO 2.	Demonstrate improved knowledge of place and culture through the systematic study of the planning principles, construction technologies, and aesthetic conventions that characterise significant historical buildings within the Western architectural canon.
CO 3.	Establish conceptual foundations that will support advanced study in subjects such as Principles of Human Settlements, Model Making Workshop, and Contemporary Architecture, among others.
CO 4.	Critically engage with historical contexts and identify their implications for contemporary design practice, situating present-day architectural concerns within a longer disciplinary genealogy.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*

Module 1	**Primitive, Mesopotamian and Egyptian Architecture**	A. Development of forms of shelters and megalithic structures. B. Salient building types: Ziggurats, Temples, Palaces, Housing and Town Planning Aspects (Mesopotamian) • Sumerians – City of Ur, White Temple at Uruk, Great Ziggurat at Ur, Oval Temple at Khafaje. • Assyrians – Palace of Sargon, City of Khorsabad, Nineveh. • Babylonians – City of Babylon, Nebuchadnezzar's Palace. • Persians – Palace of Persepolis. C. Salient building types: Development of Pyramids, Cult and Mortuary Temples, Housing and Town Planning Aspects (Egyptian) • Ancient Egyptian Period – Mastabas, Bent Pyramid, Pyramids of Giza (Parts of Pyramid). • Middle Egyptian Period – City of Hotepsenusret. • New Empire – Temple at Abu Simbel, Great Temple at Karnak.	8
Module 2	**Classical Architecture – Greek and Roman Architecture**	A. Greek Architecture I. Early Greek Period (Minoan Period) – Barrow Tombs, Minoan Palace at Knossos, Crete and Lion Gate, Mycenae. II. Ancient Greek Period (Hellenic Period): • Development of Classical Orders – Doric, Ionic, Corinthian. • City planning aspects of Athens and Priene; relevance of open spaces. • Salient building types: Salient features of Greek Houses, Development of Temple types and Temples at Acropolis, e.g. Pantheon, Stoas, Theatre of Epidaurus. • Technology of Optical Correction (Entasis). B. Roman Architecture • Contribution in new materials and construction/structural systems: Pozzolana, Cement, Stone Blocks, Stone Masonry, Arch, Barrel and Groin Vault, Dome. • Development of Tuscan and Composite Orders. • Salient building types: Parthenon, Forums, Colosseum, Circus Maximus, Thermae of Caracalla, Basilica of Trajan.	8
Module 3	**Early Christian, Romanesque and Byzantine Architecture**	A. Early Christian Architecture: Development of the Early Christian Church from the Roman Basilica. • Case example – St. Peter's Basilica. B. Romanesque Architecture: Development of Romanesque architecture from Early Christian architecture. • Case example – Pisa Complex.	8

		C. Byzantine Architecture: • Contribution of Byzantine architecture in the development of the structural system – dome construction over a square plan. • Adoption of the Greek cross in church layout. • Use of mosaic and mural in interior decoration. • Case examples – Saint Hagia Sophia, Istanbul; St. Mark's Cathedral, Venice.	
Module 4	**Gothic Architecture**	A. Development of the Gothic church and its defining formal and structural elements: • Pointed Arch window. • Arch types – lancet, equilateral, depressed. • Trefoil arch. • Cluster column and intersecting vault roof. • Clerestory window and triforium. • Flying buttress. • Glazed window, stone and metal trellis, flamboyant window, rose window. • Entrance of church. • Case examples – Cathedrals of Chartres, St. Denis, Notre Dame (Paris), Reims.	8
Module 5	**Renaissance Architecture**	A. Division of Renaissance architecture into Early, Mature and Late periods. B. Contribution in structural systems, e.g. Ribbed dome, Lantern dome. • Case examples – St. Peter's Cathedral (Rome), Louvre Palace (Paris).	8

Text Books

1. Sir Banister Fletcher, A History of Architecture, University of London, the Athlone Press, 1986.
2. G.K. Hiraskar, Great Ages of World Architecture, DhanpatRai & Sons, Delhi.
3. Moffet, M., Fazio, M. and Wodehouse, L., "A World History of Architecture", McGraw-Hill, 2008.

Reference Books

1. Watkin, D., "A History of Western Architecture", Thames and Hudson, 1986.
2. S. Lloyd and H.W. Muller, History of World Architecture – Series, Faber and Faber Ltd., London, 1986.

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil

Topics beyond Syllabus / Advanced Topics / Design: Nil

POs met through Topics beyond Syllabus / Advanced Topics / Design: Nil

Course Delivery Methods

Course Delivery Methods	Description
CD1	Lecture by use of boards / LCD projectors / OHP projectors
CD2	Tutorials / Assignments
CD3	Seminars

CD4	Self-learning such as use of NPTEL materials and internet

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure
Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (2 nos. of 10 marks each)	20
Assignment	15

Assessment Components	CO1	CO2	CO3	CO4
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√
Quiz (2 nos. of 10 marks each)	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes
Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PO1 1	PO1 2
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1
CO4	3	2	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcomes
CD1	Lecture by use of boards / LCD projectors / OHP projectors	CO1, CO2, CO4
CD2	Tutorials / Assignments	CO1, CO2, CO4
CD3	Seminars	CO2, CO3
CD4	Self-learning such as use of NPTEL materials and internet	CO1, CO2, CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Apurv Ashish

COURSE INFORMATION SHEET

Course code: **ARP 26153**
Course title: **STATICS AND STRENGTH OF MATERIALS**
Pre-requisite(s): Mathematics course with ordinary differential equations
Co- requisite(s): None
Credits: 3 L:3 T: 0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: II
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the equilibrium conditions of different force systems in two-dimensional plane
B	To understand stress-strain behaviour of ductile and brittle materials in their elastic limit.
C	To draw shear force and bending moment diagram of statically determinate beams subjected to different types of loads.

Course Outcomes

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

CO1.	Understand the basic principle of statics and strength of materials theorems and to apply the concept in structural problems.
CO 2.	Analyze force applied to the truss members in simple and plane truss.
CO 3.	Evaluate centroid and moment of inertia of plane and composite figures.
CO 4.	Analyze elastic behavior of ductile and brittle materials
CO5.	Evaluate shear force and bending moment of the beams subjected to different types of loads

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Statics**	Basic principle of statics, coplanar and concurrent system of forces, Principle of Transmissibility, free body diagrams, two and three-dimensional force systems – moment, couple, and resultants, equilibrium and its conditions in two and three dimensions, frictional effects in force systems – static and kinetic friction, friction angles	8
Module 2	**Truss and Structures**	Plane truss, simple truss, redundant, analysis of simple plane truss using method of sections and method of joints, and graphical solutions for force analysis of trusses.	6
Module 3	**Centroid and Moment of Inertia**	Determination of centroid and moment of inertia of plane and composite areas, rectangular and polar moment of inertia, perpendicular and parallel axis theorem, radius of gyration.	6
Module 4	**Simple Stress and Strain**	Concept of stress and strain – normal and shear, Poisson's ratio, stress-strain diagrams for ductile and brittle materials, linear elasticity and Hooke's Law - Young's modulus, modulus of rigidity, volumetric	10

		strain and bulk modulus, relations between Young's modulus, modulus of rigidity, and bulk modulus, allowable loads and factor of safety for ductile and brittle materials, strain energy in axially loaded members.	
Module 5	**Shear Force and Bending Moment**	Types of supports, beams, and loads, statically determinate and indeterminate beams, degree of statistical indeterminacy, shear force and bending moment, relationship between shear force, bending moment and load intensity, shear force and bending moment diagrams for statically determinate beams subjected to different types of loads, point of contraflexure	10

Text books:

J.L. Meriam and L. G. Kraige, *Engineering Mechanics: Statics*, John Wiley & Sons, Inc.
J. M. Gere and S. P. Timoshenko, *Mechanics of Materials*, Springer-Science+Business Media, B.V.

Reference books:

I. H. Shames, *Engineering Mechanics: Statics and Dynamics*, Prentice Hall,New Jersey
I.B. Prasad, *A text book of Applied Mechanics: Dynamics and Statics*, Khanna Publishers
S. Ramamurtham, *Strength of Materials*, DhanpatRai Publications
S. S. Rattan, *Strength of Materials,* Tata McGraw-Hill Publishers.

Gaps in the syllabus (to meet Industry/Profession requirements): Analysis of torsion and combined stresses

POs met through Gaps in the Syllabus: PO1, PO2, and PO4

Topics beyond syllabus/Advanced topics/Design: Stress-strain behaviour of materials using tensorial approach

POs met through Topics beyond syllabus/Advanced topics/Design: PO1, PO2, and PO4

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure
Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Mid Sem Examination Marks	25

End Sem Examination Marks	50
Quiz 1	10
Quiz 2	10
Assignment	05

Assessment Compoents	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Sem Examination Marks	√	√	√	-	-
End Sem Examination Marks	√	√	√	√	√
Quiz 1	√	-	-	-	-
Quiz 2	-	-	-	√	-
Assignment	√	√	√	√	√

Indirect Assessment –
Student Feedback on Faculty
Student Feedback on Course Outcome

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO1 0	PO11	PO12
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1
CO4	3	2	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
C D	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD 1	Lecture by use of boards/LCD projectors/OHP projectors	CO1-5	CD1
CD 2	Tutorials/Assignments	CO1-5	CD2
CD 3	Seminars		
CD 4	Mini projects/Projects		
CD 5	Laboratory experiments/teaching aids		
CD 6	Industrial/guest lectures		
CD 7	Industrial visits/in-plant training		
CD 8	Self- learning such as use of NPTEL materials and internets		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Dr. Paritosh Mahata

COURSE INFORMATION SHEET

Course code: **CE24101**
Course title: **ENVIRONMENTAL SCIENCE**
Pre-requisite(s): **NA**
Co- requisite(s): NA
Credits: 2 L:2 T: 0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: II
Branch: All
Name of Teacher:

Course Objectives
This course enables the students:

1	To develop basic knowledge of ecological principles and their applications in environment.
2	To identify the structure and composition of the spheres of the earth, the only planet sustaining life.
3	To analyse, how the environment is getting contaminated and probable control mechanisms for them.
4	To generate awareness and become a sensitive citizen towards the changing environment.

Course Outcomes

After the completion of this course, students will be:

CO 1	Able to explain the structure and function of ecosystems and their importance in the holistic environment.
CO 2	Able to identify the sources, causes, impacts and control of air pollution.
CO 3	Able to distinguish the various types of water pollution happening in the environment and understand about their effects and potential control mechanisms.
CO 4	Able to judge the importance of soil, causes of contamination and need of solid waste management.
CO 5	Able to know the impacts of noise pollution and its management

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Ecosystem and Environment**	Concepts of Ecology and Environmental science, ecosystem: structure, function and services, Biogeochemical cycles, energy and nutrient flow, ecosystem management. Concept of Biodiversity.	6
Module 2	**Air Pollution**	Structure and composition of unpolluted atmosphere, classification of air pollution sources, types of air pollutants, effects of air pollution, monitoring of air pollution, Air pollution control and management.	6
Module 3	**Water Pollution**	Water Resource; Water Pollution: types and Sources of Pollutants; effects of water pollution; Water quality monitoring, Water quality index, water and wastewater treatment: primary, secondary and tertiary.	6
Module 4	**Soil Pollution and Solid Waste**	Soil profile, soil properties, soil pollution, Municipal solid waste management. MSW – Functional elements of MSW.	10

	Management		
Module 5	**Noise Pollution**	Noise pollution: introduction, sources, outdoor and indoor noise propagation, Effects of noise on health, criteria noise standards and limit values, Noise measurement techniques, prevention and control of noise pollution.	10

Text books:

1. A, K. De. (3rd Ed). 2008. Environmental Chemistry. New Age Publications India Ltd.
2. R. Rajagopalan. 2016. Environmental Studies: From Crisis to Future by, 3rd edition, Oxford University Press.
3. Eugene P. Odum. 1971. Fundamentals of Ecology (3rd ed.) -. WB Sunders Company, Philadelphia.
4. C. N. Sawyer, P. L. McCarty and G. F. Parkin. 2002. Chemistry for Environmental Engineering and Science. John Henry Press.
5. S.C. Santra. 2011. Environmental Science. New Central Book Agency.

Reference books:

1. D.W. Conell. Basic Concepts of Environmental Chemistry, CRC Press.
2. Peavy, H.S, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International
3. G.M. Masters & Wendell Ela. 1991. Introduction to Environmental Engineering and Science, PHI Publishers.

Gaps in the syllabus (to meet Industry/Profession requirements):Nil

POs met through Gaps in the Syllabus::Nil

Topics beyond syllabus/Advanced topics/Design::Nil

POs met through Topics beyond syllabus/Advanced topics/Design::Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**				
Mid Sem Examination Marks	25				
End Sem Examination Marks	50				
Quiz (s) (1 & 2)	10+10				
Teacher's assessment	5				
Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid sem exam	√	√	√	√	√
End Sem Examination Marks	√	√	√	√	√
Quiz 1	√	√	√	√	√

Quiz 2	√	√	√	√	√
Assignment	√	√	√	√	√

Indirect Assessment –
Student Feedback on Faculty
Student Feedback on Course Outcome

Mapping between Objectives and Outcomes
Mapping of Course Outcomes onto Graduate Attributes

Course Outcome #	Program outcomes											Program specific outcomes		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		1	3			1	3						1		
CO 2		1	3			1	3						1		
CO 3		1	3			1	3						1		
CO 4		1	3			1	3						1		
CO 5		1	3			1	3						1		

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1, CD2, CD8
CD2	Tutorials/Assignments	CO2	CD1, CD2, CD8
CD3	Seminars	CO3	CD1, CD2, CD8
CD4	Mini projects/Projects	CO4	CD1, CD2, CD8
CD5	Laboratory experiments/teaching aids	CO5	CD1, CD2, CD8
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		CEE faculty members

COURSE INFORMATION SHEET

Course code: **HS24131**
Course title: **COMMUNICATION SKILLS I**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 1.5 L: 0 T: 0 P: 3
Class schedule per week: 03
Class: B.Arch
Semester / Level: II
Branch: All
Name of Teacher:

Course Objectives

This course enables the students:

A.	Develop Language Proficiency and communicative competence: Improve students' ability to read, write, speak, and listen effectively in English. In addition, students will also learn and improve politeness strategies in communicative contexts.
B.	Enhance Verbal and Non-Verbal Communication: Train students in both spoken and body language communication for personal and professional interactions.
C.	Enhance Reading Ability: Equip students with the ability to strategically comprehend and interpret visual and textual information.
D.	Enhancing Writing Proficiency: Enable students to write structured reports, emails, resumes, and other professional documents.
E.	Developing Presentation and Public Speaking Skills: Self-assurance during talks, presentations and speeches.

Course Outcomes

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

CO1.	In a variety of pragmatic and communicative contexts, students will be able to confidently and fluently articulate their ideas.
CO2.	This will enable learners to accurately interpret messages for effective interaction by comprehending audio texts and listening selectively.
CO3.	Learners will be able to examine texts for particular and intricate details, draw inferences, and provide interpretations.
CO4.	Learners will be capable of creating organized written pieces, including paragraphs, essays, and narratives, and will also be able to summarize, paraphrase, and create précis of ideas effectively.
CO5.	Learners will be capable of confidently using verbal and non-verbal communication during speeches and presentations.

Syllabus

Module No.	***Detailed Contents***	***No. of Lecture***
Module 1	**Theory** **Principles of Fundamental Communication.** Communication theory, various types and methods of communication, communication flow (upward, downward, and horizontal), characteristics of successful communication, obstacles, and approaches, verbal and non-verbal communication, and social context communication—requests, refusals, compliments, and providing constructive feedback. **Practice**	8

	Communication: Study relevant materials or case studies on effective communication, obstacles, strategies, and both verbal and non-verbal aspects. Understand and contextualize the influence of culture and society on communication in both writing and speaking. **Role plays:** Engage in scenario-based questions focusing on communication, body language, and courtesy. **Dialogue writing:** Presenting viewpoints based on various situations or scenarios—including requests, refusals, compliments, and criticism—in both writing and speaking.	
Module 2	**Theory** **Communicating, Depicting, and Hearing:** Salutations, Presenting oneself/others, Descriptive communication for locations, objects, scenarios, challenges, etc. Proficient listening abilities and the various aspects of listening, including types such as intensive, responsive, selective and extensive. A brief introduction to Varieties of English Accents (neutral accent) through audio and video examples. **Practice tasks** **Introducing people/Describing people:** - Introducing oneself and others - Characterizing an individual, image, circumstance - Discussing traits (positive/negative/critical) about a person, object, scenario, or image. **Listening skills:** - Engaging in attentive listening activities - Listening selectively to complete the blanks - Hearing a passage and rephrasing the precise information in your own words (listening comprehension) - Listening to a discussion on a topic and responding critically. - Attending to informal workplace interactions and dialogues.	8
Module 3	**Theory** **Enhancing Vocabulary and Grammar** Lexicon (Affixes- Inflections-Derivations), Registers, Idiomatic Expressions and Phrasal Verbs, vocabulary in context. Opposites, similar words, and one-word alternatives. Sentence constructions (word order like SVO, etc.), Paragraphs (Thesis statement, main idea, topic sentences), Generating ideas for paragraph composition. W. S Allen (Book) **Practice** **Vocabulary Building:** **-** Students utilize specific vocabulary related to various registers to construct paragraphs, narratives, and more. - Students incorporate phrasal verbs to create a coherent paragraph. - Exercises involving antonyms, synonyms, and word substitution can be conducted using worksheets. - Engage graphic organizers such as word associations and concept mapping for vocabulary enhancement activities. Identify suffixes, prefixes, idioms, and phrasal verbs: - Analyze texts to find suffixes and prefixes along with their	8

	definitions. - Word association and spider diagrams can be utilized to uncover suffixes and prefixes. **Paragraph writing:** **-** Generate ideas about a topic/concept/idea and prompt students to compose a detailed paragraph.	
Module 4	**Theory** **Elements of Reading and Writing** Present the sub-skills involved in reading and writing, including the different types of reading such as close reading and intensive reading. Techniques like mind mapping and note-taking. Generating ideas through brainstorming, structuring thoughts, and creating coherent written pieces consisting of an introduction, body, and conclusion. Writing letters, summaries, précis, resumes, essays, narratives, biographies, and news articles. **Practice** **Reading:** **-** Encourage students to distinguish between factual and inferential information from a text. - Read a passage and create a mind map outlining the main and supporting ideas of the content. - Read the text and take notes. - Read and interpret the author's perspective. - Read and conduct a critical analysis of the text. - Read a passage and provide constructive feedback. (speaking/writing modality) **Writing:** **-** Compose a summary. - Write a précis. - Create a resume. - Develop an essay. - Write a narrative account, whether personal or about others. - Produce a news column.	8
Module 5	**Theory** **Public speaking and presentation abilities** Public speaking and presentation techniques Public speaking, objectives of a speech – to inform, entertain, persuade, or commemorate/celebrate. Methods of persuasion in speeches – ethos, logos, and pathos. Speech preparation – researching background information, organizing content, crafting an introduction, developing main points, and concluding effectively. Showcasing structured speeches – welcome addresses, farewell remarks, expressions of gratitude (examples may be provided in written scripts, videos, or audio recordings). Presentation etiquette, verbal presentations, poster displays, and delivering speeches. **Practice** **Public speaking:** **-** Deliver an opening speech (during the Annual day, General meeting, sports day, cultural events) - Present a farewell address - Express gratitude through a vote of thanks	8

	- Make a persuasive speech (given a specific scenario) - Engage in an extempore speech **Presentations:** - Conduct a role play - Prepare a PowerPoint presentation - Create a poster presentation	

Textbooks:
1) Communication Skills (2015) 2nd edition, Sanjay Kumar & Pushp Lata, Oxford University Press
2) Business Correspondence and Report Writing (2017), R.C.Sharma, Krishna Mohan. McGraw Hill

Reference Books:
1) Basic Business Communication-(2004). Lesikar I Flatley, McGraw Hill
2) Business Communication Today, (2017), Bovee, Thill and Chatterjee, Pearson
3) Krishnan, M, & Jha, S.(2024). *Focus: A course in Communication Skills*. Cambridge University Press
4) Suparna Dutta, 2013 Business Communication, PHI Learning Pvt Ltd, New Delhi

Gaps in the syllabus (to meet Industry/Profession requirements) : nil

POs met through Gaps in the Syllabus: Nil
Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery Methods:

CD1	Lecture by use of boards/LCD projectors/OHP projectors	
CD2	Assignments/Seminars	
CD3	Laboratory experiments/teaching aids	
CD4	Industrial/guest lectures	
CD5	Industrial visits/in-plant training	
CD6	Self- learning, such as the use of NPTEL materials and the internet	
CD7	Simulation	

DIRECT ASSESSMENT

Assessment Tool	**% Contribution during CO Assessment**
Continuous Internal Assessment	60
End Semester exams	40

Continuous Internal Assessment	% Distribution
Day-to-day performance & assignments	30
Quiz 1	10
Viva- Voce	20

End Semester Examination	% Distribution
Examination: Submission of reports	30
Viva- Voce	10

Assessment Components	**CO1**	**CO2**	**CO 3**	**CO 4**	**CO 5**
Continuous Internal Assessment	√	√	√	√	√
Examination: Submission of reports	√	√	√	√	√

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	**Course Delivery Method**
CO 1	CD2, CD 3
CO 2	CD 3, CD 6
CO 3	CD 1, CD 2
CO 4	CD 3, CD6
CO 5	CD 2, CD3, CD6

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Dr. Rohit Pandey

COURSE INFORMATION SHEET

Course code:	**ARP 26161**
Course title:	**ARCHITECTURAL DESIGN II**
Pre-requisite(s):	The students should have registered for Architectural Design-I
Co- requisite(s):	None
Credits: 9	L: 0 T: 0 P:6
Class schedule per week:	06
Class:	B. Arch
Semester / Level:	II
Branch:	Architecture & Planning
Name of Teacher:	

Course Objectives:

This course enables the students:

A.	To introduce the process of architectural design, from inception to representation.
B.	To identify, analyse and relate the concepts of space, form, and order in the context of three-dimensional designed space.
C.	To identify and classify different functional spaces and their relationships and to analyze their space requirements.
D.	To identify the human standards of design based on ergonomics and relate activities to spatial data (dimensions, space-defining/establishing elements).
E.	To understand and apply the design theory and principles of design for small buildings.

Course Outcome:

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

CO1	To develop critical and analytical thinking skills in the context of the concepts of space, form, and order.
CO2	To understand, distinguish, and analyze three-dimensional designed spaces, a wide range of functions, and their relationships.
CO3	To comprehend human standards of design based on ergonomics.
CO4	To represent the forms in terms of drawings and 3D models.
CO5	To design various components of different functional spaces with an integration of the principles of composition and design.

Syllabus

1. Relationship between Basic Design and Architectural Design: comprehensive understanding of space, form, function, design, ergonomics & anthropometrics.

Study of 3D forms/shades and shadow study, and composition.

2. **MAJOR DESIGN PROBLEM (8 Weeks)** ***Individual Work***

Option A: Contemporary Rural Dwelling — Jharkhand Context	
Site Context	Sloped tribal village site near Ranchi (contoured, 1:10 gradient), surrounded by natural vegetation
Programme	2–3 BHK residence for a medium-income tribal family (approx. 120–150 sqm); verandah, courtyard, utility zone, home garden

Design Focus	• Cost-effective construction using local stone, bamboo, and mud-composite walls • Natural ventilation for the hot-humid climate of Jharkhand. • Barrier-free planning at ground level. • Integration of traditional spatial patterns with contemporary functionality
Innovation Challenge	Students must document one vernacular precedent from the region and consciously incorporate its spatial logic in their design.
Deliverables	Site analysis, concept sketches, floor plans (1:50), elevations (1:50), one section through the site showing contouring strategy, a 3D model/massing, and a perspective view.
Option B: Artist's House and Studio — Forested Flat Plain	
Site Context	Flat plot (18m x 22m) at the edge of a small town.
Programme	Residence + working studio for a self-employed artist family of 4; outdoor workspace, display area, 130–160 sqm total
Design Focus	• Orientation and daylighting strategy for north-lit studio spaces • Landscape integration — preserving existing trees, adding a kitchen garden • Flexible spatial layout with indoor-outdoor continuity
Innovation Challenge	Design a 'threshold space' between the public studio and the private home that can transform from an open gallery to an intimate courtyard.
Deliverables	Site analysis, design process sheets, plans, sections, elevations (1:50), material palette, perspective renderings
Option C: Hillside Retreat Cottage	
Site Context	Steep contoured site (1:5 slope)
Programme	Seasonal retreat dwelling for a retired couple + two guest rooms; 120 sqm; views to east and north
Design Focus	• Structural response to slope — split-level or step-section strategies • Green roof and rainwater harvesting • Stone and timber construction respecting local ecology • Landscape: retaining walls, stepped gardens, endemic planting
Innovation Challenge	The building must harvest all water on-site. Students must sketch a complete water cycle diagram alongside the design.
Deliverables	Topographic site analysis, section through slope (1:100), plans/elevations/sections (1:50), structural concept diagram, 3D study model
Option D: Urban Compact Dwelling	
Site Context	Dense urban infill plot (10m x 20m) in Ranchi—surrounded by existing construction on three sides
Programme	Multi-generation urban house for family of 6 (grandparents + nuclear family); 150–180 sqm; parking for one car

Design Focus	• Sky garden/roof terrace as green relief in dense urban context • Natural light access to all living zones despite constraints • Universal design—ramp, wide doors, accessible bathrooms for the elderly. • Cost optimisation using a rational grid structure
Innovation Challenge	No more than 50% of the ground floor to be enclosed — design a 'breathing ground floor' that creates public-private transition.
Deliverables	Zoning analysis, plans/sections/elevations (1:50), shadow analysis drawings, accessibility diagram

3. MINOR DESIGN PROBLEM (2 Weeks)

Option	Title	Brief Description
Option A	Bus Shelter + Informal Vendor Kiosk	Design a weather-protected public amenity at a busy bus stop; integrate a vendor kiosk; use locally available materials; ensure universal access.
Option B	Village Hand-pump Pavilion	Create a covered community water-point with seating, a washing slab, and a small prayer niche; design for natural cross-ventilation and rainwater drainage.
Option C	Cycle Repair Shop + Rest Shed	A 30 sqm combined cycle-repair workspace and rest shed for roadside workers; identify the tool storage, workbench, and rest zones clearly.
Option D	Nature Interpretation Kiosk	A 20 sqm kiosk within a local park or nature trail; provide display panels, seating, and toilets; use bamboo or recycled materials.

Sessional Work: Assignments based on the above topics.
Importance should be given to sketching and communicating the design/study through effective two and three-dimensional drawings/sketches and models.
Viva-voce: Final Viva-voce on all the design assignments to be conducted at the end of the semester by experts from the field.

Reference Books:

1. C. D. Joseph and Callender John; Time Saver Standards for Building Types.
2. C. D. Joseph and Callender John; Time Saver Standards for Architectural Design Data.
3. Christopher Alexander; A Pattern Language.
4. Francis D.K. Ching; – Architecture: Form Space and Order; Van Nostrand Reinhold Co., (Canaa), 1979.
5. A George and Bruce Hannah," Access by Design", Van Nostrand Reinhold, 1996.
6. Pearce Peter; Structure in Nature – Strategy for Design.
7. Peter Fawcett A.; Architecture Design Notebook. http://www.scribd.com/doc/45018090/Architecture-Design-Notebook
8. Pickering, Ernest; Architectural Design, John Wiley and Sons Inc., Canada, 1949.
9. Marjore Elliott Bevin, "Design through Discovery", Holt Rinehart and Winton, NewYork,1977.
10. Neufert's Architect's Data.3rd Ed., Blackwell Science. 2000.
11. V.S. Paramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi – 1973.
12. Von MeissPieree; Elements of Architecture.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Seminars
Mini projects/Projects
Industrial/guest lectures
Site visits/ case study documentations

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Progressive Evaluation	√	√	√	√	√
End Sem Evaluation	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO1	PO2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	3	1	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1
CO3	3	1	1	2	1	1	1	1	1	1	1	1
CO4	2	3	2	2	1	1	1	1	1	1	1	1
CO5	3	3	3	3	2	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods

CD	Course Delivery methods	Course Outcome
CD1	Seminars	CO1, CO2, CO3,
CD2	Mini projects/Projects	CO2, CO3,
CD3	Laboratory experiments/teaching aids	CO3,
CD4	Industrial/guest lectures	CO2, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Satyaki Sarkar & Ar. Ritu Agrawal

COURSE INFORMATION SHEET

Course code: **ARP 26162**
Course title: **BUILDING CONSTRUCTION I**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L:0 T:0 P:4
Class schedule per week: 04
Class: B. Arch
Semester / Level: II
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To focus on various building materials and construction techniques both in context of past and contemporary methodology
B.	To understand different parts of a building with their functionality
C.	To understand the need for foundation and it's required design criteria
D.	To classify the different types of Doors as per various requirements in building application
E.	To classify the different types of windows and ventilators as per various requirements in building application

Course Outcomes

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

CO 1.	To understand basic load bearing building structural systems with their functionality
CO 2.	To design the various types of masonry walls, arches and foundation made up of suitable materials.
CO 3.	To decide and design the various types of doors, windows and ventilators and justify the suitability based on functional requirement and spatial context.
CO 4.	To understand the importance of waterproofing requirement at different levels and to apply waterproofing treatment at different levels
CO 5.	To analyse a design decision situation and come up with correct material choice and construction specification

Syllabus

Syllabus	**No. of Sheets**
Module I : BASIC BUILDING COMPONENTS: Development of Plan, Elevation & Section of a small building to understand different levels as foundation, plinth, flooring, sill, lintel, roof slab and parapet. Typical Building Skin Section for a Two Storied Building. Damp proof details of basement, plinth, lintel, and roof level.	03
Module II : BASICS OF BUILDING FOUNDATION: Need for foundations, preliminary design criteria. Details of brick and stone footings for load bearing walls of various thicknesses. Plinth filling details, Types of sallow foundation - Isolated, combined and raft foundations and their construction techniques.	02
Module III : BRICK MASONRY AND ARCHES: Elementary construction methods explaining basic principles of load bearing structures.	03

Types of bricks, bats and closers etc. Contemporary Building Masonry with modern sustainable building blocks English and Flemish brick bonds, stopped ends, quoins, piers, junctions, jambs for various thicknesses. Jointing, pointing and copings. Concept of span and its application in creating openings in masonry walls with lintels and arches. Elementary principles of arch construction, terminology and types of lintels, corbelling and arches with their materials for construction.	
Module IV: DOORS Types of doors based on the make (battened, ledged, braced, flush, panelled, framed and etc.) usage (pivoted, single leaf, double leaf, revolving, swing, rolling shutter, safety doors, collapsible, etc.), hardware fixtures, joinery, door-fixing details, and types of materials used in doors (wood, metal, glass, aluminium, & PVC).	02
Module V: WINDOWS & VENTILATORS Types of windows based on the make (sliding, pivot, casement, louvered, fixed, bay window, etc.) and material (wood, steel, glass and aluminium) hardware fixtures, joinery, window fixing details.	02
SITE STUDY & REPORT: different types of brick bonds in wall & Paving with sketches and some photographs, Traditional building component and Wood works	

Text books:
1.Building Construction Illustrated by Francis D. K. Ching
2.Building Construction by W B Mackay (Volume 1 and Volume 2)
3.Building Construction by B C Punmia, Ashok K. Jain and Arun K. Jain
4.Building Construction Handbook by R. Chudely

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus :NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3	CO4

Progressive Evaluation	√	√	√	√
End Sem Evaluation	√	√	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	3	1	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1
CO3	3	1	1	2	1	1	1	1	1	1	1	1
CO4	2	3	2	2	1	1	1	1	1	1	1	1
CO5	3	3	3	3	2	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	Course Delivery methods	Course Outcome
CD1	Seminars	CO1, CO2, CO3, CO4
CD2	Mini projects/Projects	CO2, CO3, CO4
CD3	Laboratory experiments/teaching aids	CO2, CO3, CO4
CD4	Industrial/guest lectures	CO2, CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Anuj Toppo

COURSE INFORMATION SHEET

Course code: **ARP 26163**
Course title: **ARCHITECTURAL GRAPHICS-II**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L:0 T:0 P:4
Class schedule per week: 04
Class: B. Arch
Semester / Level: II
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To introduce to the students the fundamentals of drawing
B.	The studio also introduces drawings and sketching skill
C.	This studio teaches the students to learn the basics of graphic design and three-dimensional composition
D.	The studio also has a direct interface with the drafting skill.

Course Outcomes

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

CO 1.	Sketch buildings and building component.
CO 2.	Understand the shading pattern of the object.
CO 3.	Control over the pencil and technical pens strokes.

Syllabus	No. of Sheets
Assignment 1: Techniques for rendering of various materials/textures	03
Brickwork, stone, plastering, timber, tiles, flooring types, floor rugs, water, rock. Drawing and rendering of miscellaneous objects. Techniques of rendering the effects of lighting, shades, shadows on primary 3D objects like cubes, spheres, cones, cylinders, pyramids in different media. *NB: All the above Rendering techniques will be done with the Pencil and Pen & Ink on Opaque paper Using variant, Line (hatch) technique, dot rendering.*	
Assignment 2:Techniques for rendering an architectural plan	03
Rendering of trees, shrubs, hedges in a plan Rendering of different earths capes (natural and manmade) in a plan. Rendering of a building plan using different materials *NB: All the above Rendering techniques will be done on Opaque and Transparent paper Using Pencil color, Oil Crayons, and their intermixing.*	
Assignment 3: Techniques of rendering an architectural elevation:	03
Human figures- proportions and styles Landscaping- Trees, plants, hedges used in elevations Different hard landscape materials (street furniture, automobiles) Rendering of a building elevation. *NB: All the above Rendering techniques will be done on Opaque and Transparent paper Using variant pencil, Pen & Ink, Pencil color, Oil Crayons, and their intermixing.*	
Assignment 4:Techniques of rendering perspective views.	03
Perspective human figures, Trees and plants, Rendering of perspective views-	

indoor and outdoor. (One point and Two Point), Concept of Computer Aided rendering techniques. *NB: All the above Rendering techniques will be done on Opaque and Transparent paper Using variant Pencil, Pen & Ink, Pencil color, Oil Crayons, and their intermixing.*	

Reference books:
Sherley W, MORGAN; *Architectural Drawing, McGraw Hill*
Arthur L. Guptill, Watson ;*Rendering in Pen and Ink,– Guptill Publications, New York*
Gill Robert, "*Rendering with pen and ink*".
Gordon Griece; *The Art of Architectural Illustration.*
John Chen *; Architecture in Pen and Ink.*
Ching, F. D. K. (1997).*Design Drawing.Hoboken : John Wiley & Sons*

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3
Progressive Evaluation	√	√	√
End Sem Evaluation	√	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course	Program Outcomes

Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	2	1	1	1	1	1	1	1
CO2	1	1	1	1	2	1	1	1	1	1	1	1
CO3	1	1	1	2	2	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	Course Delivery methods	Course Outcome
CD1	Seminars	CO1, CO2
CD2	Mini projects/Projects	CO1, CO2, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr Rajan Chandra Sinha and Dr. Shama Parween

SEMESTER 3

Second Year (3rd Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/ Week)**	**P (Periods/ Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26201	Climate Responsive Architecture - I	3	0	0	3	3	PC
ARP 26202	Contemporary Architecture	3	0	0	3	3	PC
ARP 26203	Structural Mechanics	3	0	0	3	3	PC
Non-Departmental Theory Subjects							
MT24131	Universal Human Values - II	3	0	0	3	3	FS
Program Core - Sessional Subjects							
ARP 26211	Architectural Design - III	0	0	6	9	6	PC
ARP 26212	Building Construction - II	0	0	4	3	4	PC
ARP 26213	Computer Application in Architecture	0	0	4	3	4	PC
Mandatory Course							
	Choice of NCC/NSS/PT & Games/ Creative Arts (CA)	0	0	2	1	2	MC
	Total Credit				**28**		
	Total Contact Hours					**28**	

COURSE INFORMATION SHEET

Course code: **ARP 26201**
Course title: **CLIMATE RESPONSIVE ARCHITECTURE – 1**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: III
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To acquire clear knowledge of the various climatic zones , climate factors and climatic elements and their effect on Built Environment
B.	To acquire basic knowledge of impact of behavior of various climate elements on human comfort
C.	To become well equipped with scientific background, required to design climate balanced Architecture.
D.	To analyze and cultivate the interrelationship between natural and built environment

Course Outcomes

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

CO1.	Understand the relevance of climate consideration in built environment
CO2.	Apply relevant technologies to moderate the behavior of climatic elements to take advantage and save energy.
CO3.	Understand and apply the tools & technologies required to implement in buildings to make the built environment comfortable
CO4.	Designing Climate responsive Architecture

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction t o Climatology**	Climate and Weather, Global Climate classification Climate zones of India, Site Climate, Macro & micro climate Factors Effecting Climate, Elements of Climate and their effect on Built Environment.	8
Module 2	**Bio-Climatic Approach**	Comfort Conditions, Thermal Comfort Factors, Bioclimatic Requirements, Comfort Zone & Bio-Climatic Chart Relation of climatic elements to comfort.	8
Module 3	**Sun & Building Design**	Thermal and Visual Comfort Thermal insulation and Basic Principles of Heat Transfer, Thermal performance of Building elements	8

		Sunpath Diagram, Solar Control & Sun Shading Devices Daylighting & Daylight Factor Building Orientation and Building Configuration	
Module 4	**Wind & Building Design**	Function of natural ventilation Wind effect and airflow pattern Wind break and Wind Rose Diagram, Air movement around the buildings, Ventilation Techniques-Stack Effect & Venturi Effects, Wind Effect on siting of buildings	8
Module 5	**Climate Responsive Architecture**	Classification & Characteristics of Tropical Climate, Shelter for warm-humid climates, Shelter for hot-dry climates, Shelter for composite climate Climate Responsive Landscaping	8

Reference books:

1. Narashimhan; An Introduction to Building Physics.
2. O.H. Koenigsberger and others, Manual of Tropical Housing and Building – Part I – Climatic Design, Longmans , 1980.
3. M.Evans- Houising Climate & Comfort – Architectural Press, Londan, 1980.
4. B. Givoni, Man, Climate and Architecture, Applied Science, Banking Essex, 1992.

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery methods (Select whichever is required)
Lecture by use of boards/LCD projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure
Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (2 nos 10 marks each)	20
Assignment	5

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√

Quiz (2 nos 10 marks each)	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
1	3	3		2	3	2	1	1	1	2	1	3
2	3	3		2	3	2	1	1	1	2	1	3
3	3	3		2	3	2	2	1	1	3	1	3
4	3	3		2	3	2	2	1	1	3	1	3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Manjari Chakraborty

COURSE INFORMATION SHEET

Course code: **ARP 26202**
Course title: **CONTEMPORARY ARCHITECTURE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 3
Class: B.Arch
Semester / Level: III
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand and evaluate significant developments in Modernist, Post- Modernist, and contemporary architecture around the world and in the Indian sub-continent
B.	To analyze the contributing factors that led to the development of different architectural styles.
C.	To understand the various design philosophies of post-independence and contemporary architecture in Indian context.
D.	To orient students for greater understanding of trends in contemporary architecture and enable them design buildings in accordance with various architectural styles.

Course Outcomes

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

CO1.	Understand the underlying reasons that led to contemporary developments and evolution of innovative architectural forms and designs.
CO2.	Appreciate historical sources and identify the precursors of Modernism and evolution of Contemporary Architecture.
CO3.	Identify the impacts of contemporary architectural developments and its impact on built form, structure and construction methods
CO4.	Build their perspective towards various Architectural Styles and provide an insight of how various strands of modernism and modern architecture developed

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Industrial Revolution and the Advent of Steel, Glass and Ferro-concrete**	Cast Iron and Glass Construction contribution of Henry Labrouste International Exhibitions of 1851 & 1889 Development of Ferro concrete: contribution of Auguste Perret	8
Module 2	**Precursors of Modern Architecture [Development of Ornamentation, Neo-Classicist**	Revival and Skyscrapers] Art Deco and Le Art Nouveau movement H.P. Berlage and 'True Construction' Chicago School: Louis Sullivan Organic, Usonian and Prairie Style: Frank Lloyd Wright.	8
Module 3	**Programmatic Functionalism and Development of International Style**	Walter Gropius and Bauhaus. Le Corbusier Mies van der Rohe	8

Module 4	**20th Century World Architecture**	Early Modern Architecture (Cubism, Constructivism) Philip Johnson, Louis I Kahn, Oscar Niemeyer Late Modern Architecture (Post modernism and International Style, Neo- Futuristic) Zaha Hadid, Norman Foster, Frank O. Gehry, I. M. Pei, Rem Koolhaas, Robert Venturi, Renzo Piano.	8
Module 5	**Study of works done by the pioneers in Indian Architecture since Independence**	Architecture in Colonial India; Indian architecture since independence Works of Master Architects: B. V. Doshi, Charles Correa, Raj Rewal, A. P. Kanvinde, Laurie Baker	8

Text books:

1. G. H. R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Change, and the Politics of Style since 1850', Yale University Press, 1989.
2. Kenneth Frampton, 'Modern Architecture: A Critical History', Oxford University Press, 2016.
3. Leonardo Benevolo, 'History of Modern Architecture Vol 1 and 2', Reprint, MIT Press, 1977.
4. Manfredo Tafuri, 'Modern Architecture', Rizzoli Publications,1991.
5. Miki Desai et. al., 'Architecture and Independence: The Search for Identity- India 1880 to 1980', Oxford University Press, 2000.
6. Space, Time and Architecture (The Charles Eliot Norton Lectures), Harvard University Press, 2008; ISBN-13 978-0674030473
7. William J. Curtis, 'Modern Architecture since 1900', Prentice-Hall, Inc., New Jersey, 2006

Reference books:

1. Ballard B. and Rank, V.P., “Materials for Architectural Design”, Laurance King. 2006
2. Bahga, S.S: Post Independent Architecture Bhatt, Vikram and Scriver, Peter. Contemporary Indian Architecture After the Masters. Mapin Pub. Pvt. Ltd., Ahmedabad, 1990.
3. Curtis, J.R. William. Modern Architecture since 1900.
4. Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash, 'A Global History of Architecture', John Wiley and Sons, 2017
5. Gossel. P., “Architecture in the 20th Century”, Vol.1 & 2, Taschen. 2005
6. Architecture in the Twentieth Century by Peter Gössel and Gabriele Leuthäuser, Taschen, 2001.
7. Jencks, Charles.The Language of Post-Modern Architecture, 4th ed. Academy Editions, London, 1984.
8. A History of Architecture by Sir Banister Fletcher, CBS Publisher, 1999.
9. The Details of Modern Architecture (Volume 1) by Edward R. Ford, The MIT Press, 2003.
10. Twentieth Century Architecture: A Visual History by Dennis Sharp, Images Publishing, 2006.
11. Architecture and Independence: The Search for Identity--India 1880 to 1980 by Jon Lang, Madhavi Desai and Miki Desai, Oxford University Press, 1998.
12. History of Architecture: From Classic to Contemporary by Barbara Borngasser, ParragonInc; Reprint edition, 2010.
13. Housing and Urbanisation: Building Ideas for People and Cities by Charles Correa, Thames & Hudson Ltd., 2000.
14. Bhatt, Vikram and Scriver, Peter. Contemporary Indian Architecture After the Masters. Mapin Pub. Pvt. Ltd., Ahmedabad, 1990.
15. Jencks, Charles.The Language of Post-Modern Architecture, 4th ed. Academy Editions, London, 1984

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Quiz I	✓	✓		
Quiz II			✓	✓
Mid-Semester Examination	✓	✓	✓	✓
End Sem Examination	✓	✓	✓	✓
Assignment			✓	✓

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
CO 1	3	3		2	3	2	1	1	1	2	1	3
CO 2	3	3		2	3	2	1	1	1	2	1	3
CO 3	3	3		2	3	2	2	1	1	3	1	3
CO 4	3	3		2	3	2	2	1	1	3	1	3

Mapping Between COs and Course Delivery (CD) methods			
CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	
CD3	Seminars	CO1, CO2, CO3, CO4	
CD4	Mini projects/Projects		
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures	CO3, CO4	
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Smriti Mishra

COURSE INFORMATION SHEET

Course code: **ARP 26203**
Course title: **STRUCTURAL MECHANICS**
Pre-requisite(s): AR 153 Statics and Strength of Materials
Co- requisite(s): NIL
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: III
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To develop an understanding of stress–strain behavior in structural elements.
B.	Apply the principles of bending and shear to determine stresses in beams and other structural elements.
C.	To apply bending and deflection theories for predicting the structural response of beam elements.
D.	To assess the structural performance and stability of columns using analytical approaches.

Course Outcomes

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

CO1.	Understand the basic Strength of Materials theorems and to apply the concept in structural problems
CO2.	Analyse different structural bodies viz. beam, frame, and column
CO3.	Evaluate the influence of various geometric and loading parameters of structural bodies
CO4.	Compare the results obtained from bending theory of beam and strain energy method of structural problems
CO5	Create new ideas in the field of structural mechanics

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Two-dimensional stress and strain**	Introduction to Stress and Strain, State of Stress at a point, Plane stress, Bi-axial state of stress at a point, Complementary shear, Principal stresses, Graphical representation of stresses (Mohr's Circle), Plane strain, principal strains, Graphical representation of state of strain, Strain rosettes.	8
Module 2	**Stresses in Beams**	Pure Bending, Theory, assumptions and equation of bending, Concept of Sectional modulus, Distribution of bending stress in beam cross-section, Assumptions and equation of shear in beam section, Distribution of shear stress in beam cross-section. Representation of state of stress at a point for a beam in bending or shear.	8
Module 3	**Deflection of Beams**	Differential equation of elastic curve of beams, Deflection of beams (due to bending only) by double integration, Macaulay's, and moment-area method – applications to simply supported, cantilever and overhanging beams.	8

Module 4	**Energy Methods**	Strain energy due to axial and bending load, Castigliano's First theorem - applications to find the deflection of beams and statically determinate trusses.	8
Module 5	**Columns**	Buckling and stability of columns, Euler's theory of column for different support conditions, Effective lengths, slenderness ratio, Rankine's formula.	8

Text books:

1. J. M. Gere and S. P. Timoshenko, *Mechanics of Materials*, Springer-Science+Business Media, B.V.
2. S. S. Rattan, Strength of Materials, Tata McGraw-Hill Publishers.

Reference books:

1. S. Ramamurtham, *Strength of Materials*, DhanpatRai Publications
2. S. S. Rattan, *Strength of Materials,* Tata McGraw-Hill Publishers.
3. G. H. Ryder, *Strength of Materials,*Macmillan Publishers India Limited

Gaps in the syllabus (to meet Industry/Profession requirements): Torsion of circular shafts

POs met through Gaps in the Syllabus : PO1, PO2, and PO4

Topics beyond syllabus/Advanced topics/Design : Stress-strain behaviour of materials using tensorial approach.

POs met through Topics beyond syllabus/Advanced topics/Design : PO1, PO2, and PO4

Course Delivery methods	
Lecture by use of boards/LCD projectors/OHP projectors	√
Tutorials/Assignments	√
Seminars	
Mini projects/Projects	√
Laboratory experiments/teaching aids	
Industrial/guest lectures	
Industrial visits/in-plant training	
Self- learning such as use of NPTEL materials and internets	√
Simulation	

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Quiz I	√				
Quiz II					√
Mid-Semester Examination	√	√	√		

End Sem Examination	√	√	√	√	√
Assignment	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO 10	PO 11	PO 12
CO 1	3	2	1	2	2	-	-	1	-	-	-	1
CO 2	3	3	2	1	2	1	-	1	-	-	-	1
CO 3	3	3	2	2	2	1	-	1	1	-	-	1
CO 4	3	3	2	2	1	-	-	1	1	1	-	2
CO 5	3	3	3	2	1	1	-	1	1	1	-	2

Mapping Between COs and Course Delivery (CD) methods			
CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1-5	CD1
CD2	Tutorials/Assignments	CO1-5	CD2

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Dr. Arkadeb Mukhopadhyay

COURSE INFORMATION SHEET

Course code: **ARP 26211**
Course title: **ARCHITECTURAL DESIGN-III**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 9 L: 0 T:0 P: 6
Class schedule per week: 06
Class: B. Arch
Semester / Level: III
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To Develop a comprehensive understanding of residential design principles, spatial organization, and functional relationships.
B	To Explore the complexity of multi-functional and multi-cellular built environments
C.	To Integrate user needs, site context, and climatic considerations into architectural design, and use of Bubble diagrams and Flow charts to start the design process
D.	To comprehend relationship between design, visual arts, building construction, building materials, structure etc and evolve a design solution.
E.	To interpret climatic data to formulate design approaches & strengthen conceptual thinking, design development, and graphical representation techniques.

Course Outcomes

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

1.	To design a small residential & simple multi-functional building addressing functional, environmental, and user-specific requirements.
2.	To apply principles of zoning, circulation, and spatial hierarchy in architectural design.
3.	To analyse and respond to site conditions and contextual factors in design solutions.
4.	To exhibit improved critical thinking and problem-solving skills in architectural design projects.

Syllabus

MAJOR DESIGN PROBLEM (10 Weeks)
Duration: 10 Weeks | Individual Work

Option A: Neighbourhood Community Centre — Peri-Urban Village	
Site Context	Gently sloping site (1:20) at the edge of a growing village
Programme	Multipurpose hall (150 persons), library and reading room, digital literacy room, self-help group workshop space, toilets, small canteen;
Design Focus	Green building — passive cooling using traditional chhajjas, jaalis, and earth berms Accessible design from approach road to all spaces Phased construction possibility — design so Phase 1 alone is functional Landscape: open-air amphi space, community garden
Innovation	Roof as a productive surface — design a combined solar and green roof that

Challenge	supplies energy and food for the building.
Deliverables	Detailed site analysis, functional zoning, plans/sections/elevations (1:100), landscape plan, green building strategy note, perspective
Option B: Primary Health Centre	
Site Context	Flat to mildly sloped site in a village, surrounded by farmland — site approx. 60m x 40m
Programme	OPD rooms (6), waiting area (60 persons), minor surgery room, pharmacy, laboratory, doctor's residence, toilets (separate for staff/patients), ambulance bay; 700–800 sqm
Design Focus	Infection control through natural ventilation and spatial segregation Barrier-free design — all functions accessible without steps Low-maintenance materials suited to rural context Solar water heater and gravity-fed water supply
Innovation Challenge	Design the building so that the verandah and courtyard serve as overflow treatment space during disease outbreaks — a pandemic-resilient PHC.
Deliverables	Functional bubble diagrams, infection-control circulation diagram, plans/sections/elevations (1:100), material board
Option C: Craft Resource and Training Centre — Artisan Colony	
Site Context	Contoured terraced site adjacent to an existing artisan cluster
Programme	Training workshops (4 craft types), display and retail gallery, office, storage, residential hostel for 20 trainees, canteen; 800–900 sqm total
Design Focus	Working with contours — terraced planning with retaining walls Natural ventilation and daylighting in workshop spaces Indigenous materials — brick, bamboo, terracotta tile Display and retail design as curated spatial experience
Innovation Challenge	The gallery must be designed as a 'living exhibition' — spaces transform between workshop (day) and gallery (evening/weekend).
Deliverables	Context study, phasing plan, plans/sections/elevations (1:100), workshop lighting study, perspective
Option D: Government Primary School — New Construction	
Site Context	Flat site (60m x 60m) at edge of town — two large trees on site to be retained
Programme	12 classrooms, library, science lab, computer lab, principal's office, staff rooms, toilets (boys/girls/differently-abled), multipurpose hall, open play court; 1,000–1,200 sqm
Design Focus	Child-centric design — scale, colour, legible wayfinding Daylighting to all classrooms — north-light preferred Universal accessibility throughout Biophilic design — integrate trees, water features, gardens into learning zones
Innovation Challenge	Every classroom must have a direct visual and physical connection to outdoor learning. The 'corridor' is reimagined as a learning street.
Deliverables	Contextual analysis, detailed programme, plans/sections/elevations (1:100),

	section-perspective of key space, accessibility compliance diagram

VERTICAL STUDIO/ MINOR DESIGN PROBLEM (2 Weeks)

Option	Title	Brief Description
Option A	**Temple Pavilion and Forecourt Redesign**	Redesign the approach and forecourt of a local temple to improve crowd management, accessibility, and shade; design a ritual pavilion for 50 persons.
Option B	**Farmers' Market Shed**	A covered weekly market structure for 30 vendors; design for disassembly; emphasize natural ventilation and water management.
Option C	**Sports Pavilion for School**	A changing room + equipment storage + spectator shed for a school sports field; 80 sqm; all-natural ventilation; universal access.
Option D	**Community Toilet Block**	Design a 100 sqm public toilet block for a town market area; include biogas facility; accessible; designed to reduce vandalism and enhance dignity.

Viva voce
Final Viva-vice on all the design assignments to be conducted at the end of the semester

Reference books:
1.National Building Code of India, Vol.1-5,2005.
2.Joseph De Chiara, Michael J. Crosbie, "Time Savers Standards for Building Types", McGraw-Hill Professional 2001.
3. Ernst Neuferts, "Architects Data", Blackwell, 2002.
4. Daniel Williams, "Sustainable Design: Ecology, Architecture & Planning", John Wiley & sons Inc, NJ, 2007.
5. The American Institute of Architects , Architectural Graphic Standards
6. Local building byelaws corresponding to the site.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods (Select whichever is required)
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Site visit

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2
Progressive Evaluation	√	√
End Sem Evaluation	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping Between COs and Course Delivery (CD) methods		
CD	Course Delivery methods	Course Outcome
CD1	Seminars	CO1, CO2.
CD2	Mini projects/Projects	CO2.
CD3	Laboratory experiments/teaching aids	CO1,CO2.
CD4	Industrial/guest lectures	CO2.

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	1	1	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	1	1	1	1	1	1	1
CO3	3	1	1	2	1	1	1	1	1	1	1	1
CO4	2	3	2	2	1	1	1	1	1	1	1	1

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Manjari Chakraborty & Ar. Ashutosh Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26212**
Course title: **BUILDING CONSTRUCTION – II**
Pre-requisite(s): Building Construction I
Co- requisite(s): Architectural Design Studio – III
Credits: 03 L:0 T:0 P:4
Class schedule per week: 04
Class: B.Arch
Semester / Level: III
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand advanced building components including deep foundations and structural systems
B.	To develop knowledge of flooring, roofing, and staircase construction
C.	To introduce RCC construction basics and building services integration
D.	To understand modern construction systems and materials used in practice

Course Outcomes

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

CO1.	Identify and explain deep foundation systems and basement construction
CO2.	Apply construction details of floors, roofs, and staircases
CO3.	Understand RCC structural systems and integration of building services
CO4.	Recognize modern construction techniques and prepare detailed construction drawings

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Deep Foundations & Basements**	Pile, caisson, raft foundations Basement construction Retaining walls Waterproofing, ventilation, drainage	8
Module 2	**RCC Structural Systems**	Beams, slabs, columns (conceptual) Types of slabs (one-way, two-way) Reinforcement basics (intro) Formwork and shuttering	8
Module 3	**Floors & Roof Systems**	Flooring: tiles, stone, concrete, wood, special floors Methods of laying Roofs: flat (RCC), sloping roofs, trusses Waterproofing systems Rainwater drainage Basic insulation concepts	16
Module 4	**Vertical Circulation & Openings**	Staircases: types, proportions, RCC detailing Handrails and balustrades Advanced doors: sliding, folding, revolving Windows: aluminum/uPVC Introduction to façade systems (curtain wall concept)	12
Module 5	**Modern**	Precast construction	8

	Construction Systems & Site Documentation	Modular construction Dry construction (gypsum partitions) Introduction to steel structures Site visits (stage-based) Construction documentation report	

Text books:

1. W.B. McKay – Building Construction Vol. 1–4
2. Francis D.K. Ching – Building Construction Illustrated
3. Roy Chudley – Construction Technology
4. B.C. Punmia – Building Construction

Reference books:

1. Bufer – Architects' Data
2. Time Saver Standards
3. IS Codes (RCC, foundations, roofing)
4. BMTPC & CPWD Manuals

Gaps in the syllabus (to meet Industry/Profession requirements) : Limited exposure to advanced, BIM-integrated construction**,** Limited structural analysis understanding

POs met through Gaps in the Syllabus: 5,6,7,8

Topics beyond syllabus/Advanced topics/Design : Green building construction techniques**,** Smart materials and facade systems

POs met through Topics beyond syllabus/Advanced topics/Design: 3,4,7

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Lab Quiz-1	✓	✓		
Lab Quiz-2		✓	✓	
Lab Viva	✓	✓	✓	✓

Day-to-Day Progressive Evaluation	✓	✓		✓
End-Sem Performance	✓	✓	✓	✓

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO1 0	PO 11	PO12
CO1	3	3	1	1	1	2	1	1	1	1	1	1
CO2	3	2	1	1	1	2	1	1	1	1	1	1
CO3	2	1	1	2	1	2	1	1	1	1	1	1
CO4	2	2	3	3	2	1	3	1	1	1	1	1

CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO2, CO4
CD3	Seminars	CO3, CO4
CD4	Mini projects/Projects	CO2, CO3, CO4
CD5	Laboratory experiments/teaching aids	CO1, CO2
CD6	Industrial/guest lectures	CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Prashant Prasad & Ar. Anjali Pathak

COURSE INFORMATION SHEET

Course code: **ARP 26213**
Course title: **COMPUTER APPLICATIONS IN ARCHITECTURE (CAA)**
Pre-requisite(s): Basic Architectural Drawing
Co- requisite(s): Architectural Design Studio – II
Credits: 03 L:1 T:0 P:3
Class schedule per week: 4
Class: B.Arch
Semester / Level: III
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand digital drafting and representation techniques in architecture
B.	To develop skills in 2D drafting and basic 3D modelling
C.	To introduce concepts of parametric modelling and Building Information Modelling (BIM)
D.	To develop visualization and digital presentation skills for architectural communication

Course Outcomes

After the completion of this course, students will be:

CO1.	Able to prepare architectural drawings using CAD tools with proper standards
CO2.	Capable of applying spatial and geometric principles in basic 3D modelling (CO2)
CO3.	Able to understand and apply basic BIM concepts such as parametric modelling (CO3)
CO4.	Able to create simple visualizations and presentations for architectural communication (CO4)

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Digital Drafting Fundamentals**	Introduction to CAD environment; drawing and modification tools; layers and object properties; text, dimensioning and annotation; blocks and references; layouts, viewports and plotting.	8
Module 2	**2D to 3D Transition & Spatial Modelling**	Coordinate systems; basic 3D operations (extrude, revolve); transformations; boolean operations; understanding volumes and surfaces.	8
Module 3	**Introduction to BIM**	CAD vs BIM; parametric modelling concepts; families, types and instances; basic building modelling (walls, floors, openings); introduction to schedules and data integration.	16
Module 4	**Conceptual Modelling & Visualization**	Quick 3D modelling; materials and textures; scene creation; basic rendering; walkthrough concepts.	12
Module 5	**Digital Presentation & Post-Processing**	Introduction to image editing; layering and composition; integration of drawings and models for presentation.	8

Text books:

Sham Tickoo, AutoCAD for Engineers and Designers
Eddy Krygiel & Brad Nies, Green BIM: Successful Sustainable Design with BIM
Daniel Tal, SketchUp for Site Design

Reference books:
Neufert, Architects' Data
Time Saver Standards for Architectural Design, McGraw-Hill
Autodesk Revit Official Tutorials
Publications by Autodesk and Trimble (SketchUp)

Gaps in the syllabus (to meet Industry/Profession requirements): Limited exposure to advanced BIM workflows**,** No deep coverage of rendering engines (V-Ray, Lumion, etc.)**,** Lack of collaborative BIM environment exposure

POs met through Gaps in the Syllabus: **6, 7, 11, 12**

Topics beyond syllabus/Advanced topics/Design : Introduction to parametric design tools, Interoperability between CAD–BIM–Visualization tools, Concept of Digital Twin and Smart Modelling

POs met through Topics beyond syllabus/Advanced topics/Design: 3,4,6,7

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Mini projects/Projects
Laboratory experiments/teaching aids

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Lab Quiz-1	✓		✓	
Lab Quiz-2		✓	✓	
Lab Viva	✓	✓	✓	✓
Day-to-Day Progressive Evaluation	✓	✓		✓
End-Sem Performance	✓	✓	✓	✓

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO 12
CO 1	3	1	3	1	1	2	1	1	1	1	1	1
CO 2	2	3	2	1	1	2	1	1	1	1	1	1
CO 3	1	2	3	2	1	3	2	1	1	1	1	1
CO 4	1	1	2	3	1	2	2	1	1	2	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	Course Delivery methods	Course Outcome
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO1, CO2, CO4
CD3	Seminars	
CD4	Mini projects/Projects	CO2, CO3, CO4
CD5	Laboratory experiments/teaching aids	CO1, CO2
CD6	Industrial/guest lectures	
CD7	Industrial visits/in-plant training	
CD8	Self- learning such as use of NPTEL materials and internets	
CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Prashant Prasad

SEMESTER 4

Second Year (4th Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/ Week)**	**P (Periods/ Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26251	Building Services - I (Water Supply and Sanitation)	3	0	0	3	3	PC
ARP 26252	Landscape Design	3	0	0	3	3	PC
Open Elective							
MCARPXXXX (For MOOC)	OPEN ELECTIVE I /MOOC	3	0	0	3	3	OE
Program Core - Sessional Subjects							
ARP 26261	Architectural Design - IV & Measured Drawing	0	0	6	9	6	PC
ARP 26262	Building Construction - III	0	0	4	3	4	PC
ARP 26263	Building Information Modelling & Generative AI	0	0	4	3	4	PC
Non-Departmental Sessional Subjects							
CE 24212	Surveying Field Work	0	0	4	2	4	Other Dept L/S
Mandatory Course							
	Choice of NCC/NSS/PT & Games/ Creative Arts (CA)	0	0	2	1	2	MC
	Indian Knowledge System	2	0	0	0	2	MC
	Total Credit				**27**		
	Total Contact Hours					**31**	

COURSE INFORMATION SHEET

Course code: ARP 26251
Course title: BUILDING SERVICES I- Water Supply and Sanitation
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: IV
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To identify the different sources of water, list them and describe the method of intake.
B.	To identify the various methods of water purification and water distribution networks.
C.	To explain the various water supply appurtenances required for the distribution networks
D.	To explain the various sanitation system in Indian context and their functioning process
E	To design water storage tank, septic tank and soak pit
F	To prepare plumbing layout drawings for water supply and sanitation for buildings

Course Outcomes

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

CO1.	Identify of the various sources of water supply and the intake methods
CO2.	Understand the water treatment processes for different types of water
CO3.	Understand the waste water treatment processes and the functioning of various sewer appurtenances
CO4.	Design the water reservoir, septic tanks and soak pits
CO5.	Prepare plumbing layout drawings for water supply and sanitation for buildings

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Water Supply System**	Overview of water supply, sources, water quality standards, and treatment. Characteristics of potable water and estimation of domestic demand, overhead and underground tanks. Basics of water distribution systems, networks, pipe appurtenances, pumps, and pumping plants. Building water supply components such as service connections, ferrules, and water meters. Layout of domestic piping systems with joints, fittings, and valves. Cold and hot water supply in buildings, and water supply systems for high-rise buildings with associated challenges and solutions	8
Module 2	**Building Sanitation**	Principles of sanitation and methods for collection and disposal of building refuse. Overview of refuse handling systems and their working principles. Basic plumbing terms and systems (one-pipe, two-pipe). House drainage and sub-soil drainage systems. Components such as inspection chambers, manholes,	8

		sub-drains, culverts, gutters, and catch basins. Drainage for roads and pavements, including stormwater overflows and regulators.	
Module 3	**Plumbing and Sanitary Appliances**	Basic principles of Plumbing, need, scope, terminology. Specifications and installation of sanitary fittings like wash basins, water closets, urinals, bidets, sinks, etc in buildings. Uses of gate valve, float valve, flap valve, ball valve, flush valve, etc, different types of taps, faucets, stop cocks, bib cocks, 'P', 'Q', 'S', floor/bottle traps used in buildings.	16
Module 4	**Design of Plumbing Systems**	Design considerations on drainage scheme. Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storeyed buildings. Preparation of plumbing drawings, symbols commonly used in these drawings.	12
Module 5	**Sanitary Conveyance and Sewage Disposal**	Overview of Indian standards and byelaws for sanitary systems. Methods of sewage disposal from isolated buildings and recommended gradients for drains and sewers of various sizes. Design and capacity calculation of septic tanks, along with basics of sewage treatment. Use of pumps in sanitation systems, introduction to biogas, and methods of waste disposal without water carriage, including rural sanitation practices.	8

Text books:

1.AFE Wise, JA Swaffied Water, Sanitary & Waste Services in buildings, V Edition, Mitchell Publishing, Co. Ltd., 2002.
2.B.C Punmia., "WasteWater Engineering", Laxmi Publications, 2009.
3.S.J Arceivala., "WasteWaterTreatment for Pollution Control",Tata McGraw Hill, 2008.
4. S.C.Rangwala, "Water supply and sanitary engineering", Chartar publishing house, Anand, 2016.

Reference books:

1. National Building Code of India, 2016.
2. Manual of water supply and treatment, Second edition, CPHEEO, Ministry of works and housing, New Delhi, 1977

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Compoents	CO1	CO2	CO3	CO4	CO5
Mid Sem Examination Marks	√	√	√	√	√
End Sem Examination Marks	√	√	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√	√	√
Assignment	√	√	√	√	√

Indirect Assessment –

1.Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1
CO4	3	2	1	2	1	1	1	1	1	1	1	1
CO5	3	3	3	3	3	3	3	1	1	2	1	3

Mapping Between Cos and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Seminars	CO1,CO2,CO3,CO4,CO5
CD2	Mini projects/Projects	CO3,CO4,
CD3	Laboratory experiments/teaching aids	CO3,
CD4	Industrial/guest lectures	CO2,CO3
CD5	Laboratory experiments/teaching aids	CO1,CO2,CO3,
CD6	Industrial/guest lectures	CO1,CO2,CO3, CO4,CO5
CD7	Industrial visits/in-plant training	CO1,CO2,CO4
CD8	Self- learning such as use of NPTEL materials and internets	CO1,CO2,CO3, CO4,CO5

CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Bimal Chandra Roy

COURSE INFORMATION SHEET

Course code: **ARP 26252**
Course title: **LANDSCAPE DESIGN**
Pre-requisite(s): None
Co-requisite(s): None
Credits: 03 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: IV
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A	To understand the relationship between the environment, human interventions, and their resultant impacts, along with various measures of environmental protection.
B	To define the site planning process, identify its basic principles, and enumerate them systematically.
C	To classify historical gardens across cultures and identify their distinctive characteristics.
D	To illustrate the different processes of site study and their application in landscape and architectural design.
E	To classify natural and man-made landscape elements, list them, identify their uses, and infer their appropriate application in design practice.

Course Outcomes

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

CO 1.	Enhance their conceptual understanding, ideas, and techniques prevalent in landscape architecture.
CO 2.	Develop proficiency in various site analysis and planning techniques, thereby strengthening their competence in Architectural Design and Landscape Design (Sessional).
CO 3.	Build a critical understanding of the design processes employed in landscape architectural practice.

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Natural Elements of Landscape**	Landforms: soil dynamics, rock, water, and vegetation. Plant types, characteristics, structure, and colour. Climate and its role in landscape design. Environmental Degradation and its implications for landscape planning.	8
Module 2	**Manmade Elements of Landscape**	Hard and soft landscaping; garden furniture, lighting fixtures, signage and sign boards, fences, garden hardware, and surface treatment; paving materials; surface drainage; artworks; planters; garden shelters; artificial rocks, plants, and waterfalls.	8
Module 3	**Introduction to Site Analysis and Site Planning Process**	Site Analysis: Comprehensive site study and analysis of all natural and man-made factors, including site topography and slope, soil conditions, hydrology and drainage, vegetation, climate, and visual analysis. Site Planning Process: Need, definition, scope, and the	16

		relationship between Site Planning and Landscape Architecture. Basic principles of landscape design	
Module 4	**Evolution of Garden Design and Modern Gardens**	Origin of the concept of garden. A brief study of different garden types: Egyptian, Mesopotamian, Persian, Mughal Gardens, Indian Vedic Gardens, Japanese Gardens, Chinese Gardens, French Gardens, Renaissance Gardens, and English Gardens. Modern Gardens: Rock garden, terrace garden, indoor garden, and other contemporary approaches to landscape.	12
Module 5	**Guidelines for Different Landscape Situations, Safety and Security Features of Neighbourhoods**	Passive and Active Recreation Spaces and Safety. Circulation and Aesthetics in Residential Parks and Tot Lots.	8

Text Books:

1. Charles W. Harris & Nicholas T. Dines; Time Saver Standards for Landscape Architecture.
2. Kevin Lynch; Site Planning; MIT Press, Cambridge, MA – 1967.
3. J. O. Simonds; Landscape Architecture; McGraw Hill.
4. J. E. Ingels; Landscaping – Principles and Practice.
5. P. Walker, Theodore D; Planting Design.

Reference Books:

1. Bose, T.K. and Chowdhury, B., "Tropical Garden Plants in Colour", Allied Publishers.
2. Black & Decker, "Landscape Design & Construction", Creative Publishing International.
3. Thompson, W. and Sorvig, K., "Sustainable Landscape Construction: A Guide to Green", Island Press.

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery Methods

CD	Course Delivery Methods
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Self-learning such as use of NPTEL materials and internet

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure
Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Components	**CO1**	**CO2**	**CO3**
Mid Sem Examination Marks	√	√	√
End Sem Examination Marks	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√
Assignment	√	√	√

Indirect Assessment
- Student Feedback on Faculty
- Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcome
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO1, CO3
CD4	Self-learning such as use of NPTEL materials and internet	CO1, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Apurv Ashish

COURSE INFORMATION SHEET

Course code: **ARP 26261**
Course title: **ARCHITECTURAL DESIGN - IV & ACADEMIC TRIP**
Pre-requisite(s): Candidate should have cleared AR 111 Arch. Design-I, AR 161 Arch Design-II and AR 211 Arch Design-III
Co- requisite(s): NIL
Credits: 09 L: 0 T: 0 P: 6
Class schedule per week: 06
Class: B.Arch
Semester / Level: IV
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	Develop the ability to critically interpret and apply development control regulations – such as FAR, ground coverage, setbacks, as prescribed by Byelaws and translate them into spatial decisions.
B.	Analyse space to derive from user count and activity based on the area statement and perform functional space zoning.
C.	Develop the ability to derive spatial planning responsive to the environment, and a structural system that incorporates functionality and an efficient built form.
D.	Equip students to synthesise form, function, and structural knowledge by integrating aesthetic expression with functional efficiency, and applying learning from previous core subjects.

Course Outcomes

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

CO 1.	Interpret and apply development control regulations (e.g., FAR, ground coverage, setbacks, parking norms) from municipal byelaws and the National Building Code of India to generate legally compliant design proposals.
CO 2.	Calculate user-based spatial requirements, prepare detailed area statements, and translate them into efficient functional zoning diagrams that reflect appropriate spatial hierarchy and relationships.
CO 3.	Design architectural layouts that ensure adequate natural light and ventilation, while integrating suitable structural systems (column-beam, load bearing) and exploring large-span solutions (e.g., waffle slabs) in building design.
CO 4.	Synthesise knowledge through drawings: site plans, floor plans, elevations, sections, etc. with models and views

Syllabus

MAJOR DESIGN PROBLEM (10 Weeks)

Individual Work + Group Site Survey

Option A: Eco-Tourism Resort

Site Context	Heavily contoured forested site (1.5 acres) with; site slopes 1:8; stream runs along one edge
Programme	12 eco-cottages, reception+lounge, dining and kitchen, nature interpretation centre, yoga pavilion, bonfire zone, staff housing, parking; 1,500–1,800 sqm built
Design Focus	• Zero-harm site development — no tree removal; cottages respond to topography • On-site water treatment and composting • Net-zero energy aspiration — solar, biogas, natural cooling • Landscape design: endemic planting, stone-edge pathways, sensory trail
Innovation Challenge	Each cottage must be uniquely positioned relative to the landscape — no two cottages to have identical orientation, form, or view.
Deliverables	Master site plan (1:200), site section (1:200), cottage plans/elevations (1:50), landscape concept plan, environmental strategy
Option B: Roadside Dhaba and Truck Drivers' Rest Stop	
Site Context	Flat highway plot (120m x 60m)
Programme	Dining (120 covers), sleeping dormitory (30 beds), bathing/toilet facilities, prayer room, mechanic bay, fuel station forecourt, vegetable garden; 1,200–1,500 sqm
Design Focus	• Cost-effective RCC + steel construction • Climate response for hot conditions — shading, cross-ventilation • Dignified design for working class users (challenging stereotypes of roadside infrastructure) • Landscape and greenery as visual relief and thermal comfort
Innovation Challenge	Design a 'vegetable garden' that supplies fresh produce to the dhaba — fully integrated into the design as a landscape and productive element.
Deliverables	Site and landscape plan (1:200), building plans/elevations/sections (1:100), perspective, user flow diagram
Option C: River Front Cultural Park Pavilion	
Site Context	Sloped river bank site (2 acres), mildly undulating, flood-sensitive edge — design must account for 1:25 year flood level
Programme	Amphitheatre (500 persons), riverside café, visitor pavilion, boating jetty, public toilets, children's play zone, walkways; 60% open, 40% built

Design Focus	• Flood-resilient architecture — raised plinths, permeable surfaces • Landscape-driven design — building as landform • Accessibility across entire site • Ecological edge design — riparian planting, no hard edges at water
Innovation Challenge	The amphitheatre must function as public seating, outdoor classroom, and flood escape route simultaneously.
Deliverables	Master plan (1:200), sections through river bank, flood strategy diagram, amphitheatre design (1:100), perspective
Option D: Youth Hostel + Adventure Activity Centre	
Site Context	Rocky contoured site (site: 80m x 60m, sloped site)
Programme	Dormitories (40 beds in 4 dorms), dining, kitchen, rock-climbing wall, equipment room, briefing hall, first-aid room, warden's flat; 1,200–1,400 sqm
Design Focus	• Structural response to rocky terrain — minimal excavation; buildings anchor to rock • Adventure aesthetic without superficiality — raw concrete, stone, timber • Energy-efficient lighting design for adventure sports use • Water recycling and compost toilets
Innovation Challenge	Incorporate an actual rock face as a design element — the architecture must celebrate and protect it rather than hide it.
Deliverables	Topographic site plan (1:100), site section through rock face (1:100), plans/elevations/sections (1:100), structural concept

MINOR DESIGN PROBLEM (2 Weeks) — Measured Drawing Component

Option	Title	Brief Description
Option A	Measured Drawing — Colonial-Era Railway Station	Measure and document an existing colonial-era building produce accurate floor plans, elevations, and sections; annotate materials and construction systems.
Option B	Measured Drawing — Traditional Haveli /Temple	Detailed documentation of a heritage building with complex courtyards and ornamental elements; cross-sections to reveal structural hierarchy.
Option C	Measured Drawing — Modernist Institutional Building	Documentation of a significant mid-century modern institutional building; identify structural grid, module, and spatial hierarchy.

Option	Title	Brief Description
Option D	Measured Drawing — Urban Market Complex	Document a traditional market building — record vendor organisation, spatial sections, structural system, and environmental performance; critique and suggest improvements.

Viva voce: Final Viva-voice on all the design assignments to be conducted at the end of the semester by experts from the field.

Text books:

1. Educational Facilities 1995-96 Review, Wiley.
2. School Building Design in Asia, Allied Publishers.
3. Educational Facilities Design, Princeton Review.
4. Architecture school Building Manual, Boston Press

Reference books:

1. National Building Code of India, Vol. 1-5,2005.
2. JosephDeChiara,MichaelJ.Crosbie,"TimeSaversStandardsforBuildingTypes",McGraw-Hill Professional, 2001.
3. Ernst Neuferts, "Architects Data", Blackwell, 2002.
4. Daniel Williams, "Sustainable Design: Ecology, Architecture & Planning", John Wiley & Sons Inc, NJ, 2007.
5. The American Institute of Architects, Architectural Graphic Standards
6. Local building byelaws corresponding to the site.

Gaps in the syllabus (to meet Industry/Profession requirements) : NIL

POs met through Gaps in the Syllabus : NIL

Topics beyond syllabus/Advanced topics/Design : NIL

POs met through Topics beyond syllabus/Advanced topics/Design : NIL

Course Delivery Methods
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30

End-Sem Performance	30

Assessment Components	CO1	CO2	CO3	CO4
Lab Quiz-1	✓			
Lab Quiz-2		✓		
Lab Viva	✓	✓	✓	✓
Day-to-Day Progressive Evaluation	✓	✓	✓	✓
End-Sem Performance		✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1
CO4	3	2	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Seminars	CO1, CO2, CO3, CO4	
CD2	Mini projects/Projects	CO1, CO2, CO3, CO4	
CD3	Laboratory experiments/teaching aids	CO2, CO3, CO4	
CD4	Industrial/guest lectures	CO2, CO3, CO4	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr Anuj K Toppo & Ar. Anjali Pathak

COURSE INFORMATION SHEET

Course code: **ARP 26262**
Course title: **BUILDING CONSTRUCTION-III**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 0 T: 0 P: 4
Class schedule per week: 04
Class: B. Arch
Semester / Level: IV
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the layout and construction details of different types of Partitions, Cladding and suspended ceiling
B.	To understand the need for providing expansion joints and its construction details
C.	To know the construction details of ramps, elevators and escalators
D.	To know the different types and forms of large spans structures
E.	Site visits to be organized to make the students aware of various technical aspects, practical difficulties, onsite decisions which will strengthen the knowledge for handling and executing a project

Course Outcomes

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

CO1.	To recognize the various types of partitions, cladding, suspended ceiling, expansion joints, vertical transportation and large span structures.
CO2.	To explain the context and suitability of above elements under a given situation

Syllabus

Topic	Description	No. of sheets
Partitions	Details of Timber Panelled and Soft Board Partitions, Glazed Partitions using Aluminium and Timber sections, Glass Block Partitions, Partition with timber, metal, stone, PVC / plastic etc.	2
Cladding & Suspended Ceiling	Details of cladding of walls with stone, tiles, timber and steel framing. Methods of suspended framing materials like timber, pressed steel, aluminium, different covering materials such as acoustical board gypsum board, PVC tiles etc.	2
Expansion Joint	Construction details at foundation, walls, floors and roof level for both concrete and brick work.	**2**
Escalators, Ramps and elevators	Construction Details of Ramps and Elevators, Details of Escalator	**2**
Large span structure	Types and forms of roofing in steel and RCC, their applications to factories sheds, halls, Hangers, canopies, North light roofing in steel and RCC, Patent Glazing.	**2**

	Coffered Slab, Flat Slab.	
Site visit	At least two visits to be paid to the construction site covering various sequences of construction and a report to be submitted by individual students as a part of the sessional work.	**2**

Text books:
1. Building Construction - W.B. Mc. Kay Vol. 1- 4
2. Building Materials and Construction - B. C. Punmia
3. Building Materials and Construction - Bindra& Arora

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus :NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**
Progressive Evaluation	√	√
End Sem Evaluation	√	√

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	3	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Seminars	CO1, CO2
CD2	Mini projects/Projects	CO1, CO2
CD3	Laboratory experiments/teaching aids	CO1, CO2
CD4	Industrial/guest lectures	CO1, CO2

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Ar. Ashutosh Kumar & Dr. Revati Raman

COURSE INFORMATION SHEET

Course code: **ARP 26263**
Course title: **BUILDING INFORMATION MODELLING AND GENERATIVE AI**
Pre-requisite(s): The student must have cleared Computer Application in Architecture.
Co-requisite(s): None
Credits: 3 L: 0 T: 0 P: 4
Class schedule per week: 03
Class: B. Arch
Semester / Level: V
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To familiarise students with the foundational concepts and practical applications of Building Information Modelling (BIM) within architectural practice.
B.	To enable students to experiment with three-dimensional form generation, parametric modelling, rendering workflows, and digital presentation techniques.
C.	To introduce students to cloud-based rendering pipelines and the production of immersive architectural walkthroughs.
D.	To acquaint students with emerging Generative AI platforms and their integration within BIM workflows for site analysis, layout optimisation, and design automation.

Course Outcomes

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

CO1.	Explore and generate innovative architectural forms and spatial geometries across working drawings, landscape studies, and design proposals.
CO2.	Develop an applied understanding of Building Information Modelling and cloud-based rendering processes within a studio context.
CO3.	Communicate architectural intent effectively through digital visual media, leveraging computer-aided representation technologies.
CO4.	Critically evaluate and deploy Generative AI tools for the automated generation and optimisation of architectural layouts, site feasibility studies, and BIM-integrated design workflows.

SYLLABUS-

Activities:	No. of Weeks
1. Introduction to Revit Architecture- • New Features of Revit, Editing and Working with Families in a Project, Concepts of Revit, creating a shared Family, Project and System Settings. • Creating the Basic Model, Adding Doors and Windows, Floors and Floor Openings, Roof and Ceiling, Staircases.	3 Weeks
2. Modelling and Rendering- • Creating Walls, Doors, Windows, openings, stairs, railings, roofs, and curtain systems. • Creating drawings, detailing from the building model, scheduling, annotating, dimensioning, and viewing the model. • Applying materials and textures; creating perspective views; rendering	4 Weeks

exterior and interior scenes. • Creating and recording walkthroughs; generating 3D cutaways with section boxes.	
3. Introduction to 3DS Max- An overview: types of modelling, transforming objects, compound objects, modifiers and the modifier stack.	3 Weeks
4. Generative AI in Architectural Design- • **ARCHITEChTURES:** A BIM-integrated AI platform for residential building design, enabling real-time analysis of site conditions, applicable planning regulations, and preliminary cost estimation. • **Finch 3D (Finch AI):** An AI-driven layout optimisation tool that generates hundreds of floor plan variations by processing adjacency requirements, circulation logic, and daylight performance criteria. • **ArkDesign.ai:** Oriented towards schematic-stage design, particularly multi-family residential typologies; the platform generates spatially optimised plans with regard to both profitability and area efficiency. • **Spacio AI:** An automated space planning system that produces functional layout configurations derived from programmatic requirements and spatial design constraints. • **TestFit:** A real-time generative AI tool for site feasibility analysis, offering immediate feedback on unit mix, parking configurations, and financial viability — particularly suited to developer-led and architect-driven briefing processes. • **MCP for SketchUp and Revit:** Application of Model Context Protocol (MCP) to enable text-based, natural language prompting within SketchUp and Revit environments, facilitating AI-assisted parametric modelling and BIM workflow automation.	4 Weeks
5. Animation and Walkthrough- • Various animation techniques; editing animation using key frames. • Animation constraints and controllers; rendering with special effects. • Producing architectural walkthroughs and fly-through presentations.	2 Weeks

Design Assignments-
To be conducted at the end of each studio lecture session.
Viva Voce-
A final viva voce examination on the design assignments shall be conducted at the end of the semester.

Text Books:

1. Autodesk Revit Architecture: No Experience Required – Eric Wing
2. 3DS MAX – Advanced 3D Modelling and Animation – C & M, CADD Centre
3. 3DS MAX 8 Bible – Kelly C. Murdock
4. The BIM Manager's Handbook – Dominik Holzer
5. Generative Design: Visualize, Program, and Create with JavaScript in p5.js – Benedikt Gross, Hartmut Bohnacker, Julia Laub & Claudius Lazzeroni

Reference Books:

1. Photoshop CS Bible – Deke McClelland
2. Adobe Photoshop 7.0 Classroom in a Book – Adobe Creative Team
3. Architectural Intelligence: How Designers and Architects Created the Digital Landscape – Molly Wright Steenson
4. Digital Fabrications: Architectural and Material Techniques – Lisa Iwamoto
5. BIM Handbook: A Guide to Building Information Modeling – Chuck Eastman et al.
6. Parametric Building Design Using Autodesk Maya – Lars Hesselgren et al.

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil

Topics beyond Syllabus/Advanced Topics/Design: Nil

POs met through Topics beyond Syllabus/Advanced Topics/Design: Nil

Course Delivery Methods

CD1	Seminars
CD2	Mini Projects / Projects
CD3	Industrial / Guest Lectures
CD4	Self-learning such as use of NPTEL materials and internet
CD5	Hands-on workshops with Generative AI platforms and BIM software

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3	CO4
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√
Assignment	√	√	√	√
Studio Portfolio / Project	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO12
CO1	2	1	1	3	2	3	1	1	1	3	1	3
CO2	1	1	2	3	1	2	1	1	1	1	3	3
CO3	2	1	2	3	2	1	1	1	1	3	1	3
CO4	2	2	3	3	2	3	1	1	1	1	1	3

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcome
CD1	Seminars	CO1, CO2, CO3, CO4
CD2	Mini Projects / Projects	CO1, CO2, CO4

CD3	Industrial / Guest Lectures	CO1, CO2, CO3, CO4
CD4	Self-learning such as use of NPTEL materials and internet	CO1, CO2, CO3, CO4
CD5	Hands-on AI Platform Workshops	CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Apurv Ashish

COURSE INFORMATION SHEET

Course code: **CE24212**
Course title: **SURVEYING FIELDWORK**
Pre-requisite(s): None
Co-requisite(s): None
Credits: 02 L: 0 T: 0 P:4
Class schedule per week: 4
Class: B.Tech
Semester / Level: IV
Branch: Civil Engineering
Name of Teacher:

COURSE OBJECTIVES

This course enables the students to:

1	Execute chain and compass survey
2	Perform plane table surveying.
3	Carry out levelling works and take measurements by theodolite.
4	Set out different types of curves.
5	Learn about modern surveying instruments.

COURSE OUTCOMES (COs)

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

CO1	Perform chain and compass survey.
CO2	Perform plane table surveying.
CO3	Carry out levelling work and take measurement of angles with theodolite.
CO4	Set different types of curves in the field
CO5	Handle modern instruments like Total Station, Auto Level and Digital Theodolite

SYLLABUS (List of experiments)

Perform survey for an area using chain and compass
2. Perform survey for an area using plane table.
3. Carry out profile leveling and cross-sectioning work along a road.
4. Measurement of horizontal and vertical angles with a theodolite.
5. Set out horizontal curves on the field.
6. Perform traversing using Total Station.
7. Handling Digital Theodolites and AutoLevels.

TEXTBOOKS:
Punmia, B.C., Jain, A.K., Jain, A.K. "Surveying" – Vol. 1 and 2, Laxmi Publications (P) Ltd.
Kanetkar, T.P., Kulkarni S.V. "Surveying and Levelling." – Part 1 and 2, Pune Vidyarthi Griha Prakashan.

REFERENCE BOOKS:
Duggal, S.K. "Surveying" – Vol. 1 and 2, Tata McGraw-Hill Companies, New Delhi.
Arora, K.R. "Surveying" – Vol. 1 and 2, Standard Book House, New Delhi.

Gaps In The Syllabus (To Meet Industry/Profession Requirements)

POs Met Through Gaps In The Syllabus

Topics Beyond Syllabus/Advanced Topics/Design

POs Met Through Topics Beyond Syllabus/Advanced Topics/Design

Course Outcome (Co) Attainment Assessment Tools & Evaluation Procedure

DIRECT ASSESSMENT

Assessment Tool	% Contribution during CO Assessment
Lab Journal	30
Lab quizes	20
Progressive viva	20
End Sem Examination	30

Continuous Internal Assessment	% Distribution
Lab Journal	30
Lab quizes	10
Progressive viva	20

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	√	√	√	√	√
Semester End Examination	√	√	√	√	√

Indirect Assessment
- Student Feedback on Faculty
- Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO11**	**PO12**
CO1	3	3	2	2	2	2	2	1	1	1	3	2
CO2	3	3	2	2	2	2	2	1	1	1	3	2
CO3	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	2	2	2	2	2	1	1	1	3	2
CO5	3	3	2	2	3	2	2	1	1	1	3	2

COURSE DELIVERY METHODS

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures
CD5	Laboratory experiments/teaching aids
CD6	Industrial/guest lectures

CD7	Industrial visits/in-plant training
CD8	Self- learning such as use of NPTEL materials and internets
CD9	Simulation

Mapping Between COs and Course Delivery (CD) Methods

CO	Course delivery method
CO1	CD1, CD2, CD6, CD8
CO2	CD1, CD2, CD6, CD8
CO3	CD1, CD2, CD6, CD8
CO5	CD1, CD2, CD6, CD8
CO5	CD1, CD2, CD6, CD8

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Faculty CEE

SEMESTER 5

Third Year (5th Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/ Week)**	**P (Periods/ Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26301	Building Services - II (Electrical, Lighting & Acoustics)	3	0	0	3	3	PC
ARP 26302	Building Services - III (Mech. & Fire Safety)	3	0	0	3	3	PC
Non-Departmental Theory Subjects							
CE 24301	Structural Design - I	4	0	0	4	4	Civil
Open Elective							
MCARPXXXXX (For MOOC)	OPEN ELECTIVE II/MOOC	3	0	0	3	3	OE
Program Core - Sessional Subjects							
ARP 26311	Architectural Design - V	0	0	9	9	9	PC
ARP 26312	Working Drawing	0	0	4	3	4	PC
ARP 26313	Landscape Design (Sessional)	0	0	4	3	4	PC
				Total Credit	**28**		
				Total Contact Hours		**30**	

COURSE INFORMATION SHEET

Course code: **ARP 26301**
Course title: **BUILDING SERVICES - II (ELECTRICAL, LIGHTING & ACOUSTICS)**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: V
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To list the various components required in electricity distribution system
B.	To explain the electrical distribution in campus and develop the electrical layout diagram for buildings.
C.	To identify the various types of light requirement for different purpose
D.	To apply the fundamental of laws of illumination for analyse the light requirements of any space (both exterior and interior)
E.	To design the lighting scheme for interiors spaces
F.	To distinguish the behaviour of sound for enclosed spaces and open spaces and different acoustical defects along with their remedies.
G.	To identify the acoustical design criteria for different spaces and Sabin's equation and reverberation time.

Course Outcomes

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

CO1.	Understand the fundamental principles, components, and functioning of electrical, lighting, and acoustical services in buildings, and their role in creating safe, comfortable, and efficient built environments.
CO 2.	Integrate building services into architectural design, developing coordinated and context-responsive solutions that satisfy functional, aesthetic, environmental, and regulatory requirements.
CO 3.	Apply principles of electrical services to understand power generation, distribution, wiring systems, safety measures, and service planning in residential, commercial, and institutional buildings.
CO 4.	Evaluate and design lighting systems by considering natural and artificial illumination, lighting quality, energy efficiency, visual comfort, and lighting requirements for different building functions.
CO 5.	Analyse acoustical performance in buildings by understanding sound behavior, identifying acoustical defects and their remedies, applying Sabine's equation for reverberation time calculations, and developing acoustical design solutions for indoor and outdoor spaces.

SYLLABUS

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Introduction to Building**	Introduction to building services and their role in architectural design. Importance of electrical, lighting,	5

	Services – Electrical, Lighting and Acoustics	and acoustical systems in achieving occupant comfort, safety, functionality, and energy efficiency. Basic concepts of electricity, light, and sound. Integration of building services with architectural planning and design. Overview of relevant standards, codes, and sustainable building practices	
Module 2	**Electrical Services in Buildings**	Sources of electricity and methods of power generation. Electrical transmission and distribution systems including substations, transformers, overhead and underground distribution networks, and three-phase supply. Electrical distribution within buildings and campuses. Domestic wiring systems, wiring materials and accessories, electrical symbols and their representation in architectural drawings. Single-line diagrams, earthing systems, lightning protection, electrical safety measures, and protection against short circuits and overloading.	10
Module 3	**Fundamentals of Lighting and Light Sources**	Nature and characteristics of light. Concepts of visual perception, visual performance, optical sensitivity, and visual comfort. Principles of architectural illumination. Natural and artificial lighting systems. Characteristics and applications of incandescent, fluorescent, HID, gas-discharge, neon, and LED lamps. Luminaires, photometric concepts, polar curves, and selection of lighting fixtures for architectural applications.	8
Module 4	**Lighting Design and Applications**	Photometric quantities: luminous flux, luminous intensity, illumination, luminance, and efficacy. Laws of illumination, including Inverse Square Law and Lambert's Cosine Law. Illumination calculations and coefficient of utilization. Recommended illumination standards for various activities and building types. Direct, indirect, semi-direct, and diffused lighting systems. Glare and glare control techniques. Principles of lighting design for some specific Architectural project.	9
Module 5	**Architectural Acoustics and Noise Control**	Fundamentals of sound: frequency, intensity, wavelength, decibel scale, auditory range, loudness, and human perception of sound. Behaviour of sound in enclosed and open spaces. Principles of auditorium acoustics including room shape, volume, seating layout, and design criteria for speech and music. Acoustical defects and corrective measures. Reverberation and reverberation time, Sabine's formula and its applications. Noise sources, airborne and structure-borne sound, vibration isolation, and noise control techniques. Acoustical materials, their properties, selection criteria, and architectural applications.	8

Text books:

1. E. Hughes, *Electrical and Electronic Technology*, Pearson Education.
2. V. K. Mehta and Rohit Mehta, *Principles of Power System*, S. Chand Publications.
3. National Building Code (NBC) of India – Latest Edition (Electrical Installations and Services).
4. Derek Phillips, *Lighting in Architectural Design*.

5. G. K. Lal, *Elements of Lighting*, 3D Publishers.
6. R. G. Hopkinson and J. D. Kay, *The Lighting of Buildings*, Faber and Faber.
7. Duncan Templeton, *Acoustics in the Built Environment*.
8. David Egan, *Concepts in Architectural Acoustics*.
9. J. E. Moore, *Design for Good Acoustics and Noise Control*.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus : NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors and PPT presentations
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Industrial/guest lectures
CD5	Self- learning such as use of NPTEL materials and internets
CD6	Live Construction Project Site Visits

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Mid Sem Examination Marks	25
End Sem Examination Marks	50
Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Compoents	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Sem Examination Marks	√	√	√	√	√
End Sem Examination Marks	√	√	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√	√	√
Assignment	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	2	1	1	1	3	2
CO2	3	3	2	2	2	2	2	1	1	1	3	2

CO3	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	2	2	2	2	2	1	1	1	3	2
CO5	3	3	2	2	3	2	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD PPT presentation	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO3, CO4, CO5
CD3	Seminars	CO1, CO2
CD4	Industrial/guest lectures	CO1, CO2, CO3, CO4, CO5
CD5	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3, CO4, CO5
CD6	Live Construction Project Site Visits	CO1, CO2, CO3, CO4, CO5

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Bimal Chandra Roy & Ashutosh Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26302**
Course title: **BUILDING SERVICES III (MECHANICAL & FIRE SAFETY)**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 3
Class: B.Arch
Semester / Level: V
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the role of HVAC in creating human comfort conditions.
B.	To define the different psychometrics processes and identify the factors responsible for cooling load calculation.
C.	To identify different Air Conditioning equipment and their suitable location in buildings.
D.	To explain the function of mechanical equipment for vertical transportation (elevators and escalators for buildings).
E	To explain different firefighting methods and their application in building safety.

Course Outcomes

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

CO 1.	To integrate the National Building Code provisions of HVAC, Vertical Transportation and Fire fighting in architectural space design.
CO 2.	To calculate Duct Sizing, Total Air Volume Requirement, AHU Size and Approximate Cooling Load for a space.
CO 3.	To know how to provide appropriate elevators/ lifts/escalators and represent them appropriately in section drawings for different buildings like residences, apartments, offices, hospitals, hotels, stations, and airports.
CO 4.	To plan buildings in accordance with fire safety norms.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Mechanical Services in a building**	Mechanical Services required in Buildings. Role of an Architect in the design of mechanical Services. Impact on Architectural Design, especially in high-rise buildings. Impact on construction cost and the global environment. The basic components of an HVAC system and their locations depend on the type of HVAC system used. Principles of Refrigeration & Air - Conditioning	8
Module 2	**Mechanical Ventilation:**	Standard requirements of ventilation for different conditions of living and works. Conditions for comfort – Building Bioclimatic Chart (Givony, 1969). Psychrometry- Introduction, meaning of air conditioning, different psychometric properties, psychometrics processes. Control of quality, quantity,	8

		temperature, and humidity of air. Psychometric chart & its application summer air conditioning system, winter air conditioning system, and year-round air conditioning system. Calculation of U-Values of Composite Walls. Cooling load Calculation.	
Module 3	**Air Conditioning Equipment and Ducting.**	Elaboration of various equipment. Major equipment used in Air conditioning – Ducts, Registers, Diffusers, Grilles, etc., their characteristics & suitable place for location, consideration for reduction of heat gain and economic layout of supply and return air ducts. AHU location and functions. Design of ducting network. NBC Provisions for HVAC design.	8
Module 4	**Mechanical Equipment for vertical transportation**:	Building design and vertical transportation: demand for vertical transportation, Lift and escalator types, uses, functioning, and automatic control systems. Special Types of Lifts, Plans & sections to explain different parts of lifts and escalators, Planning for vertical transportation. NBC Provisions.	8
Module 5	**Fire Safety Services:**	Fire Safety: Role and Importance; Fire safety design; planning for fire protection; Fire detection & firefighting; different fire-fighting methods to be adopted in buildings. NBC Provisions.	8

Textbooks:

1. Arora &Duinkand, “Textbook of Refrigeration & Air Conditioning.”
2. Architectural Graphic Standard (HVAC System)
3. William.K.Y.Tao; “Mechanical and Electrical Systems in Buildings”
4. V.P.Lang,” Principles of air conditioning”
5. Rodney R.Alder;” Vertical Transportation for Buildings.”

Reference:

1. National Building Code of India, Vol-I & Vol-II, 2016.
2. Projecting National Energy Saving Estimate from the Adoption of Adaptive Thermal Comfort Standards in 2023, 2018, CEPT University & Alliance for an Energy Efficient Economy.
3. Energy Conservation Building Code User Guide, 2009, BEE, New Delhi.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training

Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√		
Quiz II			√	√
Mid-Semester Examination	√	√		
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3	1	2	2	1	1	1	1	1	1
CO 2	3	3	3	2	3	1	3	3	1	1	1	1
CO 3	3	3	3	2	1	1	3	3	1	1	1	1
CO 4	3	3	3	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	CD1, CD2
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	CD3, CD6
CD3	Seminars		
CD4	Mini projects/Projects		
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures	CO1, CO2, CO3, CO4	CD2, CD4
CD7	Industrial visits/in-plant training	CO1, CO2, CO3, CO4	CD1, CD2,
CD8	Self- learning such as use of NPTEL materials and internets		

CD9	Simulation	CO1, CO2, CO3, CO4	CD2, CD6

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Tiwari Pavan Kumar

COURSE INFORMATION SHEET

Course Code: **CE24301**
Course Title: **STRUCTURAL DESIGN – I**
Pre-requisite(s): Non
Co- requisite(s): NA
Credits: 4 L: 4 T: 0 P: 0
Class schedule per week: 4
Class: B.Arch.
Semester / Level: V
Branch: Architecture & Planning
Name of Teacher:

COURSE OBJECTIVES

This course envisions to impart to students:

1.	Equip students with the fundamental principles and design methodologies of Reinforced Concrete Structures using the Limit State Design approach as per standard codes, ensuring safety, serviceability, and structural efficiency.

COURSE OUTCOMES (COs)

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

CO1	Explain the principles of Limit State Design, including design loads, material properties, stress block parameters, and codal safety requirements.
CO2	Design a simple reinforced concrete structural element following codal provisions.
CO3	Recall and interpret key provisions of IS 456:2000 relevant to Limit State Design.

SYLLABUS

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Limit State Design of RCC**	Design Loads, Materials for Reinforced Concrete and Code requirements, Factor of Safety, Characteristic and design loads, Characteristic and design strength, Design Philosophy, Principles of limit states, Stress block parameters for limit state of collapse.	8
Module 2	**Design of Beams**	Design of beams for rectangular and flanged sections for moment and shears, Reinforcement requirements Anchorages of bars, check for development length, Design of RC members for combined bending shear and torsion	14
Module 3	**Design of Slabs**	General consideration of design of slabs, rectangular slabs spanning one direction, rectangular slabs spanning in two directions for various boundary conditions. Circular slab; Slab type staircase.	10
Module 4	**Design of Columns**	General consideration of design of column, Columns with uni-axial and bi-axial bending, use of design charts	10
Module 5	**Design of Footings**	Loads on footing, Design basis for limit state method, Design of wall footing, Design of isolated rectangular footing for axial load and uniaxial moment, design of pedestal.	12

TEXTBOOKS:

1. Subramanian,N.,"Design of Reinforced Concrete Structures",Oxford University Press, New Delhi, 2013
2. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete",Laxmi Publication Pvt. Ltd., New Delhi, 2007
3. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2002.
4. Gambhir.M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006

REFERENCE BOOKS:

1. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000
2. 2. SP16, IS456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999

Gaps in the syllabus (to meet industry/profession requirements)

POs met through gaps in the syllabus

Topics beyond syllabus/advanced topics/design

POs met through topics beyond syllabus/advanced topics/design

Course outcome (CO) attainment assessment tools & evaluation procedure

Direct assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination	25
End Sem Examination	50
Quiz	10
Assignment	10
Teacher's assessment	05

Continuous Internal Assessment	% Distribution
Mid Sem Examination	50
Quiz and assignment	40
Teacher's assessment	**10**

Assessment Components	CO1	CO2	CO3
Continuous Internal Assessment	Y	Y	Y
Semester End Examination	Y	Y	Y

Indirect assessment

1. Student Feedback on Course Outcome

Course delivery methods

CD1	Lectures by use of boards/LCD projectors/OHP projectors
CD2	Assignments
CD3	Self- learning such as use of NPTEL materials and internets

Mapping Between Course Outcomes and POs And PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	2	2	0	2	2	2	0	0	0	0	3	0	3
CO2	3	3	3	0	2	2	1	0	0	2	0	3	2	3
CO3	3	2	2	0	2	1	1	0	0	0	0	3	0	3

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

Mapping between course outcomes and course delivery method

Course Outcomes	Course Delivery Method
CO1	CD1, CD2, CD3
CO2	CD1, CD2, CD3
CO3	CD1, CD2, CD3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		CEE Faculty

COURSE INFORMATION SHEET

Course code: **ARP 26311**
Course title: **ARCHITECTURAL DESIGN-V**
Pre-requisite(s): Candidate should have cleared Architectural Design III
Co- requisite(s): None
Credits: 09 L: 0 T: 0 P: 9
Class schedule per week: 09
Class: B.Arch
Semester / Level: V
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To engage in an effective design process; that entails application and use of relevant building bye-laws and provisions of National Building Code.
B.	To explain exterior and interior design decisions through scaled drawings.
C.	To use 2D and 3D media to clearly and evocatively present and document design ideas.
D	To develop concepts that integrates site, human activity, structure and building materials.

Course Outcomes

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

CO1.	To demonstrate design, structural systems, services and construction systems in the design of a modern medium to high rise building in the urban context.
CO2.	To apply and use building byelaws and codal provision contextually.
CO3.	To design structures with lighting and circulation efficiency.

Syllabus

MAJOR DESIGN PROBLEM (10 Weeks)

Duration: 10 Weeks | Individual Work

Option A: Mixed-Use Neighbourhood Commercial Complex	
Site Context	Irregular urban plot (40m x 55m, one corner cut) — flat; overlooking main arterial road
Programme	Retail shops (ground + first), food court (second floor), offices (third floor), rooftop garden + multipurpose terrace; basement parking (20 cars); 3,500–4,000 sqm
Design Focus	• Structural design — RCC framed with post-tension slabs for large spans in food court • Building Legislation - Building Bye Laws and NBC provisions to be applied. • Building services — mechanical ventilation and AC for retail; daylighting strategy for offices • Green building — GRIHA 3-star target; solar on rooftop; rainwater harvesting • Barrier-free access — all levels via ramps and lifts

Innovation Challenge	Design the ground floor as a 'shared street' — pedestrianised internal lane that blurs boundary between building and city.
Deliverables	Context and zoning study, multi-level plans/sections/elevations (1:100), structural grid diagram, MEP concept, GRIHA checklist
Option B: Performing Arts School — Music, Dance, Theatre	
Site Context	Campus site (1 acre) within a university campus, moderate slope, edge trees retained
Programme	Performance hall (300 seats), rehearsal rooms, recording studio, dance studios (4), music practice rooms (10), administrative offices, costume store, canteen; 3,500–4,000 sqm
Design Focus	• Acoustic design — each performance space designed for specific reverberation times • Structural innovation — clear-span spaces using space frames or pre-stressed concrete • Natural daylighting for practice spaces without glare • Landscape: outdoor amphitheatre, acoustic garden
Innovation Challenge	Design the building so that informal performances can happen everywhere — corridors, courtyards, and passages become stages.
Deliverables	Programme analysis, plans/sections/elevations (1:100), acoustic concept sketches, structural concept, landscape plan, section-perspective
Option C: Science and Technology Museum	
Site Context	Urban public park-edge site (1.2 acres)
Programme	Permanent exhibit halls (science/tech/space/biology), temporary gallery, auditorium (200 seats), children's science lab, café, gift shop, administration; 4,000–5,000 sqm
Design Focus	• Daylighting as exhibit design element — zenithal, raking, controlled light • Long-span structural systems for column-free exhibit halls • Green building — natural ventilation for circulation zones; air conditioning only for sensitive exhibits • Universal accessibility — exhibits designed for all abilities
Innovation Challenge	At least one exhibit hall must be partially underground — design an earth-sheltered space and demonstrate its thermal and acoustic advantages.
Deliverables	Visitor flow and exhibit organisation diagram, plans/sections/elevations (1:100), structural section, light study sketches, perspective
Option D: Integrated Sports Complex — University Campus	
Site Context	Flat campus site (2 acres) adjacent to existing sports fields
Programme	Indoor sports hall (badminton x4, basketball x1), 25m swimming pool, gymnasium, squash courts (4), changing rooms, physiotherapy clinic, cafeteria, spectator gallery (400 seats); 5,000–6,000 sqm
Design Focus	• Structural system for long-span sports halls — steel portal frame or lamella shell

	• Building services — pool filtration, HVAC for indoor sports, sports lighting • Green building — daylit sports halls with clerestories; solar for pool heating • Accessibility throughout including pool area
Innovation Challenge	Design the building so its roof serves as a public walking/jogging track connected to the campus landscape.
Deliverables	Programme matrix, structural system sketches, plans/sections/elevations (1:100), MEP concept note, perspective

VERTICAL STUDIO PROJECT (2 Weeks)

Option	Title	Brief Description
Option A	**Pedestrian Foot Over Bridge with Urban Plaza**	Design a foot over bridge connecting two urban neighbourhoods; integrate a public rest plaza at the midpoint; make it a landmark; universal access mandatory.
Option B	**Urban Pocket Park**	Transform a 30m x 20m vacant urban lot into a pocket park; include shade structures, seating, water feature, and children's play area; use recycled materials.
Option C	**Campus Welcome Pavilion**	A 100 sqm arrival pavilion for an institutional campus; set the design character for the campus; integrate information, seating, and security.
Option D	**Night Market Temporary Pavilion**	Design a reusable modular structure for a weekly night market (500 persons); design for assembly/disassembly; all electric from solar; rainwater-collected toilets.

Viva voce:Final Viva-vice on all the design assignments to be conducted at the end of the semester by experts from the field.

Text books:

1. Levitt, D., & McCafferty, J. (2019). *The housing design handbook: A guide to good practice* (2nd ed.). Routledge.
2. Pickard, Q. (2008). *The architects' handbook*. Blackwell Publishing

Reference books:

1. Michael Malone, The Architects guide to Residential Design, McGraw-Hill Publication
2. Mary Lou Bakker, Space Planning for Commercial Office Interiors, Bloomsbury Publishing
3. Joseph De Chiara, Michael J. Crosbie, Times Savers Standard for Building types, McGraw-Hill Publication
4. The American Institute of Architects , Architectural Graphic Standards,
5. Francis D. K. Ching, Steven R. Winkel, Building Codes Illustrated: A Guide to Understanding the 2015 International Building Code, Wiley
6. Local building byelaws corresponding to the site.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**
Progressive Evaluation	√	√	√
End Sem Evaluation	√	√	√

Indirect Assessment–

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Course Outcome #	**Program Outcomes**											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	1	1	1	1	3	2
CO2	3	3	2	1	2	2	2	1	1	1	3	2
CO3	3	1	2	2	2	1	2	1	1	1	3	2
CO4	1	3	2	2	2	1	2	1	1	1	3	2
CO5	3	3	2	2	3	2	2	1	1	1	3	2

Mapping Between Cos and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Seminars	CO1,CO2,CO3,
CD2	Mini projects/Projects	CO2,CO3,
CD3	Laboratory experiments/teaching aids	CO3,

CD4	Industrial/guest lectures	CO2,CO3
CD5	Laboratory experiments/teaching aids	CO1,CO2,CO3,
CD6	Industrial/guest lectures	CO1,CO2,CO3,
CD7	Industrial visits/in-plant training	CO1,CO2
CD8	Self- learning such as use of NPTEL materials and internets	CO1,CO2,CO3,
CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr.Bimal Chandra Roy & Dr. Tiwari Pavan Kumar.

COURSE INFORMATION SHEET

Course code: **ARP 26312**
Course title: **WORKING DRAWING**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L:0 T:0 P:4
Class schedule per week: 04
Class: B.Arch
Semester / Level: V
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To familiarize students with the drawings prepared for the actual construction/ execution of the buildings.
B.	To enable students to understand the basics of working drawings, the study of the process of making working drawings and symbols, labeling, and dimensioning of working drawings.
C.	To teach students the essential components of working drawings, notations, and drawing standards, and to strengthen the students' knowledge about preparing working drawings for various buildings and elements.

Course Outcomes

After the completion of this course, students will be:

CO 1.	Able to understand the basics of working drawings and their use and implementation on site.
CO 2.	Able to read the drawing and know the implementation and challenges on the construction site.
CO 3.	This will improve the understanding of the principles of design detailing as applicable to various situations.
CO 4.	It will be helpful in detailing out the drawings for the subject working drawing I and understanding the various stages of construction for estimation and costing.

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Introduction to Working Drawings and Documentation**	• Purpose and Importance of Working Drawings: o Role of working drawings in the construction process. o Legal and contractual significance of construction documents. o Types of architectural drawings (plans, elevations, sections, details). • Drawing Standards and Conventions: o Introduction to architectural drafting standards (e.g., scales, line types, symbols, dimensioning). o Understanding architectural abbreviations and notations. o Title blocks, drawing organization, and sheet indexing.	10

Module 2	**Developing Architectural Plans**	• Site Plan:
		  o Elements of a site plan: property lines, building footprint, setbacks, access roads, utilities, landscaping, topography (introduction to contour lines).
		  o Scales and North arrow.
		• Floor Plans:
		  o Reading and interpreting architectural floor plans.
		  o Developing floor plans from architectural models or sketches.
		  o Representation of walls, doors, windows, stairs, and room layouts.
		  o Dimensioning strategies for floor plans (overall, grid, room dimensions).
		  o Annotation: room names, areas.
		• Foundation Plans:
		  o Types of foundations (slab-on-grade, crawl space, basement).
		  o Representing foundation walls, footings, and relevant structural elements.
			10

Module 3	**Creating Elevations and Sections**	• Architectural Elevations:
		  o Purpose and importance of elevations.
		  o Drawing exterior and interior elevations.
		  o Representation of building form, finishes, window and door placement, rooflines, and ground level.
		  o Dimensioning and annotation for elevations.
		• Architectural Sections:
		  o Purpose and types of sections (building sections, wall sections).
		  o Cutting planes and their representation.
		  o Drawing key building sections to reveal vertical relationships, floor heights, structural systems, and material transitions.
		  o Annotation and dimensioning for sections
			10

Module 4	**Detailing and Specific Systems**	• Wall Sections:
		  o Detailed representation of building envelope components.
		  o Layers of walls (structure, insulation, finishes).
		  o Waterproofing, air barriers, and vapor barriers.
		  o Window and door jamb details.
		• Stair and Ramp Details:
		  o Drawing detailed sections and plans of stairs and ramps.
		  o Specifying dimensions (riser height, tread depth, width) and materials.
		  o Guardrail and handrail details.
			10

		• Roof Plans and Details: o Representation of roof shapes, slopes, a nd drainage systems. o Basic roof construction details.	

Reference books:

1. Joe, B. (Ed). (2002). Details in Architecture: Vol. I-V. Victoria: The Images Publishinggroup.
2. Weston, R. (2004). Plans Sections Elevations – Key buildings of the twentieth century.London: Laurence King Publishing.
3. RIBA Working Drawings Handbook, Keith Styles, 2014,1893 (Part 1)

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery Methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self-learning, such as the use of NPTEL materials and the internet
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3	CO4
Lab Quiz-1	√	√	√	√
Lab Quiz-2	√	√	√	√
Lab Viva	√	√	√	√
Day-to-Day Progressive Evaluation	√	√	√	√
End-Sem Performance	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO11	PO12
CO1	3	3	2	2	2	2	2	1	1	1	3	2
CO2	3	3	2	2	2	2	2	1	1	1	3	2
CO3	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	2	2	2	2	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD PPT presentation	CO1, CO2, CO3, CO4,
CD2	Tutorials/Assignments	CO3, CO4,
CD3	Seminars	CO1, CO2
CD4	Industrial/guest lectures	CO1, CO2, CO3, CO4,
CD5	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3, CO4,
CD6	Live Construction Project Site Visits	CO1, CO2, CO3, CO4,

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Anuj Kumar Toppo

COURSE INFORMATION SHEET

Course code: **ARP 26313**
Course title: **LANDSCAPE DESIGN**
Pre-requisite(s): None
Co-requisite(s): Landscape Design (ARP 26252)
Credits: 03 L: 0 T: 0 P:4
Class schedule per week: 4
Class: B. Arch
Semester / Level: IV
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A	To apply theoretical knowledge of site planning and landscape architecture in the resolution of real or simulated design problems, through an iterative, studio-based process.
B	To develop compositional skill in the use of both natural and manmade landscape elements — landform, vegetation, water, paving, and furniture — as integral instruments of spatial design.
C	To translate site analysis data, including topographic, ecological, climatic, and socio-cultural readings, into responsive and contextually grounded landscape design proposals.
D	To demonstrate an understanding of historical and contemporary garden typologies and apply relevant precedents critically in design ideation and development.
E	To communicate landscape design proposals effectively through drawings, plans, sections, perspectives, and physical or digital models, meeting professional standards of graphic representation.

Course Outcomes

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

CO 1.	Produce a well-resolved landscape design scheme for a given site, demonstrating integration of natural and manmade elements, sensitivity to ecological and climatic conditions, and coherence in spatial organisation.
CO 2.	Develop and communicate design proposals through a range of representational technique, hand-drawn and digital at appropriate scales, with clarity of intent, technical accuracy, and design development.
CO 3.	Critically engage with design precedents, historical garden traditions, and contemporary landscape projects, situating their own design work within the broader disciplinary discourse of landscape architecture.

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Site Reading and Design Intention**	Studio orientation and introduction to the design process as applied to landscape. Site visit, sketching, and contextual observation; recording natural and man-made characteristics through measured drawings and diagrams. Development of a site analysis dossier incorporating topographic survey, slope analysis, microclimate mapping, vegetation inventory, hydrology, and visual character assessment.	8

		Formulation of a design programme and preliminary design concept from site data; identification of opportunities and constraints. Introduction to concept diagrams, bubble diagrams, and design intent statements.	
Module 2	**Spatial Organisation and Landscape Composition**	Study of outdoor spatial typologies — enclosed, semi-enclosed, open, and transitional spaces. Principles of visual composition as applied to landscape: scale, proportion, rhythm, balance, contrast, and sequence. Organisation of movement, circulation hierarchies, and arrival sequences in designed landscapes. Integration of hard landscape elements — paving patterns, retaining walls, steps, ramps, water features, furniture, and lighting — with soft landscape components including ground cover, shrubs, and tree canopy. Exercises in spatial arrangement at the site scale, progressing from schematic layout to developed design	8
Module 3	**Planting Design**	Principles of planting design: functional, ecological, and aesthetic dimensions. Selection of plant species appropriate to regional climate, soil conditions, and design intent. Structural planting, seasonal interest, canopy layering, and edge conditions. Preparation of planting plans, plant schedules, and species sheets. Study of plant characteristics — form, texture, colour, and growth habit — as compositional tools. An introductory exploration of ecological planting strategies, including native species selection and habitat creation, is expected to inform design decision-making.	16
Module 4	**Landscape Design for Specific Contexts**	Application of landscape design principles to selected typologies relevant to architectural and urban practice: residential outdoor spaces, institutional campuses, urban plazas and streetscapes, recreational parks and tot lots, and rooftop or terrace gardens. For each typology, design determinants, spatial standards, and typical programmatic elements are studied through precedent analysis and then tested in design exercises. Safety, accessibility, and inclusive design in outdoor environments, including consideration of differently-abled users, are treated as non-negotiable design conditions rather than supplementary provisions.	12
Module 5	**Design Development, Documentation, and Presentation**	Progression from concept to schematic design to developed design and working drawings. Preparation of a complete landscape design package: master plan, hard landscape layout plan, planting plan, sections and elevations, detail drawings of key landscape elements, and a design report. Studio critique sessions, mid-review, and final jury presentation. Development of presentation skills including board composition, model-making, and verbal design communication. Emphasis is placed on design process documentation, showing iterative development, revisions, and design justification, rather than solely on the final product.	8

Text Books:

1. Simonds, J.O.; Landscape Architecture: A Manual of Site Planning and Design; McGraw-Hill.
2. Harris, C.W. and Dines, N.T.; Time-Saver Standards for Landscape Architecture; McGraw-Hill.
3. Walker, P. and Simo, M.; Invisible Gardens: The Search for Modernism in the American Landscape; MIT Press.
4. Ingels, J.E.; Landscaping: Principles and Practices; Delmar Cengage Learning.
5. Reid, G.W.; Landscape Graphics: Plan, Section and Perspective Drawing of Landscape Spaces; Watson-Guptill.
6. Moore, C.W., Mitchell, W.J. and Turnbull, W.; The Poetics of Gardens; MIT Press.

Reference Books:

1. Dee, C.; Form and Fabric in Landscape Architecture: A Visual Introduction; Spon Press.
2. Balmori, D. and Sanders, J.; Groundwork: Between Landscape and Architecture; Monacelli Press.
3. Thompson, W. and Sorvig, K.; Sustainable Landscape Construction: A Guide to Green Building Outdoors; Island Press.
4. Bose, T.K. and Chowdhury, B.; Tropical Garden Plants in Colour; Allied Publishers.
5. Booth, N.K.; Basic Elements of Landscape Architectural Design; Waveland Press.
6. Lynch, K. and Hack, G.; Site Planning; MIT Press, Cambridge, MA.

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery Methods

CD	Course Delivery Methods
CD1	Studio-based design exercises, desk critiques, and iterative design development
CD2	Tutorials, assignments, and guided site analysis exercises
CD3	Seminars, peer reviews, and mid-term and final jury presentations
CD4	Self-directed study: precedent research, NPTEL materials, and professional publications

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3
Mid-Term Review (Jury)	√	√	√
End Semester Final Jury	√	√	√
Exercise Submissions / Assignments	√	√	
Sketchbook / Process Documentation	√		√
Attendance and Studio Participation	√		√

Indirect Assessment

• Student Feedback on Faculty

• Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	2	1	1	2	1	1	1	1	1	1	1	1
CO2	3	1	1	2	1	1	1	1	1	1	1	1
CO3	3	2	1	2	1	1	1	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcome
CD1	Studio-based design exercises, desk critiques, and iterative design development	CO1, CO2, CO3
CD2	Tutorials, assignments, and guided site analysis exercises	CO1, CO2
CD3	Seminars, peer reviews, and jury presentations	CO2, CO3
CD4	Self-directed study: precedent research, NPTEL, and professional publications	CO1, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Apurv Ashish & Revati Raman

SEMESTER 6

Third Year (6th Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/ Week)**	**P (Periods/Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26351	Universal Design	3	0	0	3	3	PC
ARP 26352	Specification, Estimation and Costing	3	0	0	3	3	PC
Non-Departmental Theory Subjects							
CE 24308	Structural Design - II	4	0	0	4	4	Civil
MT 24204	Constitution of India	2	0	0	0	2	
Program Electives (Any one)							
ARP 26353	Architectural Conservation & Heritage Management	3	0	0	3	3	PE
ARP 26354	Vernacular Architecture						
ARP 26355	Architecture and Environment						
Open Electives							
MCARPXXXXX (For MOOC)	OPEN ELECTIVE III/MOOC	3	0	0	3	3	OE
Program Core - Sessional Subjects							
ARP 26361	Architectural Design - VI and Academic Field Trip	0	0	9	12	9	Dept L/S
Non-Departmental Sessional Subjects							
HS 24133	Communication Skills - II	0	0	3	1.5	3	
	Total Credit				**29.5**		
	Total Contact Hours					**30**	

COURSE INFORMATION SHEET

Course code: **ARP 26351**
Course title: **UNIVERSAL DESIGN**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch
Semester / Level: VI
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	Introduce the fundamental concepts of Universal Design, accessibility, and the diverse physical and psychological needs of vulnerable populations in the built environment.
B.	Familiarize students with national and international policies, statutory frameworks, and guidelines, including the RPwD Act 2016 and Harmonised Guidelines 2021.
C.	Equip students with the technical knowledge required to apply anthropometric data and space standards for designing barrier-free interior and exterior architectural spaces.
D.	Develop skills for conducting comprehensive accessibility audits, post-occupancy evaluations, and formulating retrofitting strategies for existing structures with minimal disruption.
E.	Explore multi-sectoral applications of Universal Design, including public open spaces, transportation systems, product design, and the integration of digital accessibility and AI technologies.

Course Outcomes

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

CO 1.	Understand and articulate the theories, approaches, and principles of Universal Design and inclusive architecture. Interpret and apply relevant statutory guidelines, codes, and government policies for creating accessible built environments.
CO 2.	Design inclusive architectural spaces incorporating appropriate dimensions, materials, finishes, and specialized accessibility elements.
CO 3.	Conduct practical accessibility audits and propose viable, cost-effective retrofitting solutions for diverse building typologies.
CO 4.	Integrate Universal Design principles across broader urban scales, transit systems, and emerging digital/AI environments.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Universal Design and Accessibility**	Need for barrier-free design as a rising concern. Definition and socio-economic profiling of vulnerable populations (people with disabilities, elderly, women, and children). Concepts of temporary disability and transactional needs. Identification of physical, psychological, social, and institutional barriers in cities. Approaches towards disability: Shift from 'charity-based' to 'rights-based' approach. Levels of Access: Reasonable Accommodation, Visitable,	8

		Barrier-free, and Universal Design.	
Module 2	**Principles, Policies, and Statutory Frameworks**	The 7 Principles of Universal Design and 5 Universal Design India Principles (UDIP). Human-environment interaction systems and ergonomics. Timeline of barrier-free initiatives globally. Statutory provisions: UNCRPD and SDGs Vision, Rights of Persons with Disabilities (RPWD) Act 2016, Accessible India Campaign (2015). Introduction to the Harmonised Guidelines and Standards for Universal Accessibility in India 2021, and relevant sections of the National Building Code (NBC).	8
Module 3	**Design Guidelines and Anthropometrics**	Design requirements according to human abilities. Anthropometrics study of persons with different disabilities. Design considerations for internal and external environments. Specifications for ramps, steps, stairs, tactile paving, handrails, doors, and accessible washrooms. Finishes, material selection, and detailing for inclusive implementation. Wayfinding, signage, and tactile mapping in public buildings.	8
Module 4	**Implementation, Retrofitting, and Audits**	Access audit approaches and methodologies. Hands-on audit procedures using checklists based on the Harmonised Guidelines. Formulation of phasing plans and retrofitting strategies for existing buildings causing minimal disturbance to occupants. Maintenance of accessible infrastructure. Accessibility standards in escape routes, disaster evacuation, and mock drills. Accessibility certification and grading frameworks (e.g., ABLE India Framework).	8
Module 5	**Multi-Sectoral Applications and Future Trends**	Application of Universal Design standards in public open spaces, transportation systems, transit terminals, workplaces, tourism, recreation, and product design. Digital Accessibility: making public documents, Information and Communication Technologies (ICT), and websites accessible. Role of Artificial Intelligence (AI) and digital twinning in the design, construction, auditing, and maintenance of accessible built environments.	8

Text books:

1. Ministry of Housing and Urban Affairs [MoHUA], Government of India. (2021). Harmonised Guidelines & Standards for Universal Accessibility in India.
2. Rights of Persons with Disabilities Act [RPwD]. (2016). No. 49 of 2016. Government of India.
3. Preiser, W. F., & Smith, K. H. (Eds.). (2011). Universal Design Handbook (2nd ed.). McGraw-Hill Education.
4. United Nations. Accessibility for the Disabled - A Design Manual for a Barrier Free Environment.

Reference books:

1. Inclusive City Framework (2021). Published by the National Institute of Urban Affairs (NIUA) & IIT-Kharagpur.
2. Bednar, M.J. Barrier Free Environments.
3. ISO 21542: Accessibility and usability of the built environment (2011).
4. ADA Standards for Accessible Design (2010).

5. Indian Building Congress (2012). Guidelines for Design of Universally Accessible Built Environment.

Gaps in the syllabus (to meet Industry/Profession requirements) : NIL

POs met through Gaps in the Syllabus : NIL

Topics beyond syllabus/Advanced topics/Design :
Simulation exercises using VR/AR to experience architectural barriers from the perspective of different user groups.

POs met through Topics beyond syllabus/Advanced topics/Design :

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√	√	
Quiz II	√	√	√	√
Mid-Semester Examination	√	√	√	√
End Sem Examination	√	√	√	√
Assignment		√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course	Program Outcomes

Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12
CO1	3	3	2	2	2	2	2	1	1	1	3	2
CO2	3	3	2	2	2	2	2	1	1	1	3	2
CO3	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	2	2	2	2	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1, CD2
CD2	Tutorials/Assignments	CO2	CD1, CD2, CD3
CD3	Seminars	CO3	CD1, CD4, CD5
CD4	Mini projects/Projects	CO4	CD2, CD4, CD7
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. R Raman

COURSE INFORMATION SHEET

Course code: **ARP 26352**
Course title: **SPECIFICATION ESTIMATION AND COSTING**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch
Semester / Level: VI
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To introduce the subject along with various aspects of writing specification and quantity survey and to understand the basic difference between the general and detailed specifications of works.
B.	To familiarize students with various methods of estimation and their suitability for different projects and to introduce the basic skill of writing items of works and their relation with specification
C.	To analyse the material quantity and rate for different items of work
D.	Analysis of material and labour cost

Course Outcomes

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

CO 1.	Understand the relevance and importance of specification Estimation and costing for building projects.
CO 2.	Understand the relevance and importance of estimation and costing for building projects with specification
CO 3.	Develop the basic skills to prepare the building estimate and quantity with its suitable specification
CO 4.	Have a brief understanding of the rate analysis of a composite item.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Specification and Item of Works**	The relevance of specifications for building projects and the classification of specifications. Tender types, the tender process, and the tender process.	8
Module 2	**Introduction to Building Estimate and Costing**	Cost estimation and different types of estimates and their suitability. Different methods of preparing an Approximate/Rough estimate, the relevance of writing items in the BOQ for the Item Rate "Measurement form" and the "Abstract of estimate" form for preparing the detailed estimate.	8
Module 3	**Methods of Measurement of Works**	Different measurement methods and applications on different types and shapes of the building to estimate the quantity - foundation, plinth, superstructure, and finishing works.	8

Module 4	**Estimating quantity and cost of Reinforcement in RCC works**	Measurement of steel reinforcement in concrete slabs, beams, columns, etc., and the methodology for calculating the quantity and cost with suitable exercise.	8
Module 5	**Analysis of Rate for different items**	The concept of rate analysis of different materials of an item of work and labor cost with suitable exercises.	8

Text books:

1. Chakraborty M, Estimating, Costing, Specification & Valuation
2. Kohli D. D. & Kohli R. C, A Text Book of Estimating and Costing

Reference books:

1. Dutta B N, Estimating & Costing
2. Delhi Schedule of Rate 2016

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	✓			
Quiz II		✓		
Mid-Semester Examination	✓	✓		✓
End Sem Examination	✓	✓	✓	✓
Assignment		✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO1 1	PO12
CO1	3	2	2	2	2	2	2	1	1	1	3	2
CO2	1	3	1	2	1	1	2	1	1	1	3	2
CO3	1	1	2	2	2	2	2	1	1	1	3	2
CO4	1	3	2	1	2	2	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery Methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	
CD2	Tutorials/Assignments	CO3, CO4	
CD4	Mini projects/Projects	CO1, CO2, CO3, CO4	
CD8	Self- learning such as use of NPTEL materials and internets		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Bimal C Roy & Ar. Anjali Pathak

COURSE INFORMATION SHEET

Course Code: **CE24308**
Course Title: **STRUCTURAL DESIGN – II**
Pre-requisite(s): NA
Co- requisite(s): NA
Credits: 4 L: 4 T: 0 P: 0
Class schedule per week: 4
Class: B.Arch.
Semester / Level: VI
Branch: Architecture & Planning
Name of Teacher:

COURSE OBJECTIVES

This course envisions to impart to students:

1.	This course enables the students to develop an understanding of structural steel properties, design approaches, and loading standards, apply IS 800:2007 provisions for designing structural elements and their connections, and enhance analytical and problem-solving skills for real-world steel structure applications.

COURSE OUTCOMES (COs)

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

CO1	Apply fundamental concepts of structural steel properties, design approaches, and loading standards to analyze and assess lateral loads based on IS codes. (K1, K2, K3)
CO2	Design structural connections using bolts and welds, considering both direct and eccentric loading, ensuring compliance with relevant IS standards.(K3, K4)
CO3	Utilize IS 800:2007 provisions to design various structural steel elements, including tension members, compression members, beams, and their connections, ensuring compliance with codal requirements. (K3, K4)

SYLLABUS

Module	(No. Of Lecture hours)
Module I: Structural Steel and Design Approaches Engineering properties and characteristics of structural steel, Types of sections, Rolling process necessity and importance. Loads and loading standards, assessment of lateral loads as per IS codes. Introduction to Plastic analysis, Methods of design working stress, LRFD and Limit state design.	**10**
Module II: Connections Bolted connections - Design of bolted connections subjected to direct and eccentric loadings. Welded connections - Design of welded connections subjected to direct and eccentric loadings.	**10**
Module III: Design of Tension Members Types of tension members, sectional areas, types of failure, design strength, design of tension members, lug angles and splices.	**10**

Module IV: Compression Members and foundation design Types of section, section classification, column formulae, buckling classification. Design strength of simple members and struts, Design of built up and compound members including splicing, lacing and battening, Design of column bases and foundation.	**10**
Module V: Design of Flexural Members Concept of lateral restraint, laterally supported and unsupported beams, section classification, Elastic and plastic sections modulus, determination plastic section modulus of sections, IS criteria for design, Design of simple and plated beams	**10**

TEXTBOOKS:

3. Design of Steel Structures, N. Subramanyam, Oxford University Press, New Delhi, India, 2008
4. Limit State Design of Steel Structures, S. K. Duggal, Tata McGraw Hill Education Private Limited, New Delhi, India, 2015
5. Design of Steel Structures, P. Dayarathnam, Prentice Hall India, New Delhi, India, 2011

REFERENCE BOOKS:

1. IS : 800 2007 Code of Practice for General Construction in Steel
2. SP : 6(1) 1964 Handbook for Structural Engineers : I. Structural Steel Sections
3. Teaching Resources for Structural Steel Design Vol. I & II, INSDAG, Kolkatta.
4. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., Design of Steel Structures, 3rd edition, McGraw-Hill Publications.

Gaps in the syllabus (to meet industry/profession requirements)

POs met through gaps in the syllabus

Topics beyond syllabus/advanced topics/design

POs met through topics beyond syllabus/advanced topics/design

Course outcome (CO) attainment assessment tools & evaluation procedure

Direct assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination	25
End Sem Examination	50
Quiz	10
Assignment	10
Teacher's assessment	05

Continuous Internal Assessment	% Distribution
Quiz	10
Assignment	10
Teacher's assessment	**5**

Assessment Components	CO1	CO2	CO3
Continuous Internal Assessment	Y	Y	Y
Mid Semester Exam	Y	Y	
Semester End Examination	Y	Y	Y

Indirect assessment

2. Student Feedback on Course Outcome

Course delivery methods

CD1	Lectures by use of boards/LCD projectors/OHP projectors
CD2	Assignments
CD3	Seminars
CD4	Mini projects/Projects
CD5	Laboratory experiments/teaching aids
CD6	Industrial/guest lectures
CD7	Industrial visits/in-plant training
CD8	Self- learning such as use of NPTEL materials and internets
CD9	Simulation

Mapping Between Course Outcomes and POs And PSOs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO1	PSO2	PSO3
CO1	3	2	2	0	2	2	2	0	0	0	0	3	0	3
CO2	3	3	3	0	2	2	1	0	0	2	0	3	2	3
CO3	3	2	2	0	2	1	1	0	0	0	0	3	0	3

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

Mapping between course outcomes and course delivery method

Course Outcomes	Course Delivery Method
CO1	CD1, CD8
CO2	CD1, CD2, CD4, CD8
CO3	CD1, CD2, CD4, CD8

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Faculty CEE

COURSE INFORMATION SHEET

Course Code: **MT 24204**
Course Title: **CONSTITUTION OF INDIA**
Pre-requisite(s): None
Co- requisite(s): None
Credits:0 L: 02 T: 0 P: 0
Class schedule per week: 2
Class: B.Arch
Semester / Level: VI
Branch: All
Name of Teacher:

COURSE OBJECTIVES

This course aims to impart to students:

1.	To describe the importance and role of Constitution of India
2.	To explain the provisions related to Social Problems and Issues in Constitution
3.	To explain the significance of the Constitution for maintaining social unity and integrity
4.	To describe the process for formulating and designing public policies in accordance with constitutional provisions

COURSE OUTCOMES (COs)

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

CO1	Outline the need and importance of the Indian Constitution
CO2	Explain the fundamental rights and duties of citizens of India
CO3	Relate appropriate Constitutional Provisions with relevant social issues
CO4	Describe the role of different departments of government
CO5	Describe the Government policies and programs designed for the society at large

SYLLABUS

Module	**(No. of lecture hours)**
Module – I Introduction to the Constitution of India, Salient Features of the Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy	9
Module – II Union and State Executives: President and Prime Minister, Council of Ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha. Governor: Role and Position, Chief Ministers and Council of Ministers.	9
Module – III The Indian Judicial System - The Supreme Court and The High Court's - composition, Jurisdiction and functions, The Role of the Judiciary.	9
Module – IV Local Government- District's Administration: Role and Importance, The Panchayatas - Gram Sabha, Constitution and Composition of Panchayatas,Constitution and Composition of Municipalities	9
Module – V Miscellaneous- Election Commission: Role and Functioning, Chief Election	4

Commissioner and Election Commissioners. State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.	

TEXTBOOKS:

1. The Constitution of India by "Ministry of Law India" Kindle Edition
2. Constitutional History of India by Prof.M.V.PYLEE-S.Chand Publishing
3. Indian Administration by Avasti and Avasti-Lakshmi Narain Agarwal Educational Publishers.2017 edition.
4. Introduction to the Constitution of India by D DBasu by Lexis Nexis: 20th edition.
5. Constitution of India V.N.Shukla's EBC Explorer Edition 13th,2017

Gaps in the syllabus (to meet industry/profession requirements)

POs met through gaps in the syllabus

Topics beyond syllabus/advanced topics/design

POs met through topics beyond syllabus/advanced topics/design

Course outcome (co) attainment assessment tools & evaluation procedure

DIRECT ASSESSMENT

Assessment Tool	% Contribution during CO Assessment
End Semester Examination	50
Quiz (s)	20
Assignment	5
Mid-Semester Exam	25

Continuous Internal Assessment	% Distribution
Quiz (s)	20
Assignment	5
Mid-Semester Exam	25

Assessment Components	CO1	CO2	CO3	CO4	CO5
Continuous Internal Assessment	2	2	2	2	
Semester End Examination	2	2	2	2	2

INDIRECT ASSESSMENT

1. Student Feedback on Course Outcome

COURSE DELIVERY METHODS

CD1	Lecture using boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Mini projects/Projects
CD5	Laboratory experiments/Teaching aids
CD6	Industrial/Guest lectures
CD7	Industrial visits/In-plant training
CD8	Self, learning such as the use of NPTEL materials and the internet simulation

CD9	Tutorials/Assignments

MAPPING BETWEEN COURSE OUTCOMES AND POs and PSOs

	PO 1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO8	PO9	PO 10	PO 11	PO 12
CO1	2	2	1	2	1	2	2	2	2	1	2	
CO2	2	2	1	2	2	2	2	2	1	2	2	
CO3	2	2	1	2	1	2	2	2	2	1	1	
CO4	2	2	1	2	2	2	2	2	2	1	1	
CO5	2	2	1	2	1	2	2	2	2	3	3	

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	Lecture using boards/LCD projectors/OHP projectors
CO2	Lecture using boards/LCD projectors/OHP projectors
CO3	Lecture using boards/LCD projectors/OHP projectors
CO4	Tutorials/Assignments
CO5	Seminars

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Dr. Anand Kumar, Mgmt

COURSE INFORMATION SHEET

Course code: **ARP 26353**
Course title: **ARCHITECTURAL CONSERVATION AND HERITAGE MANAGEMENT**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VI
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To explore the history, philosophy and science of building conservation;
B.	To encourage appropriate methodologies and tools for recording, documentation, inventories and information management of historic structures
C.	To develop professional level skills on conservation using various techniques.

Course Outcomes

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

CO1.	To understand the development of the philosophy and ethics of conservation and the legislation that protects the historic environment.
CO2.	To survey, record and analyze the development of historic buildings through the examination of their materials, construction and style.
CO3.	To arrive at environmentally sustainable solution for conservation of build structuresusing practical techniques for conservation, repair and restoration.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**History, Philosophy, and Ethics**	**1.1 Defining Heritage:** Introduction to concepts of Cultural Heritage, Built Heritage, and Natural Heritage. Understanding the various Values (historical, aesthetic, social, functional, spiritual) attributed to heritage properties. **1.2 History of Conservation Movement:** Review of key milestones, from early antiquarianism to modern international practice. **1.3 International and National Frameworks:** Detailed study of International Charters (Venice Charter, Burra Charter, Nara Document on Authenticity) and the roles of international agencies (UNESCO, ICCROM) and national bodies (ASI, INTACH). **1.4 Conservation Terminologies and Ethics:** Clear distinction between Preservation, Conservation, Restoration, Reconstruction, and Adaptive Reuse. Introduction to the core ethical principles: Minimum Intervention, Authenticity, Integrity, and Reversibility.	8

Module 2	**Documentation and Significance Assessment**	**2.1 Heritage Listing and Inventory:** Procedures for identifying, listing, and grading heritage structures and precincts at local and national levels. **2.2 Documentation Techniques:** Hands-on training in accurate physical documentation: o **Measured Drawing and Architectural Photography:** Techniques for creating base plans, sections, and elevations. o **Advanced Documentation:** Introduction to **Laser Scanning**, **Photogrammetry**, and **GIS** (Geographic Information Systems) for large-scale heritage mapping. **2.3 Assessment of Condition and Deterioration (Pathology):** Methods for visual and non-destructive examination of the structure to diagnose defects (e.g., moisture, structural cracks, biological growth). **2.4 Significance and Condition Reports:** Methodology for preparing a comprehensive Conservation Report that establishes the significance of the property and its current state of preservation.	8
Module 3	**Traditional Materials and Conservation Science**	**3.1 Historic Building Materials:** In-depth study of the composition, properties, and decay mechanisms of traditional materials like lime mortars, stone, brick, timber, and ferrous metals. **3.2 Material Conservation Techniques:** Study of corrective and preventative measures for historic building materials **3.3 Structural Interventions:** Techniques for stabilizing historic structures, including **grouting, underpinning,** and crack repair. The principle of using compatible materials in repairs. **3.4 Maintenance and Monitoring:** Developing a maintenance plan (cyclical and routine) for the long-term upkeep of historic buildings. Introduction to structural monitoring	8
Module 4	**Urban Conservation**	**4.1 Urban Heritage and Planning:** Definition of Historic Urban Landscape (HUL) and Heritage Precincts. Integrating conservation policies into urban master plans. **4.2 Conservation Tools in Urban Planning:** Use of tools like Zoning Regulations, Design Guidelines for infill development, and Transferable Development Rights (TDR) to protect heritage areas. **4.3 Adaptive Reuse and Urban infill:** Principles and case studies of changing the function of a historic building while respecting its character and significance. Developing criteria for compatible New Construction in Historic Settings. **4.4 Intangible Heritage and Cultural Landscapes:** Introduction to the concept and management of Intangible Cultural Heritage (ICH) and its link to the built environment. Conservation of Cultural Landscapes (e.g., historic gardens, industrial heritage sites).	8

Module 5	**Heritage Management, Law, and Practice**	**5.1 Heritage Legislation and Jurisprudence:** Study of the legal framework for heritage protection in India (e.g., Ancient Monuments and Archaeological Sites and Remains Act, 1958) and relevant state/local laws. **5.2 Heritage Management Planning:** Developing comprehensive Management Plans for historic sites and World Heritage Sites citing global examples **5.3 Heritage Economics and Finance:** Understanding the costs of conservation vs. new construction. Sources of funding, financial incentives, and the concept of Sustainable Heritage Tourism.	8

Text books:

1. Bernard M. Feilden; Conservation of Historic Buildings, Architectural Press, London
2. Bernard M. Feilden; Guidelines for conservation; Architectural Press, London.
3. Robert Pickard; Policy and Law in Heritage Conservation; Taylor & Francis
4. Nahoum Cohen, Urban Conservation, MIT Press,
5. Eric May, Mark Jones, Conservation Science: Heritage Materials, Royal Society of Chemistry
6. Jokilehto, J. (2017). *A history of architectural conservation* (2nd ed.). Routledge.
7. Insall, D. (1972). *The care of old buildings today: A practical guide*. The Architectural Press.

Reference books:

1. Nahoum Cohen, Urban Planning, Conservation, and Preservation, Volume 1 McGraw Hill Professional
2. Xavier Greffe; Managing our Cultural Property; Aryan Book International, New Delhi.
3. Claire Cave, Elene Negussie, World Heritage Conservation: The World Heritage Convention, Linking Culture and nature for Sustainable Development, Routledge
4. Alison Richmond, Alison Bracker, Conservation, Routledge

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus:NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Industrial/guest lectures
CD5	Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50

Assignment	05

Assessment Components	CO1	CO2	CO3
Mid Sem Examination Marks	√	√	√
End Sem Examination Marks	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√
Assignment / Quiz (s)	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	2	3	3	1	1	2	1	1	1	1	1	2
CO2	3	3	2	3	3	3	1	1	1	1	1	1
CO3	3	3	3	2	3	3	2	2	1	1	2	3

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lectures by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO3
CD4	Industrial/guest lectures	CO3
CD5	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Satyaki Sarkar

COURSE INFORMATION SHEET

Course code: **ARP 26354**
Course title: **VERNACULAR ARCHITECTURE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VI
Branch: Architecture & Planning
Name of Teacher:

Course Objectives:

A.	To gain basic concepts regarding the traditional and vernacular architecture of India with regard to traditional building forms and its relation to settlement systems.
B.	To develop capacity to understand the socio-economic and technological architectural expressions to appreciate and impart knowledge of vernacular architecture of India.
C.	To analyse, apply and adopt the materials, patterns of construction and building techniques in vernacular style in modern contemporary times.

Course Outcomes:

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

CO1.	To identify and interpret specific local, regional and national vernacular traditions from India in socio-cultural context.
CO2.	To understand the vernacular styles and traditional construction techniques of different traditional settlements in India.
CO3.	To analyse and evaluate the applicability of vernacular styles in contemporary practice in architecture.

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Introduction to the field of Vernacular Architecture**	Defining and differentiating vernacular architecture from contemporary architecture; Differentiating Vernacular Architecture from traditional architecture; Scope of Vernacular Architecture in Indian Context; Factors Influencing Vernacular Architecture; Building Material and Construction Techniques in Indian Vernacular Architecture; Evolution of development of shelter form and identity**;** Physiography, ecology, culture and Vernacular Architecture; Difference in rural and urban Vernacular Architecture.	8
Module 2	**Vernacular Architecture of Rajasthan and Gujarat**	Materials and Construction techniques of the region; Banni Community and their Bhunga House from Rajasthan; Havelis of the Brahmins, Rajputs and Hindu Merchants from Rajasthan; Shekawati Haveli of Rajasthan; Tribes of Gujarat - Rathva, Chodri – the settlement pattern and the houses;	8

		Sociology and Planning of North Gujarat, Rural South Gujarat, Saurashtra, Muslim Community in Gujarat; Woodwork Details of Gujarat; Contemporary Examples from the region.	
Module 3	**Vernacular Architecture in Jharkhand, Bengal and North Eastern Hills**	Rural Villages and Houses of Jharkhand, Bengal; Eight Roof House Structure of Bengal style, Four Roof House Structure of Bengal style; Traditional houses of different tribes of Jharkhand, Bungalow Construction; Traditional houses of different tribes of North easern India; Contemporary Examples from the regions.	8
Module 4	**Vernacular Architecture of the North**	Regional topography, local climate, settlement pattern; Case studies covering settlement pattern, architectural forms and construction details of Northern India - Jammu Kashmir, Himachal Pradesh, Uttarakhand; TAQ construction, DhajjiDiwari Construction, Khat-Kuni Technique using local materials; Contemporary Examples from the region.	8
Module 5	**Vernacular Architecture of the South**	Regional topography, local climate; Case studies covering vernacular settlement pattern, architectural forms and construction details of Southern India - Karnataka, Kerala, Tamil Nadu, Andra Pradesh; Contemporary Examples from the region.	8

Syllabus

Text Books:

1. Dawson Bary, Cooper Ilay, Traditional Buildings of India,1998.
2. Shikha Jain, Havelis of Rajastan.
3. C. Tadgell,The History of Indian Architecture, Design and Technology Press, London 1990.
4. Kullrishan Jain &Minakshi Jain – Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad, 1992.

Reference Books:

1. Fathy Hassan – Architecture for the Poor. University of Chicago Press.
2. Michell, G., Penguin Guide to the Monuments of India, Vol I, Viking, London 1989.
3. Paul Oliver, Encyclopedia of Vermacular Architecture of the World, Cambridge University Press, 1997.
4. V.S. Praman, Havali – Wooden Houses & Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad, 1989.
5. G.H.R. Tilotsum, The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.
6. Richardson,Vickey; New Vernacular Architecture: Laurance King Publishing, 2001.
7. Appropriate and Affordable Rural Housing for Jharkhand –UNDP/Ministry of Rural Development, Govt. of India.

	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors/OHP projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Industrial/guest lectures
CD5	Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End SemExamination Marks	50
Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Components	CO1	CO2	CO3
Mid Sem Examination Marks	√	√	√
End Sem Examination Marks	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√
Assignment	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	3	3	1	2	2	1	2	1	1	1	1	1
CO2	3	3	1	1	2	1	2	1	1	1	1	1
CO3	3	3	1	2	2	1	2	1	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2,CO3	CD1, CD8
CD2	Tutorials/Assignments	CO1, CO2,CO3	CD1, CD8
CD3	Seminars	CO1, CO2,CO3	CD1, CD2
CD4	Mini projects/Projects	CO1, CO2,CO3	CD1, CD8
CD5	Laboratory experiments/teaching aids	CO1, CO2,CO3	CD1, CD3, CD8
CD6	Industrial/guest lectures		
CD7	Industrial visits/in-plant training		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Ar. Ritu Agrawal & Ar. Ashutosh Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26355**
Course title: **ARCHITECTURE AND ENVIRONMENT**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 3
Class: B.Arch
Semester / Level: VIII
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand and discuss the relationship between natural and built environments.
B.	To be aware of the impact of Architecture on the natural environment
C.	To introduce the concepts and theories of ecology in the architectural context
D.	To explain the principles and strategies for natural resource conservation and management and the associated conflicts.
E.	To be aware of best practices in built space design addressing environmental conservation.

Course Outcomes

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

CO1.	To gain a wider understanding of environmental issues and appreciate the interrelated role of Architecture.
CO2.	To enhance abilities and skills related to the design of low-impact built spaces.
CO3.	To learn and integrate best practices in built space design for addressing environmental challenges.
CO4.	To make scientifically informed decisions about environmentally sensitive built space design.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Man-Environment Relationship in Urban Ecosystem**	Man, and Environment - Changing Perspectives in Man-Environment Relationship with Focus on Issues of Population, Urbanisation, Resource Depletion and Pollution, Concepts of Ecology and fundamentals of ecosystems; Components of the natural and built environment.	8
Module 2	**Human Comfort and Environment.**	The conception of human comfort across different climatic zones and vernacular architecture responses in various climatic zones. The demand for HVAC services for human comfort and its impact on the micro and macro environments. Climate-responsive design and Solar passive design strategies. Discussion on case studies and identification of techniques and materials for low-impact built environment design.	8
Module 3	**Land Environment Factors in Built**	Tools to map the terrain and understand the role of Contour and vegetation on microclimate. Understanding contour profiles and developing strategies for built	8

	Space Planning	space design through case studies. Topsoil conservation, necessity and conservation techniques.	
Module 4	**Water Environment Factors in Built Space Planning**	Water as a human resource and as an environmental entity. Water demand, wastewater generation and disposal from the built space. On-site wastewater treatment and reuse strategies. Accommodating rainwater in the built envelope and site planning. Strategies for rainwater harvesting, estimation of rainwater runoff, and active and passive methods of rainwater recharge.	8
Module 5	**Air Environment Factors in Built Space Planning**	Concept of Air quality and role of ventilation in promoting overall human health and well-being. Indoor Air quality, how challenges and solutions are different than the outdoor air quality. Use of active and passive ventilation for cooling and human comfort. Discussion on case studies to learn design strategies.	8

Text books:

1. "Sustainable Architecture: Principles, Paradigms, and Case Studies" by Terry L. Williamson and Anthony P. Grainger
2. "Design with Nature" by Ian L. McHarg
3. Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life" by Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador
4. "The Barefoot Architect: A Handbook for Green Building" by Johan van Lengen
5. The Solar House: Passive Heating and Cooling" by Daniel D. Chiras
6. "Architecture and Energy: Performance and Style" by William W. Braham
7. The Green House: New Directions in Sustainable Architecture" by Alanna Stang and Christopher Hawthorne.

Reference books:

1. Loftness, V., & Haase, D. (Eds.). (2020). *Sustainable built environments* (2nd ed.). Springer.
2. Yola, L., Nangkula, U., Ayegbusi, O. G., & Awang, M. (Eds.). (2022). *Sustainable architecture and building environment*. Springer.
3. Central Public Works Department. (2002). *Rain water harvesting and conservation manual*. Government of India, Ministry of Urban Development.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training

Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√		
Quiz II			√	√
Mid-Semester Examination	√	√		
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	3	1	2	2	1	1	1	1	1	1
CO2	3	3	3	2	3	1	3	3	1	1	1	1
CO3	3	3	3	2	1	1	3	3	1	1	1	1
CO4	3	3	3	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	CD1, CD2
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	CD3, CD6
CD3	Seminars		
CD4	Mini projects/Projects		
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures	CO1, CO2, CO3, CO4	CD2, CD4
CD7	Industrial visits/in-plant training	CO1, CO2, CO3, CO4	CD1, CD2,
CD8	Self- learning such as use of NPTEL materials and internets		

CD9	Simulation	CO1, CO2, CO3, CO4	CD2, CD6

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Tiwari Pavan Kumar

COURSE INFORMATION SHEET

Course code:	**ARP 26361**
Course title:	**ARCHITECTURAL DESIGN -VI & ACADEMIC FIELD TRIP**
Pre-requisite(s):	Should have cleared all Architectural Design Laboratories up to IV Semester;
Co- requisite(s):	None
Credits: 12	L: 0 T: 0 P: 9
Class schedule per week:	09
Class:	B. Arch
Semester / Level:	VI
Branch:	Architecture& Planning
Name of Teacher:	

Course Objectives

This course enables the students:

A.	To apply the design theory and principles in the design of multi- functional large span public building in an urban setting.
B.	To include various aspects of design parameters, graphical presentation of design details and architectural expression in functional and constructional elements large span public building in an urban setting.
C.	To apply and use the relevant building bye-laws and National Building Code provisions in the design assignments.

Course Outcomes

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

CO1.	Design of the built structures incorporating the local building bye-laws and the relevant National Building Code provisions applicable to the design assignment.
CO2.	Develop proficiency in the design of multi- functional large span public building in an urban setting.
CO3.	Design of various components and aspects associated with the urban environment in terms of physical infrastructure, socio cultural aspects etc, with an integration of the various building services.

Syllabus

MAJOR DESIGN PROBLEM

Duration: 10 Weeks | Individual Work | Integrates Field Trip Documentation

Option A: Cultural Heritage and Interpretation Centre	
Site Context	Site adjacent to a historically significant urban precinct in (site visit during field trip)
Programme	Main gallery (permanent + rotating exhibition), heritage library and archive, lecture hall (150 seats), café, souvenir shop, conservation lab, courtyard, administration; 4,500–5,500 sqm
Design Focus	• Architectural conservation — programme elective A; building must demonstrate conservation principles in its spatial language • Contextual design — materials, scale, and massing respond to historic surroundings

	• Museum-quality daylighting — controlled diffused light for artefact preservation • Universal accessibility in a heritage context
Innovation Challenge	The main entry must be through an open court that 'excavates' the ground — revealing the idea that culture lies beneath the surface of daily life.
Deliverables	Heritage context analysis (from field trip), programme, site and landscape plan (1:200), multi-level plans/sections/elevations (1:100), daylighting strategy, perspective
Option B: State-Level Institute of Technology and Vocational Training	
Site Context	Greenfield suburban campus (3 acres), gently sloping site near an industrial zone
Programme	Training workshops (metal, electronics, garments, IT, construction), library, hostel (100 students — separate for male/female), cafeteria, admin block, sports courts, principal's residence; 7,000–8,000 sqm total campus
Design Focus	• Campus planning — connected clusters rather than isolated buildings • Workshop design — structural and environmental requirements of industrial spaces • Vernacular resonance — programme elective B; Jharkhand vernacular material palette with modern construction • Inclusive and gender-sensitive design — safe lighting, accessible hostels
Innovation Challenge	Design the campus as a 'skill village' — a microcosm of a settlement where different workshops are neighbourhoods and shared spaces are streets.
Deliverables	Campus master plan (1:500), section through campus, workshop building (1:100), hostel plans/elevations (1:100), landscape and lighting plan
Option C: Multi-Faith Retreat and Wellness Centre	
Site Context	Serene forest-edge site at buffer zone, highly contoured (1:5 slope on part of site)
Programme	Meditation halls (3 faiths), yoga hall, Ayurvedic treatment rooms (10), residential retreat (30 rooms), vegetarian restaurant, nature library, walking trails; 4,000–5,000 sqm
Design Focus	• Resilient Cities and Climate Change — programme elective C; building as climate-resilient sanctuary • Landscape as primary design medium — buildings emerge from terrain • Passive cooling and natural ventilation in high-humidity forest environment • Water sensitivity — grey water treatment, rainwater harvesting
Innovation Challenge	The three meditation halls must be distinct in character and material — designed to evoke silence, movement, and community through architecture rather than symbolism.
Deliverables	Site analysis and topographic response, landscape master plan (1:200), plans/sections/elevations (1:100), section through meditation halls, material study
Option D: Children's Hospital — 150 Beds	
Site Context	Flat urban-edge site (2 acres), adjacent to a major road, with residential areas on

	three sides
Programme	OPD (30 specialists), emergency, 150 IPD beds, NICU (10 cots), operation theatres (4), pharmacy, diagnostic lab, imaging, family support centre, cafeteria, staff hostel, rooftop garden; 9,000–10,000 sqm
Design Focus	• Evidence-based design for healing environments — colour, light, noise, biophilia • Barrier-free design — all spaces universally accessible • Infection control — ventilation zones, isolation wards, clean/dirty circulation • Green building — solar, water recycling, natural light for patient rooms
Innovation Challenge	All patient wards to have a view of a planted courtyard or garden — no bed to be more than 10m from a window with natural light.
Deliverables	Functional zoning and infection control diagram, circulation analysis, multi-floor plans/sections/elevations (1:200/1:100), environmental strategy note

MINOR DESIGN PROBLEM (2 Weeks) — Academic Field Trip Debrief

Option	Title	Brief Description
Option A	**Field Trip: Critical Analysis Drawing Set**	Produce a measured analytical drawing of one building visited during the academic field trip — identify structure, light, circulation, and spatial sequence through drawings, not words.
Option B	**Hypothetical Addition to a Visited Building**	Design a small contextual addition (100–150 sqm) to an existing building visited during the field trip — must respond sensitively in scale, material, and spatial language.
Option C	**Precedent Deconstruction + Principle Application**	Select one building from the field trip; extract 3 design principles; apply them explicitly to a new small pavilion design on the home campus.
Option D	**Field Trip Photo Essay + Design Concept**	Curate a photo essay from the field trip (20 images with captions); distil a design concept in 5 drawings for a small gateway structure at BIT Mesra main entrance.

Viva voce: Final Viva-vice on all the design assignments to be conducted at the end of the semester by experts from the field.

Text books:

1.Michael Barron, Auditorium Acoustics and Architectural Design, Taylor and Francis, 2010
2. David Egan, “Concepts inArchitecturalAcoustics”, 1972.
3. Richard H. Penner, Hotel Design, Planing and Development, 2012
4. Cindy Allen, Hospitality,Architecture and Design, 2012

Reference books:

1.Chiara, J.D., Panero, J., Zelnik, M., “Time Saver Standards for Building Types”, 2nd Ed., McGraw-Hill,1995
2. Neufert, P., “Architects‟ Data”, 3rd Ed., Blackwell Science. 2000
3. Watson, D.(Editor), “Time-saver Standards for Architectural Design: Technical Data for Professional Practice”, McGraw-Hill. 2005

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3
Day-to-Day Progressive Evaluation	√	√	√
End-Sem Performance	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	2	1	1	1	3	2
CO2	1	3	1	2	1	1	2	1	1	1	3	2
CO3	1	1	2	2	2	2	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**

CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO1, CO2, CO3
CD3	Seminars	CO2, CO3
CD4	Mini projects/Projects	CO1, CO2, CO3
CD5	Laboratory experiments/teaching aids	CO1, CO2, CO3
CD6	Industrial/guest lectures	CO1, CO2, CO3
CD7	Industrial visits/in-plant training	CO1, CO2, CO3
CD8	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3
CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Bimal Chandra Roy& Dr. Prashant Prasad

COURSE INFORMATION SHEET

Course code: **HS24133**
Course title: **COMMUNICATION SKILLS II**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 1.5 L: 0 T: 0 P: 3
Class schedule per week: 03
Class: B.Arch
Semester / Level: VI
Branch: All
Name of Teacher:

Course Objectives

This course enables the students:

A.	To improve listening comprehension and retention of spoken content.
B.	To develop fluency and coherence in oral communication.
C.	To enhance interpretative and inferential reading abilities.
D.	To foster clarity, coherence, and accuracy in writing.
E	To integrate LSRW skills for academic and real-life applications.

Course Outcomes (COs)

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

CO1.	Comprehend and retain spoken content using effective listening strategies.
CO2.	Express ideas fluently and accurately in structured speaking tasks.
CO3.	Interpret written texts with an ability to infer meaning and analyze arguments.
CO4.	Compose coherent and error-free writing suited to academic or professional contexts.
CO5.	Apply integrated LSRW skills to accomplish real-world communicative tasks.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Developing Listening Accuracy and Retention**:	This module focuses on enhancing learners' comprehension of spoken English in academic and workplace settings. Students will listen to excerpts from lectures, discussions, and presentations, identifying main ideas, supporting details, and speaker's intent. Through guided listening tasks followed by reflective exercises, they will improve their attention span and accuracy in comprehension. Note-taking strategies such as outlining, mapping, and summarizing will be practiced helping retain and organize information effectively	8
Module 2	**Improving Speaking Fluency and Confidence**	Students will participate in structured speaking activities to develop fluency, pronunciation, and coherence. They will engage in dialogues, role-plays, and short extemporaneous speeches on familiar and semi-formal topics. Emphasis will be placed on turn-taking, intonation, stress patterns, and overcoming hesitation. Students will receive peer and instructor feedback to refine their clarity and delivery style. This module will also include one formal oral presentation to build	8

		professional communication skills.	
Module 3	**Reading for Interpretation and Inference**	develops critical and analytical skills. Students will read short academic texts, articles, and essays from diverse fields. Emphasis will be placed on identifying tone, argument structure, underlying assumptions, and rhetorical devices. Comprehension tasks will move beyond factual recall to inference, synthesis, and evaluation. Vocabulary enhancement will be contextualized through guided annotation, dictionary use, and peer discussion.	8
Module 4	**Writing with Clarity and Purpose**	The focus is on constructing clear, cohesive, and audience-appropriate written content. Students will write short texts including paragraphs, summaries, formal emails, and brief reports. The module trains students in sentence structure, logical progression of ideas, and avoiding common errors. Through multiple drafting and peer review, they will learn to revise their work critically. An integrated LSRW task requiring writing based on listening and reading will conclude the module.	8
Module 5	**Integrative LSRW Project and Reflection**	The module integrates all four skills through a capstone communication task. Students will work in small groups to prepare and present a short seminar on a contemporary issue, using written reports, oral presentations, and visual aids. The task includes listening to peer presentations, offering written and oral feedback, and submitting a reflective journal on their learning experience. This module emphasizes teamwork, planning, and real-world communication competence.	8

Textbooks:

1) Communication Skills (2015) 2nd edition, Sanjay Kumar & Pushp Lata, Oxford University Press
2) Business Correspondence and Report Writing (2017), R.C.Sharma, Krishna Mohan. McGraw Hill

Reference Books:

1) Basic Business Communication-(2004). Lesikar I Flatley, McGraw Hill
2) Business Communication Today, (2017), Bovee, Thill and Chatterjee, Pearson
3) Krishnan, M, & Jha, S.(2024). *Focus: A course in Communication Skills*. Cambridge University Press
4) Suparna Dutta, 2013 Business Communication, PHI Learning Pvt Ltd, New Delhi

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: Nil

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery Methods:

CD1	Lecture by use of boards/LCD projectors/OHP projectors	✔
CD2	Assignments/Seminars	✔

CD3	Laboratory experiments/teaching aids	✔
CD4	Industrial/guest lectures	
CD5	Industrial visits/in-plant training	
CD6	Self- learning, such as the use of NPTEL materials and the internet	✔
CD7	Simulation	

Direct assessment

Assessment Tool	**% Contribution during CO Assessment**
Continuous Internal Assessment	60
End Semester exams	40

Continuous Internal Assessment	% Distribution
Day-to-day performance & assignments	30
Quiz 1	10
Viva- Voce	20

End Semester Examination	% Distribution
Examination: Submission of reports	30
Viva- Voce	10

Assessment Components	**CO1**	**CO2**	**CO 3**	**CO 4**	**CO 5**
Continuous Internal Assessment	✔	✔	✔	✔	✔
Examination: Submission of reports	✔	✔	✔	✔	✔

Mapping between course outcomes and course delivery method

Course Outcomes	**Module**	**Delivery Mode**
CO 1	I	Audio-based listening tasks Guided note-taking sessions Reflective listening exercises
CO 2	II	Dialogues and role-plays Peer interaction & group speaking Instructor-guided oral presentations
CO 3	III	Close reading sessions Vocabulary contextualization Discussion and written interpretation
CO 4	IV	Writing workshops Draft–review–revise activities Individual assignments (email, report, summary)
CO 5	V	Group project and presentations Integrated tasks (listen–read–write) Reflective journal writing

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
		Dr. Rohit Pandey

SEMESTER 7

Fourth Year (7th Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/ Week)**	**P (Periods/ Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26401	Housing	3	0	0	3	3	DC
ARP 26402	Structural Design and Systems	3	0	0	3	3	PC
ARP 26403	Climate Responsive Architecture - II	3	0	0	3	3	PC
Program Electives (Any one)							
ARP 26404	Green building and Sustainability	3	0	0	3	3	PE
ARP 26405	Architectural Journalism						
ARP 26406	Parametric Design						
Open Electives							
MCARPXXXXX (For MOOC)	OPEN ELECTIVE IV/MOOC	3	0	0	3	3	OE
Program Core - Sessional Subjects							
ARP 26411	Architectural Design - VII	0	0	9	12	9	Dept L/S
ARP 26412	Interior Design	0	0	4	3	4	Dept L/S
	Total Credit				**30**		
	Total Contact Hours					**28**	

COURSE INFORMATION SHEET

Course code: **ARP 26401**
Course title: **HOUSING**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To select different types of housing and methods of delivery for housing schemes
B.	To explain the issues involved with changing contextual policies for housing and generalize the new directions of opportunities
C.	To assess housing shortage and decide criteria for selection of land for development in order to bridge the gap in a settlement/ part of a settlement
D.	To analyze nature and causes of growth of deficient housing / slums and identify differentiated needs across income categories
E.	To evaluate and apply the settlement plan provisions affecting the housing delivery and development
F.	To apply the standards, norms and statutory regulations affecting the housing development and design of housing neighbourhoods

Course Outcomes

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

CO1.	**To define** basic elements of housing, neighbourhood, community and slums.
CO2.	**To outline** various housing policies and programmes
CO3.	**To explain** housing typologies or differentiate settlement design in terms of local context (Physical, economical, socio-cultural, ecological, environmental aspects)
CO4.	**To interpret** cause and effects housing demand and supply
CO5.	**To Apply** zoning regulations and sub-division techniques and computation for density, FAR, built-up area, as per development norms.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Housing**	Definition & concept of Housing, Housing typologies, Form of Housing provision (Plotted, Group Housing, Cooperative, Self Help, Leasehold, Freehold / Condominium, Rental Housing etc.) and Special Housing types (Barrier free, Mobile homes, congregate housing for assisted living, disaster housing, Student & public housing, Guest house, Night shelters, Incremental Housing etc.). Concept of Neighbourhood and community. Neighbourhood planning principles & examples	8

Module 2	**Housing Scenario & Urban Slums**	Overview of Housing situation in India, Census classification of houses, Computation of Housing Shortage. Understanding the causes of growth of Slums, Squatter settlements & Urban sprawl, Types and generic characteristics of slums, An overview of measures & approaches to slums & squatter settlements, Objectives of National Slum Policy (2002), Concept of few schemes e.g.: Site & Services, EIUS, BSUP, VAMBAY, IHSDP.	8
Module 3	**Affordable Housing, new trends & Housing Policy**	Affordable Housing, approach for affordable housing, Characteristics of Urban housing vis-à-vis Rural housing, Goals, Objectives & contents of National Housing & Habitat Policy (2007), Examples of housing schemes & programmes e.g., PMAY (U) 1.0 and PMAY (U) 2.0	8
Module 4	**Urban Settlement Planning System & Processes**	Recommended Planning system & inter-related plans, Scope, purpose & inter-relationship of various plans, Plan formulation process, Public sector & private sector actions & concept of joint venture, Contents of a Development plan	8
Module 5	**Norms & Standards for Urban & Housing Development**	Town & Residential density, FAR, Different types of codes/ norms affecting settlement development planning, Land –use Classification & compatibility of uses (e.g., compatible uses in residential zone), Factors affecting space standards / land requirements for facilities, Land area requirement for different uses in a town & for community facility in a sector/ residential planning area, Design Considerations based on subdivision norms / regulations	8

Text books:

1. J.D.Chiara et al; *Time Saver Standards For Housing & Residential Development.*
2. Bawa R. L., Fernandes B. G.*; Design for Living: A Guide for Planning of Residential Neighbourhoods; Galgotia Publishing Company; N. Delhi*
3. Modak& Ambedkar; *Town & Country Planning & Housing*

Reference books:

1. Populous K T(compiled); *Reading Material on Housing; Institute of Town Planners, India; New Delhi; 2002*
2. The SAGE Handbook of Housing Studies.
3. URDPFI guidelines
4. National Building Code of India 2016

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus :NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors/OHP projectors

CD2	Tutorials/Assignments
CD3	Seminars
CD4	Industrial/guest lectures
CD5	Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz	20
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4	CO5
Mid Sem Examination Marks	√	√	√	√	√
End Sem Examination Marks	√	√	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√	√	√
Assignment	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	3	3	1	2	1	2	3	2	1	2	2	2
CO2	3	3	2	2	1	2	3	2	1	2	1	2
CO3	3	3	2	2	2	2	3	3	3	3	3	2
CO4	3	1	1	2	2	2	3	2	1	2	2	2
CO5	3	3	3	3	3	3	2	3	2	3	3	3

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4, CO5
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO3, CO4
CD4	Industrial/guest lectures	CO3, CO4
CD5	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Rajan Chandra Sinha

COURSE INFORMATION SHEET

Course code: **ARP 26402**
Course title: **STRUCTURAL DESIGN AND SYSTEMS**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch
Semester / Level: VII
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To identify the concept of various structural elements and system
B.	To inculcate and promote among students an awareness of structural principlesinvolved in various building systems.
C.	To make students aware and understand the context of planning, designing and construction of High-Rise buildings and other structures.
D.	Emphasis on structural concepts and stability of forms rather than intricate numerical calculations. While dealing with different structural concepts, their importance shall be related to architectural requirements by giving examples from history of architecture / contemporary architecture.

Course Outcomes

After the completion of this course, students will be:

CO1.	Able to understand the various structural systems and their application in variousbuildings as per the requirement.
CO2.	Able to design and apply various modern structural systems in the high rise and large span structures in design.
CO3.	Able to increase their ability to identify the structural forms suitable for architectural expression.
CO4.	Able to understand and explore about use of various structural systems for various building applications.

Syllabus

Module No.	***Detailed Contents***	***No. of Lecture***
Module 1	The role of structure in the building, the interrelation between structural systems and architecture, and the concept of loads acting on a structure. Concept of arches, shells, domes, and vaults, its application and classification.	8
Module 2	Different structural systems: load bearing and framed system, reinforced concrete structure, pre-stress concrete structure, their structural concept, classification, and application. Structural elements - Slabs (one-way and two-way); beams (simply supported, cantilever, Vierendeel girders)Flat slab and coffered slab and their classification and application. Folded plate: structural concept and classification and application.	8
Module 3	High Rise Buildings- Introduction, Importance, Limitations, Advantages and Disadvantages, Structural Concept and its	8

	Application.	
Module 4	Trusses: classification and application in architecture, advantages, disadvantages, and use. Space frames: structural concept and application in buildings. Tensile structures: concept, classification, and application in architecture.	8
Module 5	Special structures: pneumatic structures, kinetic structures, and mobile structure: structural concept and application.	8

Text books:

1. Engel H, Structure Systems
2. Salvadori Mario, Building of Building
3. Butler Robert B; Architectural Engineering Design: Structural Systems
4. Schierle G G. ; Architectural Structure
5. Moore Fuller, Understanding Structure.
6. Wolfgang Schuller- High Rise Building Structures, John Wiley & Sons; New York1976.
7. Frei Otto; Tensile Structures ; Vol-II, Pneumatic Structures, Cable Structures: The MIT PressLondon.
8. N.Subramaniam; Principles of Space Structures: Wheeler& Co.; Allahabad 1983.
9. The architecture of cities: Rossi, Aldo

Reference books:

1. International Building Code 2009, International Code Council.
2. Bureau of Indian Standards. (2002). Criteria for Earthquake Resistant Design of Structures - GeneralProvisions and Buildings. IS: 1893 (Part 1).
3. National Building Code, Bureau of Indian Standards

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery Methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Industrial/guest lectures
Self- learning such as use of NPTEL materials and internets

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4

Quiz I	✓			
Quiz II		✓		
Mid-Semester Examination	✓	✓	✓	✓
End Sem Examination	✓	✓	✓	✓
Assignment		✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	3	3	2	2	2	2	2	1	1	1	3	2
CO2	3	3	2	2	2	2	2	1	1	1	3	2
CO3	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	2	2	2	2	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery Methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	
CD2	Tutorials/Assignments	CO3, CO4	
CD4	Mini projects/Projects	CO1, CO2, CO3, CO4	
CD6	Industrial/guest lectures	CO2, CO4	
CD8	Self- learning such as use of NPTEL materials and internets		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Ar. Anjali Pathak

COURSE INFORMATION SHEET

Course code: **ARP 26403**
Course title: **CLIMATE RESPONSIVE ARCHITECTURE 2**
Pre-requisite(s): Climate Responsive Architecture I; Building Information Modelling and Generative AI.
Co-requisite(s): None
Credits:03 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VII
Branch: Architecture & Planning
Name of Teacher:
Course Objectives

This course enables the students:

A.	To consolidate and deepen the theoretical foundations of climate-responsive design introduced in earlier semesters, with particular attention to building physics, bioclimatic principles, and regional climatic contexts within the Indian subcontinent.
B.	To develop applied competence in energy and environmental performance simulation software, principally Ladybug Tools (within Grasshopper/Rhino) and Autodesk Insight enabling students to quantify and visualise the thermal, daylighting, and energy behaviour of building proposals.
C.	To enable students to integrate BIM-based energy analysis workflows, using Revit's built-in energy optimisation tools alongside linked simulation environments, so that performance feedback informs design decisions from the schematic stage onward.
D.	To cultivate critical evaluation skills, allowing students to interpret simulation outputs, identify performance gaps, and iteratively refine architectural solutions in response to climatic data and energy benchmarks.
E.	To acquaint students with green building rating frameworks, GRIHA and LEED India in particular, situating software-based performance analysis within the professional and regulatory expectations of contemporary practice.

Course Outcomes

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

CO 1.	Interpret and apply climate data including EPW weather files, solar radiation profiles, wind rose diagrams, and psychrometric chart analyses to inform site-responsive and bioclimatically grounded architectural design decisions.
CO 2.	Conduct building performance simulations for thermal comfort, daylight autonomy, solar exposure, and annual energy use, using Ladybug Tools and Autodesk Insight, and communicate findings through annotated performance reports.
CO 3.	Integrate parametric and BIM-based energy analysis workflows, demonstrating the capacity to transfer building geometry from Revit or Rhino into simulation environments and to iteratively assess the effect of design variables on performance outcomes.
CO 4.	Critically evaluate architectural proposals against established energy benchmarks and green building rating criteria, proposing evidence-based design modifications that balance climatic responsiveness, occupant comfort, and resource efficiency.

SYLLABUS

Activities:	No. of Weeks

Module 1: Climate Data Literacy and Environmental Analysis Foundations • **Climate classification systems:** Koppen-Geiger and NBC classifications; understanding composite, hot-dry, warm-humid, and cold climatic zones of India. • **Weather data and instrumentation:** reading and interpreting EPW files; automatic weather stations; solar constant, sun-path geometry, and wind rose diagrams. • **Thermal comfort models:** PMV-PPD indices, adaptive comfort standards (ASHRAE 55, NBC), and their relevance to indoor environmental quality in Indian building typologies. • **Introduction to Climate Consultant:** visualising weather data; psychrometric chart analysis; passive design strategy identification for specific Indian climatic zones.	3 Weeks
Module 2: Environmental Simulation with Ladybug Tools • **Introduction to Ladybug Tools:** the Ladybug-Honeybee-Dragonfly ecosystem within Grasshopper/Rhino; importing and visualising EPW data. • **Solar and radiation analysis:** sun-path diagrams, radiation rose, direct and diffuse radiation studies, solar envelope and shadow range analysis. • **Outdoor thermal comfort:** UTCI mapping, wind comfort studies, pedestrian-level analysis for site and urban microclimate assessment. • **Daylighting simulation with Honeybee:** climate-based daylight modelling (CBDM); Daylight Autonomy (DA) and Useful Daylight Illuminance (UDI) for compliance with NBC daylighting standards.	4 Weeks
Module 3: BIM-Integrated Energy Analysis • **Revit Energy Optimisation (Autodesk Insight):** setting up an energy model within Revit; defining thermal zones, envelope assemblies, HVAC archetypes, and occupancy schedules. • **Autodesk Insight 360 workflows:** cloud-based energy simulation; interpreting Energy Use Intensity (EUI) benchmarks; sensitivity analysis of building orientation, glazing ratio, and shading depth. • **Green BIM:** the intersection of BIM and sustainability; exporting gbXML from Revit to third-party energy engines; coordinating design intent and performance documentation across disciplines.	3 Weeks
Module 4: Performance-Driven Facade and Passive System Design • **Envelope performance:** U-value and SHGC optimisation; shading device design validated through Ladybug radiation analysis; dynamic versus fixed shading strategies. • **Passive system simulation:** natural ventilation assessment using airflow network models; thermal mass sizing; earth-air heat exchange and evaporative cooling strategies. • **Iterative design refinement:** structured comparison of design alternatives using simulation outputs; documentation of performance gains through successive design iterations.	3 Weeks
Module 5: Green Building Rating Frameworks and Performance Reporting • **GRIHA rating system:** criteria, point allocation, and mandatory requirements; site ecology, building envelope, and energy performance credits. • **LEED India and ECBC compliance:** energy performance path under LEED v4.1; Energy Conservation Building Code mandatory and prescriptive provisions; role of simulation in compliance documentation. • **Performance reporting:** preparing a building performance report; communicating simulation results to non-specialist clients; post-occupancy evaluation methodologies.	2 Weeks

Design Assignments-

Studio assignments to be submitted at the end of each unit, comprising simulation models, performance reports, and annotated design drawings demonstrating climate-responsive decisions supported by computational analysis.

Viva Voce-

A final viva voce examination on the simulation portfolio and design assignments shall be conducted at the end of the semester.

Text Books:

1. Lechner, N. (2014). Heating, Cooling, Lighting: Sustainable Design Methods for Architects (4th ed.). Wiley.
2. Szokolay, S. V. (2008). Introduction to Architectural Science: The Basis of Sustainable Design (2nd ed.). Architectural Press.
3. Banham, R. (1984). The Architecture of the Well-Tempered Environment (2nd ed.). University of Chicago Press.
4. Tedeschi, A. (2014). AAD Algorithms-Aided Design: Parametric Strategies Using Grasshopper. Le Penseur Publisher.
5. Grondzik, W. T., & Kwok, A. G. (2014). Mechanical and Electrical Equipment for Buildings (12th ed.). Wiley.

Reference Books:

1. Olgyay, V. (1963). Design with Climate: Bioclimatic Approach to Architectural Regionalism. Princeton University Press.
2. Givoni, B. (1998). Climate Considerations in Building and Urban Design. Van Nostrand Reinhold.
3. Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2011). BIM Handbook: A Guide to Building Information Modeling (2nd ed.). Wiley.
4. Davidson, S. (2021). Grasshopper Primer (Third Edition). Modelab. [Ladybug Tools documentation at www.ladybug.tools]
5. GRIHA Council. (2019). GRIHA Rating System Version 2019. New Delhi: TERI.
6. Bureau of Energy Efficiency. (2017). Energy Conservation Building Code 2017. Ministry of Power, Government of India.

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil

Topics beyond Syllabus/Advanced Topics/Design: Nil

POs met through Topics beyond Syllabus/Advanced Topics/Design: Nil

Course Delivery Methods

CD1	Lecture by use of boards / LCD projectors / OHP projectors
CD2	Tutorials and studio assignments
CD3	Seminars and industrial / guest lectures from practitioners in sustainable design and building simulation
CD4	Mini projects and simulation-based design projects
CD5	Self-learning through NPTEL, online EPW repositories, Ladybug Tools documentation, and Autodesk Knowledge Network

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Mid Sem Examination Marks	25
End Sem Examination Marks	50

Quiz (02 nos. of 10 marks each)	20
Assignment / Simulation Portfolio	05

Assessment Components	CO1	CO2	CO3	CO4
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√	√
Assignment	√	√	√	√
Simulation Portfolio / Viva	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Course Objective	CO1	CO2	CO3	CO4
A	√	√		
B	√	√	√	
C		√	√	√
D		√	√	√
E	√		√	√

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	2	1	1	2	3	1	1	3	3	2	3
CO2	2	2	3	3	2	3	1	2	3	3	3	3
CO3	1	2	3	3	2	2	2	2	3	2	1	3
CO4	2	3	3	2	2	3	3	1	3	2	2	3

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcome
CD1	Lecture by use of boards / LCD projectors / OHP projectors	CO1, CO2, CO3, CO4
CD2	Tutorials and studio assignments	CO1, CO2, CO3
CD3	Seminars and industrial / guest lectures	CO1, CO3, CO4
CD4	Mini projects and simulation-based design projects	CO2, CO3, CO4
CD5	Self-learning: NPTEL, Ladybug documentation, Autodesk Insight tutorials	CO1, CO2, CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Apurv Ashish and Ashutosh Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26404**
Course Title: **GREEN BUILDING AND SUSTAINABILITY**
Pre-requisite(s): None
Co-requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VII
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the impact of the global energy crisis and accordingly commit to the professional responsibilities involved in it.
B.	To acquire basic knowledge regarding various types of renewable Energy sources applicable in the building industry
C.	To analyse the need for decreasing energy consumption in buildings and to incorporate specific measures accordingly
D.	To equip students with scientific knowledge for adopting and applying specific energy conservation measures in the building sector.
E	To explore the fundamental Materials and Methods Used to Construct Green Buildings and assess the impact of buildings on their Global and Local environment.

Course Outcomes

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

CO1.	Interpret and apply technical knowledge related to energy conservation in the building sector.
CO2.	Provide passive and active design solutions for energy-efficient buildings.
CO3.	Investigate ways to promote the efficient use of energy, water, and other building-related resources.
CO4.	Demonstrate knowledge related to sustainable development.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Green Building and Sustainability**	Principles of Sustainability: Three Pillars of Sustainability, Environmental Impact of Buildings, Sustainable Design Checklist and Priorities. Genesis of Green Building, Green Building – definition and attributes, Green Buildings in India.	8
Module 2	**Green Building Concept**	Green Ratings: LEED, TERI, GRIHA, etc. Implementation and Application Measures in Green Buildings. Introduction to Low Environmental Impact Design Strategies in LEED, TERI, GRIHA Rating Systems.	8
Module 3	**Sustainable Buildings Materials & Technology**	Sustainable materials, contemporary innovation in sustainable construction materials, recycled building materials, the fundamental materials and methods used to construct green buildings, and techniques of	8

		designing sustainable habitats.	
Module 4	**Energy Performance of a Building**	Thermal Performance of a Building, Visual Performance of a Building, Ventilation & Air Movement, Performance of Building Materials, Factors Affecting Energy Consumption, Energy Model, Energy Audit, and Energy Simulation Software.	8
Module 5	**Energy Conservation: Passive & Active Solar Techniques**	Basic Architectural Design Strategy, Energy Consumption in buildings, Thermal Comfort Criteria and Heat Flow within a building, Passive Heating and Cooling Techniques, Daylighting. Solar Collectors, Active Solar Water Heating, Storage of Solar Energy, and Active Space Heating Techniques.	8

Text books:

1. Kibert, C. J. (2022). Sustainable construction: Green building design and delivery (5th ed.). Wiley.
2. Carrico, C., & Rizzo, D. M. (2025). Green building: An engineering approach to sustainable construction. Elsevier.
3. Ching, F. D. K., & Shapiro, I. M. (2020). Green building illustrated (2nd ed.). Wiley.
4. Yadav, R., & Pathak, G. (2019). Green building: Towards sustainable development. McGraw Hill Education.
5. Addis, B., & Schouten, J. (2021). The green building materials manual. Routledge.
6. Kabre, C. (2018). Sustainable building design: Applications using climatic data in India. Springer.
7. Jain, A., & Ojha, A. (2025). Sustainable construction materials: Innovations for a greener future. Orange Books Publication.

Reference books:

1. Bureau of Energy Efficiency. (2017). Energy conservation building code (ECBC 2017). Ministry of Power, Government of India.
2. Bureau of Energy Efficiency. (2021). Eco-Niwas Samhita (ENS) 2021: Energy conservation building code for residential buildings. Ministry of Power, Government of India.
3. U.S. Green Building Council. (2019). LEED reference guide for building design and construction. U.S. Green Building Council.
4. Vallero, D. A., & Brasier, C. (2019). LEED practices, certification, and accreditation handbook. Butterworth-Heinemann.
5. U.S. Green Building Council. (2018). LEED reference guide for green building operations and maintenance. U.S. Green Building Council.
6. Roy, R. (2016). Green building: Principles and practices. Oxford University Press.

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars

Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√	√	√
Quiz II	√	√	√	√
Mid-Semester Examination	√	√	√	√
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	2	1	2	2	1	1	1	1	1	1
CO2	1	3	1	2	3	1	3	3	1	1	1	1
CO3	1	1	1	2	1	1	3	3	1	1	1	1
CO4	1	1	1	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	CD1, CD2
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	CD2, CD6
CD6	Industrial/guest lectures	CO1, CO2, CO3, CO4	CD2, CD4
CD8	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3, CO4	CD2, CD6
CD9	Simulation	CO1, CO2,	CD2, CD6

		CO3, CO4	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr Manjari Chakraborty, and Dr Tiwari Pavan Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26405**
Course title: **ARCHITECTURE JOURNALISM**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students to:

A.	To introduce the fundamentals and scope of architectural journalism, including its role in shaping discourse on the built environment.
B.	To develop an understanding of architectural criticism through historical and contemporary writings by Indian and international authors.
C.	To equip students with essential journalistic skills, including research, writing, editing, interviewing, and visual documentation.
D	To familiarise students with print, digital, and multimedia platforms, along with ethical and professional practices in journalism.

Course Outcomes

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

CO1.	Analyze architectural works and writings critically, identifying key themes and discursive techniques.
CO2.	Produce structured and effective journalistic content, including reports, reviews, and visual narratives.
CO3.	Apply research, interviewing, and editing skills to document and communicate architectural issues.
CO4.	Develop architectural content for print and digital media while adhering to ethical and professional standards.

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Introduction to Architectural Journalism and Criticism**	Introduction to journalism: concepts, scope, and objectives, Specialised journalism with emphasis on architectural journalism, Role of architectural journalism in shaping public discourse, Overview of historical and contemporary architectural criticism, Study of selected writings by Indian and international critics, Major critical themes and thematic categories in architectural writing over the past three centuries	8
Module 2	**Writing, Reporting, and Critical Analysis**	Principles of descriptive and analytical writing in architecture, Writing architectural reports, reviews, and critiques, Book reviews and analysis of architectural publications, Reporting on architectural projects, events, and contemporary issues, Techniques of argument, debate, and critical reasoning (evidence,	8

		persuasion, refutation), Interviewing techniques and public interaction	
Module 3	**Media, Publishing, and Editorial Practices**	Structure and organisation of architectural journals and magazines, Writing for print and digital media platforms, Editing of articles, features, and journalistic content, Page composition, layout, and presentation standards, Role of the editor and editorial processes, Code of ethics, documentation standards, and overview of press laws (including role of Press Council of India), Engagement with conferences, seminars, and professional networking	8
Module 4	**Digital Journalism and Multimedia Content Creation**	Introduction to digital and multimedia journalism, Content creation for web platforms and social media, Basics of journalism software and tools, Video documentation and walk-throughs of buildings, Understanding media formats: newspapers, magazines, radio, film, and television, Emerging trends in online architectural journalism	8
Module 5	**Architectural Photography and Documentation**	Fundamentals of architectural photography (composition, lighting, framing), Exterior and interior photography techniques, Photo journalism in architecture, Photographic documentation of buildings highlighting spatial qualities, Practical exercises in visual storytelling and documentation	8

Textbooks:

1. Writing About Architecture: Mastering the Language of Buildings and Cities — Alexandra Lange; Princeton Architectural Press; 2012;
2. The Architecture of Happiness — Alain de Botton; Penguin; 2006;
3. Delirious New York: A Retroactive Manifesto for Manhattan — Rem Koolhaas; Monacelli Press; 1978 (latest editions available);
4. Architectural Criticism and Journalism: Global Perspectives — Edited by Mohammad Al-Asad et al.; Aga Khan Award for Architecture; 2006
5. Media Building: Architecture, Design, and the Spatial Politics of Mass Communication — Will Mari et al.; Springer; 2025
6. The Death and Life of Great American Cities — Jane Jacobs
7. Exploration of Architectural Journalism in India — Pappal Suneja; IBP Books; 2017

Reference books:

1. How to Read Architecture — Carol Davidson Cragoe; Rizzoli; 2nd Ed., 2012.
2. Architecture: The Critic's Guide to 100 Masterpieces — Owen Hopkins; Laurence King; 2014.
3. Theorising a New Agenda for Architecture — Kate Nesbitt (Ed.); Princeton Architectural Press; 1996 (reprints available)
4. Architectural Photography — Adrian Schulz; Rocky Nook; 2nd Ed., 2015; practical techniques for photographing building

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil
POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods

Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√	√	√
Quiz II	√	√	√	√
Mid-Semester Examination	√	√	√	√
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	2	1	2	2	1	1	1	1	1	1
CO2	1	3	1	2	3	1	3	3	1	1	1	1
CO3	1	1	1	2	1	1	3	3	1	1	1	1
CO4	1	1	1	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	CD1, CD2
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	CD2, CD6

CD6	Industrial/guest lectures	CO1, CO2, CO3, CO4	CD2, CD4
CD8	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3, CO4	CD2, CD6
CD9	Simulation	CO1, CO2, CO3, CO4	CD2, CD6

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr Rizwan Kazmi

COURSE INFORMATION SHEET

Course code: **ARP 26406**
Course title: **PARAMETRIC DESIGN**
Pre-requisite(s): The student must have cleared Building Information Modelling and Generative AI course.
Co-requisite(s): None
Credits:3 L: 3 T: 0 P:0
Class schedule per week: 3
Class: B. Arch
Semester / Level: VII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives
This course enables the students:

A.	To introduce students to the theoretical underpinnings and historical evolution of parametric design, situating computational approaches within broader architectural discourse.
B.	To develop practical competence in parametric modelling software — principally Rhinoceros 3D and Grasshopper — with selective engagement of relevant plugins for environmental and structural analysis.
C.	To enable students to generate, evaluate, and iterate complex geometric forms and building elements through rule-based, algorithm-driven design processes.
D.	To cultivate critical awareness of digital fabrication methods, responsive facade design, and the application of parametric tools within professional architectural practice.

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

CO1.	Understand and articulate the principles of parametric and algorithmic design, including their historical development from analogue precedents to contemporary computational practice.
CO2.	Generate complex three-dimensional architectural geometries using Rhinoceros 3D and Grasshopper, demonstrating facility with NURBS surfaces, Boolean operations, and parametric relationships.
CO3.	Design and evaluate parametric building elements including facades, roofs, and structural members by embedding environmental, structural, and spatial constraints within the computational model.
CO4.	Translate parametric digital models into fabrication-ready outputs, evidencing an understanding of additive and subtractive manufacturing processes relevant to architectural production.

SYLLABUS-

Activities:	No. of Weeks
1. Elements of Parametric Design • **Historical context:** from Gaudí's ruled surfaces and Frei Otto's hanging models to the digital turn in computational architecture. • **Parametric design theory:** rule-based thinking, associative modelling, and the structure of parametric design processes. • **Design patterns and approaches:** an overview of morphogenetic, topological, and performance-driven parametric strategies.	2 Weeks
2. Geometric Modelling with Rhinoceros 3D • **Fundamentals:** spatial coordinates, NURBS curves and surfaces, Boolean operations, and formal transformations.	3 Weeks

• **Surface operations:** free-form surface creation, surface deformation, discretisation, and meshing strategies. • **Digital prototyping:** geometry reconstruction and model preparation for parametric workflows.	
3. Parametric Tools and Techniques — Grasshopper • **Visual programming logic:** data trees, lists, and algorithmic flow within the Grasshopper canvas. • **Component-based design:** building geometric relationships among complex shapes; use of LunchBox for panelisation and Weaverbird for mesh operations. • **Environmental integration:** introduction to Ladybug for climate analysis and passive design optimisation within parametric models. • **Scripting basics:** a selective introduction to Python scripting within Grasshopper for design automation.	4 Weeks
4. Parametric Building Elements and Responsive Design • **Component design:** parametric facades, roof structures, and non-standard building elements embedding structural and environmental performance criteria. • **Kinetic and responsive facades:** design of adaptive shading systems and dynamic building skins responding to climatic parameters. • **BIM integration:** exporting parametric models from Grasshopper to Revit via Rhino.Inside, maintaining associativity across platforms.	4 Weeks
5. Digital Fabrication • **Fabrication logic:** translating parametric models into fabrication-ready geometry; nesting and unrolling surfaces. • **Manufacturing processes:** CNC cutting, CNC milling, and laser cutting — subtractive methods and their architectural applications. • **Additive manufacturing:** 3D printing techniques (FDM and SLS); model scaling and material considerations for physical prototyping.	2 Weeks

Design Assignments-
Studio assignments to be conducted at the end of each thematic unit, requiring students to submit parametric models, process documentation, and reflective notes.
Viva Voce-
A final viva voce examination on the design assignments and computational portfolio shall be conducted at the end of the semester.

Text Books:
1. Woodbury, R. (2010). Elements of Parametric Design. Routledge.
2. Tedeschi, A. (2014). AAD Algorithms-Aided Design: Parametric Strategies Using Grasshopper. Le Penseur Publisher.
3. Burry, M. (2011). Scripting Cultures: Architectural Design and Programming. Wiley.
4. Jabi, W. (2013). Parametric Design for Architecture. Laurence King Publishing.
5. Shiffman, D. (2012). The Nature of Code: Simulating Natural Systems with Processing. Self-published.

Reference Books:
1. Kolarevic, B. (ed.) (2003). Architecture in the Digital Age: Design and Manufacturing. Spon Press.
2. Oxman, R. & Oxman, R. (eds.) (2014). Theories of the Digital in Architecture. Routledge.
3. Menges, A. & Ahlquist, S. (eds.) (2011). Computational Design Thinking. Wiley.
4. Iwamoto, L. (2009). Digital Fabrications: Architectural and Material Techniques. Princeton Architectural Press.
5. Davidson, S. (2021). Grasshopper Primer (Third Edition). Modelab.

Gaps in the Syllabus (to meet Industry/Profession requirements): NA

POs met through Gaps in the Syllabus: Nil

Topics beyond Syllabus/Advanced Topics/Design: Nil

POs met through Topics beyond Syllabus/Advanced Topics/Design: Nil

Course Delivery Methods

CD1	Seminars and theory lectures
CD2	Studio assignments and mini projects
CD3	Industrial / guest lectures from practitioners in computational design
CD4	Self-learning through NPTEL materials, online tutorials, and parametric design repositories
CD5	Software workshops: Rhinoceros 3D, Grasshopper (with Ladybug, LunchBox, Weaverbird)

Course Outcome (CO) Attainment Assessment Tools & Evaluation Procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Mid Sem Examination Marks	√	√	√	√
End Sem Examination Marks	√	√	√	√
Assignment	√	√	√	√
Studio Portfolio / Viva	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Course Objective	CO1	CO2	CO3	CO4
A	√	√		
B		√	√	
C		√	√	√
D			√	√

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	2	1	2	2	1	1	1	1	1	1
CO2	1	3	1	2	3	1	3	3	1	1	1	1
CO3	1	1	1	2	1	1	3	3	1	1	1	1
CO4	1	1	1	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) Methods

CD	Course Delivery Methods	Course Outcome
CD1	Seminars and theory lectures	CO1, CO2, CO3, CO4
CD2	Studio assignments and mini projects	CO1, CO2, CO3
CD3	Industrial / guest lectures	CO1, CO3, CO4
CD4	Self-learning such as use of NPTEL materials and internet	CO1, CO2, CO3, CO4
CD5	Software workshops: Rhinoceros 3D, Grasshopper (Ladybug, LunchBox, Weaverbird)	CO2, CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Apurv Ashish & Revati Raman

COURSE INFORMATION SHEET

Course code: **ARP 26411**
Course title: **ARCHITECTURAL DESIGN-VII**
Pre-requisite(s): Should have cleared all courses up to V Semester
Co- requisite(s): None
Credits: 12 L: 0 T: 0 P: 9
Class schedule per week: 9
Class: B. Arch
Semester / Level: VII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To apply the design theory and principles in the design of a multi-functional, service (advanced services) oriented buildings.
B.	Low rise / medium rise /high rise buildings with complex issues to be tackled covering functional relationship, climatic condition, public spaces, physical infrastructure, socio-cultural aspects along with structural considerations and building services.
C	To apply and use the relevant building bye-laws and provisions of National Building Code in the design assignments
D	To estimate the approximate cost of the areas

Course Outcomes

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

CO1.	Design of various components and aspects associated with the urban environment in terms of physical infrastructure, socio cultural aspects etc, with an integration of the various building services.
CO2.	Development of site planning/ constructional details with a focus on understanding the designing of a complex building with all aspect of site planning and services in urban setting.

Syllabus

MAJOR DESIGN PROBLEM (10 Weeks) — *Individual Work*

Option A: Live Project — Group Housing Neighbourhood (250 Units)	
Site Context	Actual government/ Real Estate housing project with site .
Programme	200 Units for MIG and HIG Category along with 50 low-income dwelling units (Type A: 30 sqm, Type B: 45 sqm), community centre (200 sqm), Club house, open-to-sky courts, parking, waste management point, Plot area accordingly.
Design Focus	• Circular building design — programme elective H; design for material reuse, adaptability, and decarbonisation • Cost-effective construction — optimised brick/block modular grid; minimal material waste • Universal accessibility — every unit accessible; lift provision in stacked typology • Landscape — community garden, children's play, solar streetlights

Innovation Challenge	Design every dwelling so that the family can extend it themselves by one room in future — design includes a manual for self-extension.
Deliverables	Live project report (client brief, site visit, community consultation notes), master plan (1:500), unit types (1:50), community facilities (1:100), phasing strategy
Option B: Integrated Bus Terminal and Urban Hub	
Site Context	City-centre brownfield site (2.5 acres) — existing bus depot being upgraded; Central bus stand redevelopment
Programme	Intercity bus platforms (30), local bus bays (20), commuter facilities (ticketing, luggage, toilets, ATMs, police post), commercial podium (retail, food court, offices), sky bridge connectivity; 15,000–18,000 sqm
Design Focus	• Urban design — interface between transit hub and city street • Structural systems — long-span canopy over bus bays using tensile or space frame • Climate response for public waiting — passive cooling, natural ventilation • Universal accessibility — all platforms and facilities universally accessible
Innovation Challenge	Design the roof of the bus canopy as a public park — accessible by pedestrians from the street via a ramp, independent of the terminal functions below.
Deliverables	Urban context plan, functional zoning, circulation diagram, multi-level plans/sections/elevations (1:200/1:100), structural concept, section-perspective
Option C: Green Business Park — IT Campus	
Site Context	Flat greenfield site (3 acres), — near existing IT corridor; site has a seasonal nala (stream) running along one edge
Programme	IT office towers (3 blocks x 5,000 sqm), shared amenity podium (cafeteria, gym, crèche, medical), basement parking, green plaza; total built area 18,000–20,000 sqm
Design Focus	• Green Buildings — programme elective D; target LEED or IGBC Gold certification • Parametric facade design — programme elective F; optimised solar shading using algorithmic tools (BIM/Grasshopper) • Structural system for office high-rise — core and frame; transfer slabs • Water body as landscape feature and ecological asset — nala restored as bioswale
Innovation Challenge	Every office floor must have a work-from-nature zone — a semi-open terrace garden accessible directly from workfloor.
Deliverables	Master plan, greenfield development strategy, tower plans/sections/elevations (1:200/1:100), facade analysis, green building scorecard, landscape plan

Option D: University Campus Master Plan + Academic Block	
Site Context	Undulating terrain (15 acres) — new campus for a proposed university; 1:15 average slope
Programme	Phase 1: Academic block (classrooms, labs, library, admin — 10,000 sqm); overall master plan for 5,000-student campus including hostels, sports,

	cafeterias, faculty housing, open spaces
Design Focus	• Campus planning principles — legibility, hierarchy, ecology, phasing • Contoured site design — buildings follow contours; no major cut-and-fill • Vernacular material and climate response for Jharkhand • Biophilic campus — 40% green cover maintained through all phases
Innovation Challenge	Design the campus so that the central open space is a 'campus farm' — a productive landscape that provides food, learning, and community gathering.
Deliverables	Master plan (1:1000), phasing diagram, section through site, Phase 1 academic block (1:100), landscape design intent

VERTICAL STUDIO PROJECT (2 Weeks)

Option	Title	Brief Description
Option A	**Memorial Park and Sculpture Garden**	Design a 0.5-acre memorial park for a public figure or historical event; integrate sculpture, water, planting, and interpretive panels; universal access; no built enclosure.
Option B	**Parametric Facade Study**	Using parametric tools (Grasshopper, Revit, or hand-ruled geometry), design a facade module that responds to orientation; apply to a 20m x 30m building face; produce shadow studies.
Option C	**Transit Node Micro-intervention**	Identify one uncomfortable transit node (bus stop, auto stand, footpath junction) and design a 50 sqm micro-intervention that improves comfort, identity, and accessibility.
Option D	**Interior Design — Conference Centre**	Design the interior of a 200-seat conference centre within an existing building shell; address acoustics, lighting, furniture, and wayfinding through an interior architecture proposition.

Viva voce : Final Viva-vice on all the design assignments to be conducted at the end of the semester by experts from the field.

Text books:

1. Kevin Lynch, “Site Planning”, MITPress, Cambridge, 1984.
2. MiliMazumdar, “Energy Efficient Buildings in India”,TERI, New Delhi, 2012
3. DianeTsang, “SPACE Shopping Mall”, Pace Publishing, 2011
4. Lara Menzel, “Office Architecture and Design”, Braua Publishers 2009.
5. Sheri Koones, “Prefabulous and Sustainable: Building and Customizing an affordable, Energy efficient home”,ABRAMS, 2010.

Reference books:

1. JosephDeChiara,MichaelJ.Crosbie,“TimeSaversStandards for Housing and Residential Development”,McGraw Hill Professional 2001.
2. Ernst Neuferts, “Architects Data”, Blackwell, 2002.
3. National Building Code of India,Vol 1-5, 2005.
4. Daniel Williams, “Sustainable Design: Ecology, Architecture & Planning”, John Wiley & sons Inc, NJ, 2007.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2
Day-to-Day Progressive Evaluation	√	√
End-Sem Performance	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	3	2	2	2	2	2	2	1	1	1	3	2
CO2	1	3	1	2	1	1	2	1	1	1	3	2

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2,
CD2	Tutorials/Assignments	CO1, CO2,
CD3	Seminars	CO2,
CD4	Mini projects/Projects	CO1, CO2,
CD5	Laboratory experiments/teaching aids	CO1, CO2,
CD6	Industrial/guest lectures	CO1, CO2,
CD7	Industrial visits/in-plant training	CO1, CO2,
CD8	Self- learning such as use of NPTEL materials and internets	CO1, CO2,
CD9	Simulation	

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Rajan Chandra Sinha and Dr. Shama Parween

COURSE INFORMATION SHEET

Course code: **ARP 26412**
Course title: **INTERIOR DESIGN**
Pre-requisite(s): Should have cleared all courses up to V Semester.
Co- requisite(s): None
Credits: 3 L: 0 T: 0 P: 4
Class schedule per week: 04
Class: B. Arch
Semester / Level: VII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the visual language of interiors through exploring the elements and principles of design and recognize various materials and surface treatments used in Interiors along with its technology of application and specifications.
B.	To familiarise the students with latest technological aspects of building services and develop their skills to assimilate various aspects of interior space to design functional and meaningful spaces which meets the expected ambience.
C.	To build the capacity of students to generate creative and functional solutions for residential and non-residential interior design problems including programming, schematic concept development, design development and construction documentation for mid to large-scale multi-functional interior spaces.

Course Outcomes

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

CO1.	To demonstrate the application of design principles, building services and construction systems in developing and providing contextual interior design solutions.
CO2.	To demonstrate capabilities of research, analysis, and synthesis gained through the course work to generate appropriate and creative design solutions for the interior projects undertaken.
CO3.	To develop knowledge, abilities and attitudes essential to the practice of Interior Design.

Sessional Input:

The students should be given theoretical inputs during the interior design sessional class regarding:

- Elements of Interior Design; transformation of design elements
- Enveloping space, contained space and residual spaces, Spaces within space.
- Colour for interiors: hue, chroma and tonal values, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Colour planning process.
- Interior lighting: direct and indirect lighting, location and light grid systems, luminaire types, quality of lighting. Ambient, task and accent lighting.
- Various systems of Air Conditioning.
- Furniture design. Modular approach in system furnishings. Selection and design of accessories.
- Principles of interior landscaping, texture, height grouping and layout. Plant species specifications.

- Open office system, Industrial interiors and specialized interior space design. Styles of Interiors: Italian, English, French, Japanese styles etc.
- Presentation of interior design schemes with detail specification for the materials and technology used.

Syllabus

Activities:

- Students must work on minimum two Interior Design projects, one residential and one non-residential, as a part of the studio exercise;
    - Residential Interior design projects: *6 weeks*
    - Non-residential Interior design projects can be considered for anyone: *8 weeks*
        - offices, factories, library, hospitals, hotels, shopping malls, showrooms, Hotel lobbies, Banquet halls, cinema, and exhibition halls.
- The studio exercises undertaken should demonstrate the knowledge assimilated during the course and give design solutions that include:
    - multiple interrelated activity spaces designed for functional and ergonomic efficiency and ambience, and
    - identifies appropriate building materials, furnishings, furniture, illumination, services, fixtures, hardware, plants etc for the proposed interior design solution

Other activities to be undertaken:

- Study and exposure to eminent interior designers works;
- Site visits, documentation exercises, workshops, guest-lectures, seminars to be organized including interactions with professionals, consultants, and skilled artisans;
- Submission of reports on various lectures, site visits; market surveys

Viva voce: Final Viva-vice on the Interior design assignments to be conducted at the end of the semester by experts from the field.

Text books:

Reference books:

1. Francis .D.K. Ching. (1987). Interior Design Illustrated, V.N.R. Pub., NY 1987.
2. Ching, Francis D K. and Binggeli, Corky. (2012). Interior design illustrated, 3rd ed, John Wiley, N. Jersey:
3. Steport-De Van Kness, Logan and Szebely., (1980). Introduction to Interior Design. Macmillan Publishing Co., NY
4. Allen Tate and C. Ray Smith. (1986). Interior Design in the 20thCentury, Harpercollins College Div
5. Reznikoff, S. C. (1986).Interior Graphic & Design Standards. Watson-Guptill
6. Beginnings of Interior Environment by Phyllis Sloan, Allen & Miriam F. Stimpson (10th edition).7.John F. Pile, Interior Design, Published by Harry N. Abrams, Inc., Publishers, New York, 1995.
8. Interior Design Course, Mary GilliatCoyran, Octopus Ltd. London
9. Time Savers Standard for Interior Design, Joseph De Chiara, McGraw Hill New York
10. Archi World Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV.Archi World Co., Korea, 2003.
11. Sethi, S. Indian Interiors: Intaerieurs De L'Inde (Interiors (Taschen),
12. Whito, S., (2010). Elements of Interior Design and Decoration. Read Books
13. Caan, S. Rethinking Design and Interiors: Human Beings in the Built Environment,
14. Starmer, A. (2012). The Color Scheme Bible: Inspirational Palettes for Designing Home Interiors.
15. Linda O'Shea, Chris Grimley, Mimi Love. (2013). The Interior Design Reference & Specification Book: Everything Interior Designers Need to Know Every Day (Indispensable Guide)

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus :NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Seminars
Mini projects/Projects
Industrial/guest lectures
Site visits/ case study documentations

	Course Delivery methods
CD1	Seminars
CD2	Mini projects/Projects
CD3	Laboratory experiments/teaching aids
CD4	Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**
Progressive Evaluation	√	√	√
End Sem Evaluation	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO1 2
CO1	3	3	3	3	2	2	2	2	1	1	1	2
CO2	2	3	2	2	3	3	3	1	1	2	1	3
CO3	3	3	3	3	3	2	1	1	2	3	3	2

CD	Course Delivery methods	Course Outcome	Course Delivery Method
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1 and CD2
CD2	Tutorials/Assignments	CO2	CD1 and CD2
CD3	Seminars	CO3	CD1 and CD2

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Ar. Ritu Agrawal & Dr. Rizwan Kazmi

SEMESTER 8

Fourth Year (8th Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/ Week)**	**P (Periods/ Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26451	Introduction to Urban Planning & Design	3	0	0	3	3	DC
ARP 26452	Disaster Resilient Architecture	3	0	0	3	3	PC
Program Electives							
ARP 26453	Resilient Cities and Climate Change	3	0	0	3	3	PE
ARP 26454	Circular Economy in the Built Environment						
ARP 26455	Road Safety and Civic Sense						
Open Elective or MOOC Course							
MCARPXXXXX	MOOC Course	0	0	0	3	3	MOOC
Program Core - Sessional Subjects							
ARP 26461	Architectural Design - VIII cum Live Project	0	0	12	15	12	Dept L/S
ARP 26462	Dissertation	0	0	4	3	4	Dept L/S
				Total Credit	**30**		
				Total Contact Hours		**28**	

COURSE INFORMATION SHEET

Course code: **ARP 26451**
Course title: **INTRODUCTION TO URBAN PLANNING AND DESIGN**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L:3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VIII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To introduce students to the historical evolution of cities and the foundational theories and concepts that underpin modern urban planning and design, including the contributions of key pioneers
B.	To equip students with the necessary knowledge of the planning process, including methods for conducting urban surveys, collecting and analyzing spatial and demographic data, and the principles of plan formulation.
C.	To familiarize students with the legislative framework and regulatory tools used to control and guide urban growth
D.	To develop the student's ability to analyze and critique urban form and the quality of the public realm by applying core urban design principles, including Kevin Lynch's elements of city image and the concept of Townscape.
E.	To encourage critical thinking regarding contemporary urban challenges facing India (e.g., slums, unsustainable growth, mobility) and to foster an appreciation for the principles of sustainable and equitable urban development.

Course Outcomes

After the completion of this course, students will able:

CO1	To contextualize planning history and theory
CO2	To apply planning methodology and data
CO3	To interpret and apply regulatory tools
CO4	To evaluate urban infrastructure standards
CO5	To analyze urban image and legibility.
CO6	To propose sustainable urban interventions.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Understanding the Urban Context and History**	1.1 Definitions and Scope: Defining Town Planning, Urban Design, Regional Planning, and their relationship to Architecture. 1.2 Historical Evolution of Cities: Principals of Human Settlement of cities and towns of various historical periods like Egyptian, Greek, Roman, Medieval, Renaissance, Neo-classical, Baroque. 1.3 Town Planning in India- Vedic period, Indus Valley,	8

		Islamic, Medieval and Colonial Period. 1.4 Planning concepts given by Ebenezer Howard, Patrick Geddes, Clarence Perry, Frank Lloyd Wright, Le Corbusier, Soria Y Mata, Lewis Mumford, Clarence Stein, and C.A. Doxiadis.	
Module 2	**Survey, Analysis, and Plan-Making Process**	2.1 Planning Surveys and Data Collection: Types of urban data (demographic, socio-economic, land use, traffic, infrastructure). Techniques for conducting physical and social surveys. 2.2 Urban Analysis Techniques: Analyzing the collected data. 2.3 Planning Hierarchies: Understanding the administrative structure of planning in India (or relevant national context): o Regional Plans, Master/Development Plans, Zonal Plans, Local Area Plans. 2.4 The Plan-Making Process: Stages involved in preparing a Master Plan: goal setting, projection of future needs (population, housing, infrastructure), plan formulation, and implementation**.**	8
Module 3	**Zoning, Land Use, and Regulations**	3.1 Land Use Planning: Principles of functional classification of land (residential, commercial, industrial, recreational, transport). 3.2 Urban Infrastructure: Planning standards and requirements for essential services: water supply, sanitation (sewerage), solid waste management, and power distribution. 3.3 Urbanisation, emergence of new forms of developments – SMART cities, SEZ, transit-oriented development, integrated townships, case studies	8
Module 4	**Urban Design Principles**	4.1 Concepts of Urban Form: Understanding the elements that constitute the physical city: Figure-Ground, grain, block size, and typology. 4.2 Imageability and Legibility: Detailed study of Kevin Lynch's elements for reading the city: Paths, Edges, Districts, Nodes, and Landmarks. 4.3 Public Realm Design: Principles for designing high-quality public spaces (streets, squares, parks, plazas). Importance of Streetscape, street furniture, and landscape design.	8
Module 5	**Contemporary Issues and Urban Design approaches**	5.1 Sustainable Urban Development: Principles of Sustainable Planning, incorporating environmental considerations, resource efficiency, and climate resilience. 5.2 Designing parts of the city – central areas, town areas, civic areas, shopping centers, Industrial areas, residential areas and housing, Formal and natural urban spaces in urban design, urban blights, urban renewal/ rejuvenation of urban form, Case study / appraisal of an urban center / central business district /Town center in view of the above issues related to Urban Design.	8

Text books:

1. Bawa, V. K. (2009). *Urban planning theory and practice*. CBS Publishers & Distributors.

2. Kostof, S. (1991). *The city shaped: Urban patterns and meanings through history*. Bulfinch Press.
3. Hall, P., & Tewdwr-Jones, M. (2011). *Urban and regional planning* (5th ed.). Routledge.
4. Bandyopadhyay, A. (2000). *Textbook of town planning*. Books & Allied (P) Ltd.
5. C.A.Doxiadis, (1968). Ekistics, An Introduction to the Science of Human Settlements, Hutchinson, London.
6. Lynch, K. (1960). *The image of the city*. The MIT Press.
7. Bacon, E. N. (1974). *Design of cities*. Penguin Books.
8. Gallion, A. B., & Eisner, S. (2006). *The urban pattern: City planning and design* (4th ed.). CBS Publishers & Distributors.
9. Zamora, F. (1998). *Source of contemporary urban design*. Harper Collins Publisher.
10. Lynch, K. (1960). *The image of the city*. The MIT Press.

Reference books:

1. URDPFI Guidelines 2014– Ministry of Housing and Urban Affairs (MoHUA), Government of India
2. Jacobs, J. (1992). *The death and life of great American cities*. Vintage Books.

Gaps in the syllabus (to meet Industry/Profession requirements) : nil

POs met through Gaps in the Syllabus : nil

Topics beyond syllabus/Advanced topics/Design : nil

POs met through Topics beyond syllabus/Advanced topics/Design : nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Sem Examination Marks	√	√	√	√	√	√
End Sem Examination Marks	√	√	√	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√	√	√	√
Assignment / Quiz (s)	√	√	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	2	1	2	1	1	1	1	1	1	1	1	1
CO2	3	3	1	1	1	2	2	2	1	1	1	1
CO3	1	1	3	2	1	2	1	3	1	1	1	2
CO4	1	1	1	1	1	1	1	1	1	2	1	2
CO5	1	1	1	1	1	1	1	3	1	1	2	1
CO6	3	2	1	1	3	1	1	1	2	2	3	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1	CD1, CD2
CD2	Tutorials/Assignments	CO2	CD3, CD6
CD3	Seminars	CO3	CD2, CD3, CD4
CD4	Mini projects/Projects	CO4	CD1, CD2, CD3
CD5	Laboratory experiments/teaching aids	CO5	CD2, CD6
CD6	Industrial/guest lectures	CO6	CD2, CD4
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Satyaki Sarkar

COURSE INFORMATION SHEET

Course code: **ARP 26452**
Course title: **DISASTER RESILIENT ARCHITECTURE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VIII
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To develop awareness about disasters, hazards, exposure & risk.
B.	To understand the disaster management cycle's significance, concept, components, and phases.
C.	To develop an understanding of earthquake, cyclone and flood resilient building design aspects and features and identify their role in design & planning solutions for reducing risk.
D.	To learn about disaster risk reduction through land use and zoning control, site planning and land management measures for natural hazards like earthquakes, cyclones and floods.
E	To learn about institutional arrangements, policies and plans of international and national disaster management agencies.

Course Outcomes

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

CO1.	To explain the concept, components, and phases of the disaster management cycle.
CO2.	To learn strategies, design regulations and codes for preparing disaster-resilient structures.
CO3.	To identify earthquake-, cyclone-, and flood-resilient building features and construction techniques, and to design a resilient building against these hazards.
CO4.	To understand the role of national and international disaster management agencies in the formulation of policies, plans and implementation of disaster management on the ground.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Fundamentals of Disaster and Disaster Management**	Definitions and concepts related to disaster and the related terms– Hazards, Vulnerability, Capacity, Risk. Hazards: classification and types. Causal factors of disaster. Phases of Disaster. The link between disaster and development. Aspects of Disaster Preparedness and Risk Assessment. Nature of disaster in India: Major disasters in the Indian context; Disaster profile of the country; Factors contributing to the vulnerability of the Indian population.	8
Module 2	**Resilient Building Design**	Fundamentals of earthquakes. Earthquake effects on natural and manmade environment: Behaviour of various types of buildings, structures, and collapse	8

	Concepts and Features for Earthquake Hazard	patterns. Behaviour of Non-structural elements. General seismic planning and design consideration related to building configuration. BIS provisions on earthquake resistant built environment for non-engineered and reinforced concrete buildings. Fundamental of ductile detailing. Seismic retrofitting. Some traditional local/ regional responses. Case studies of some housing prototypes.	
Module 3	**Disaster Resistant Building Practices for Cyclone Hazards**	Climate change and its impact on tropical cyclones. Fundamentals of cyclonic winds. Behaviour of structures in cyclones and windstorms. General planning/design considerations under windstorms & cyclones & wind resistant features in design. Cyclonic retrofitting, strengthening of structures and adaptive sustainable reconstruction. Codal Provisions, design wind speed, pressure coefficients, innovative construction material & techniques, and traditional construction techniques in coastal areas. Case studies of some housing prototypes.	8
Module 4	**Disaster Resistant Building Practices for Flood Hazards**	Causes of floods. Flood mitigation measures. Elements at risk of flood damage. Mechanism of damage to buildings. Categories of damage to housing. Protection from rain damage. General protection of habitat/ buildings from flood damage. Specific protection of houses against inundation effects. Specific protection of houses against flowing water. Recommendation for construction of flood-resistant houses. Case studies of some housing prototypes.	8
Module 5	**Concept of Resilient Cities and International and National Agencies in Relief:**	UNs mandate for disaster management; International Landmarks in Disaster Management: International decade for Disaster Risk Reduction; Hyogo Framework; Sendai Framework. Mandate of India's Disaster Management Act, 2005; Legal and Institutional Framework for Disaster Management; Mandate of National Disaster Management Authority (NDMA); National Disaster Management Plan (2016).	8

Text books:

1. Disaster Response- A Handbook for Emergencies, Babu Thomas, 1993
2. McDonald, R. (2003). Introduction to Natural and Man-made Disasters and their Effects on Buildings. Burlington: Architectural Press.
3. Agarwal, P. and Shrikhande, M. (2009). Earthquake Resistant Design of Structures. New Delhi : PHI Learning.
4. Building Urban Resilience: Principles, Tools, and Practice edited by Abhas K. Jha, Todd W. Miner, Zuzana Stanton-Geddes
5. Holmes, J. D. (2007). Wind Loading of Structures. 2nd Ed. Taylor & Francis.
6. Talwar, A. K. and Juneja, S. (2009). Cyclone Disaster Management. Commonwealth Publishers
7. Burby, R. J. (1998). Cooperating with Nature. Confronting Natural Hazards with Land-Use Planning for Sustainable Communities. Washington: Joseph Henry Press.

Reference books:

1. Vulnerability Atlas of India, Third Edition, 2019.
2. Improving Earthquake Resistance of Housing, 2010, BMTPC.

3. Improving Flood Resistance of Housing, 2010, BMTPC.
4. Improving Cyclone Resistance of Housing, 2010, BMTPC.
5. Dutta, S. C. and Mukhopadhyay, P. (2012). Improving Earthquakes and Cyclone Resistance of Structures: Guidelines for the Indian Subcontinent. TERI.
6. S. Rajagopal – Problems of housing in cyclone prone areas – SERC, Vol.2, Chennai, 1980
7. Taranath, B. S. (2004). Wind and Earthquake Resistant Buildings: Structural Analysis and Design. CRC Press.
8. Murthy, C. V. R., Earthquake Tips- Learning Earthquake Design and Construction, IITK – BMTPC, National Information Center of Earthquake Engineering, Indian Institute of Technology Kanpur.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Quiz I	√	√	√	
Quiz II	√	√	√	√
Mid-Semester Examination	√	√	√	
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	1	1	1	1	2	2	1	1	1	1	1	1
CO 2	1	3	3	2	3	1	3	3	1	1	1	1
CO 3	3	3	3	2	1	1	3	3	1	1	1	1
CO 4	3	3	3	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	CD1, CD2
CD2	Tutorials/Assignments	CO2, CO3, CO4	CD3, CD6
CD3	Seminars		
CD4	Mini projects/Projects		
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures	CO3, CO4	CD2, CD4
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Tiwari Pavan Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26453**
Course title: **RESILIENT CITIES AND CLIMATE CHANGE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 03
Class: B.Arch
Semester / Level: VI
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	Understand the basic relationship between urbanization and climate change and its relevance to the built environment.
B.	Identify and describe the impacts of climate change on cities, infrastructure, and communities.
C.	Recognize how urban activities contribute to climate change through resource use and emissions.
D.	Develop introductory awareness of climate-responsive design, including mitigation and adaptation strategies in urban contexts.

Course Outcomes

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

CO1.	Explain fundamental concepts of climate change and their connection to urban development and architecture.
CO2.	Illustrate the impacts of climate change on urban areas using basic analysis and case examples.
CO3.	Identify major sources of emissions in cities and their relationship to built form and urban systems.
CO4.	Apply basic principles of climate-responsive planning and design in simple urban or architectural proposals.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Climate Change and Urbanization**	Basics of climate change (causes and evidence); Urbanization and its environmental implications; Linkages between cities and climate change; Introduction to global frameworks such as the United Nations Framework Convention on Climate Change and Kyoto Protocol; Relevance to architecture and planning	8
Module 2	**Impacts of Climate Change on Cities**	Effects on buildings and infrastructure; Impacts on public health and daily life; Social and economic consequences; Climate risks (flooding, heat, etc.); Vulnerability of different urban areas	8
Module 3	**Cities as Contributors to Climate**	How cities generate emissions; Major sources: buildings, transport, waste; Energy use in the built environment; Concept of carbon footprint (introductory level)	8

	Change		
Module 4	**Climate Change Mitigation in Urban Design**	Basic mitigation strategies (reducing emissions); Role of urban planning and building design; Passive design strategies (orientation, shading, ventilation); Sustainable transport and land use (introductory ideas)	8
Module 5	**Climate Change Adaptation and Urban Responses**	Understanding adaptation (coping with impacts); Examples of adaptation in cities; Role of communities and local governments; Introduction to resilient design concepts; Overview of major initiatives and future directions (basic level)	8

Text books:

1. Tang, J., Lu, Q., Zhao, P., Brilakis, I., Broyd, T., & Chen, L. (2026). * Title: Resilient Cities under Global Climate Change: From Principles to Applications, Edward Elgar Publishing
2. Cheshmehzangi, A., Ghosh, S., & Majumdar, S. (Eds.). (2025).Cities of Tomorrow: Urban Resilience and Climate Change Preparedness, Springer
3. Ahern, J., Cilliers, S., & Niemelä, J. (2021).Urban Resilience: Principles and Practices for Built Environments, Routledge
4. Douglas, I. (2021). The Urban Environment and Climate Change: An Introduction to the Urban Climate System, Routledge

Reference books:

1. Geraldine, A., & Taşan-Kok, T. (Eds.). (2013). Resilient Cities: A New Paradigm for Urban Systems and Spatial Planning. Springer

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25

End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√	√	√
Quiz II	√	√	√	√
Mid-Semester Examination	√	√	√	√
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO2	PO 3	PO4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
CO1	3	3	1	2	2	1	2	1	1	1	1	3
CO2	3	2	2	1	2	1	2	1	1	1	1	3
CO3	3	3	1	2	2	1	2	1	1	1	1	3
CO4	3	2	2	1	2	3	1	2	1	1	2	3

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2,CO3, CO4
CD2	Tutorials/Assignments	CO1, CO2,CO3, CO4
CD3	Seminars	CO1, CO2,CO3, CO4
CD4	Mini projects/Projects	CO1, CO2,CO3
CD5	Laboratory experiments/teaching aids	CO1, CO2,CO3
CD6	Industrial/guest lectures	CO1, CO2,CO3
CD7	Industrial visits/in-plant training	CO1, CO2,CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Shama Parween

COURSE INFORMATION SHEET

Course code: **ARP 26454**
Course title: **CIRCULAR ECONOMY IN THE BUILT ENVIRONMENT**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: VIII
Branch: Architecture& Planning
Name of Teacher:

Course Objectives

This course enables the students to:

A.	To understand the difference between the linear model and the circular model in the construction industry.
B.	To understand the strategies towards circular construction.
C.	To develop knowledge of the possible circular materials and related tools available, and their applications.
D	To analyse the various existing policies and initiatives for circular construction across the globe and in India.

Course Outcomes

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

CO1.	Understand the principles of the circular economy and their relevance to the construction industry.
CO2.	Analyze circular construction practices and their integration across different stages of the building life cycle.
CO3.	Evaluate and apply appropriate building materials and tools to support circular construction approaches.
CO4.	Assess global and Indian initiatives promoting circular construction and sustainable built environments.

Syllabus

Module No.	***Module name***	***Detailed Contents***	***No. of Lecture***
Module 1	**Introduction to Circular Built Environment**	Linear Economy Model, Circular Economy Model, Definition of Circular Economy, Significance of Circular Economy in the Construction Industry, R principles of Circular Economy and their hierarchy, Circular Economy and Construction & Demolition Waste Management.	8
Module 2	**Circular Construction Practices and Strategies**	Life Cycle Stages of a Building, Integration of Circular Economy Practices during all the stages of a building, An Overview of Circular Construction Practices: Design for Disassembly, Design for Reuse and Recycling, Modular or Prefabricated Construction, Adaptive Reuse, Building Renovation, Standardisation, Design for Demolition, Circularity tools such as BIM, LCA, etc.	8

Module 3	**Circular Construction and Building Materials**	Selection of Materials; Use of bio-based materials; Use of recycled and reused materials; Use of local materials; Industrial rejects and their reuse and recycling in the construction industry: Agricultural, Construction & Demolition, Mining, Plastic, etc.; Circular Construction & Digitisation.	8
Module 4	**Legal Framework for Circular Construction across the Globe**	Frameworks as per Ellen MacArthur Foundation, The Circular Economy Action Plan in Europe 2020, EU Construction Products Regulation (Revised 2024), Waste Framework Directive, EU Framework Level(s), National Circular Economy Roadmap, Australia, 2020, Circular Economy Promotion Law, 2009 & Cleaner Production Promotion Law, China, Law for Promotion of Efficient Utilization of Resources, Japan, 2000, Deconstruction of Building Law, USA, 2019, Environment Protection Act, USA	8
Module 5	**Circular Construction in India**	Need for Circular Construction in India, Existing Sustainable/Circular Construction Practices in India, GRIHA, LEED, IGBC, ECBC, Construction & Demolition Waste Management Rules, 2016, C&D Waste Management Rules 2025, Initiatives by NITI Aayog, Swachh Bharat Abhiyan, Waste to Wealth Mission, PMSTIAC, 2020, Light House Projects, GHTC, 2021, Initiatives by BMTPC, etc.	8

Textbooks:

1. Circular Economy for Buildings and Infrastructure — Edited by Jian Zuo, Liyin Shen, Ruidong Chang; Springer; 2024
2. Sustainable Housing in a Circular Economy — Naomi Keena & Avi Friedman; Routledge; 2024
3. A Circular Built Environment in the Digital Age — Edited by Catherine De Wolf et al.; Springer; 2024
4. Building Revolutions: Applying the Circular Economy to the Built Environment, David Cheshire, RIBA Publishing
5. Circular Economy for the Built Environment: Research and Practice, Rabia Charef, BRI Research Series
6. Fundamentals of Building Construction — Edward Allen & Joseph Iano; Wiley; 7th Edition, 2022

Reference books:

1. NITI Aayog Circular Economy Reports — 2021–2024; provide Indian context on resource efficiency, waste management, and circular construction strategies.
2. The Energy and Resources Institute (TERI) Publications on C&D Waste — Focus on recycling, reuse, and sustainable materials in India

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors

Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	√	√		
Quiz II			√	√
Mid-Semester Examination	√	√		
End Sem Examination	√	√	√	√
Assignment	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	3	1	2	2	1	1	1	1	1	1
CO2	3	3	3	2	3	1	3	3	1	1	1	1
CO3	3	3	3	2	1	1	3	3	1	1	1	1
CO4	3	3	3	3	2	3	3	3	1	1	1	1

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	CD1, CD2
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	CD3, CD6
CD6	Industrial/guest lectures	CO1, CO2, CO3, CO4	CD2, CD4

CD7	Industrial visits/in-plant training	CO1, CO2, CO3, CO4	CD1, CD2,
CD9	Simulation	CO1, CO2, CO3, CO4	CD2, CD6

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr Rizwan Kazmi

COURSE INFORMATION SHEET

Course code: **ARP 26455**
Course title: **ROAD SAFETY AND CIVIC SENSE**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T:0 P:0
Class schedule per week: 3
Class: B.Arch
Semester / Level: VIII
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the principles, components, and design aspects of road safety and transportation systems.
B.	To familiarize students with standards, regulations, and design guidelines related to roads and traffic infrastructure.
C.	To develop awareness of safe road behaviour, user responsibility, and civic sense.
D.	To analyse traffic management systems and accident prevention strategies in urban and rural contexts.

Course Outcomes

After the completion of this course, students will be:

CO1	Able to understand road hierarchy, user behaviour, and geometric design elements influencing road safety.
CO2	Capable of applying standards for intersections, pedestrian facilities, and inclusive/barrier-free design.
CO3	Able to interpret and apply traffic control systems including signs, signals, markings, and lighting.
CO4	Able to analyze accident scenarios, traffic regulations, and demonstrate responsible civic behavior.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Road Safety & Typology of Roads: Components and Design**	Road as an active space; types of users and behavior; sensory factors; vehicle types and characteristics; hazards; road classification (rural and urban); speed limits; cross-sectional elements; spatial standards; relationship between design and safety.	8
Module 2	**Intersections, Pedestrian Circulation and Barrier-Free Design**	Types of intersections; design standards; turning radii; pedestrian infrastructure; traffic signals; merging/diverging traffic; barrier-free design; safety provisions.	8
Module 3	**Traffic Signs, Road**	Types and standards of traffic signs; road markings; materials and colors; traffic signals and control systems;	8

	Markings, Signals and Street Lighting	roadway delineators; traffic calming measures; street lighting standards.	
Module 4	**Road Accidents, Safety and Civic Sense**	Types and statistics of accidents; causes and prevention; first aid; traffic management; civic sense; road etiquette; driving precautions; road rage awareness.	8
Module 5	**Traffic Regulations, Laws and Legislations**	Motor Vehicles Act; traffic rules; pedestrian regulations; speed and hazard management; policies and good practices.	8

Text books:

1. Michael Barron, Auditorium Acoustics and Architectural Design, Taylor & Francis, 2010 (contextual reference for acoustic safety)
2. David Egan, Concepts in Architectural Acoustics, 1972
3. Richard H. Penner, Hotel Design, Planning and Development, 2012 (urban interface relevance)
4. Cindy Allen, Hospitality, Architecture and Design, 2012

Reference books:

1. R. Srinivasa Kumar, Introduction to Traffic Engineering
2. L.R. Kadiyali, Traffic Engineering and Transport Planning
3. Ministry of Road Transport and Highways, Road Safety Signage Manual
4. MORTH, Pocketbook for Highway Engineers, 2019
5. UTTIPEC Guidelines (Street Design, Markings, Crossings, etc.)
6. Time Saver Standards, Neufert Architects' Data
7. Publications by Indian Roads Congress (IRC)

Gaps in the syllabus (to meet Industry/Profession requirements)

Use of AI-based traffic analysis and simulation tools
Exposure to smart mobility and ITS (Intelligent Transport Systems)
Practical training on road safety audits

POs met through Gaps in the Syllabus: PO6, PO7, PO11, PO12

Topics beyond syllabus/Advanced topics/Design

Complete Street Design approach
Tactical urbanism and temporary traffic interventions
Smart city mobility and pedestrian-first planning

POs met through Topics beyond syllabus/Advanced topics/Design: PO3, PO4, PO6, PO7

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Laboratory experiments/teaching aids
Industrial/guest lectures

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**

Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Quiz I	✓		✓	
Quiz II		✓	✓	
Mid-Semester Examination	✓	✓		✓
End Sem Examination	✓	✓	✓	✓
Assignment		✓		✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	3	1	1	2	1	1	1	1	1	1
CO2	1	2	3	3	1	2	3	3	1	1	1	1
CO3	1	1	2	1	1	3	3	3	1	2	1	1
CO4	1	2	1	3	2	1	3	3	3	2	2	1

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO1, CO2, CO4
CD3	Seminars	CO2, CO3, CO4
CD4	Mini projects/Projects	
CD5	Laboratory experiments/teaching aids	CO2, CO3
CD6	Industrial/guest lectures	CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Prashant Prasad

COURSE INFORMATION SHEET

Course code: **ARP 26361**
Course title: **ARCHITECTURAL DESIGN - VIII CUM LIVE PROJECT**
Pre-requisite(s): Should have cleared all courses up to VI Semester;
Co- requisite(s): None
Credits: 15 L: 0 T: 0 P: 12
Class schedule per week: 12
Class: B. Arch
Semester / Level: VIII
Branch: Architecture& Planning
Name of Teacher: Dr. Rizwan Kazmi

Course Objectives

This course enables the students:

A.	Develop the ability to address complex architectural and urban design problems through multi-scalar planning and design approaches, ranging from urban precincts to individual institutional buildings.
B.	Integrate structural systems, building services, climate-responsive design strategies, and the provisions of the National Building Code (NBC) and relevant building bye-laws into comprehensive architectural design solutions.
C.	Design context-sensitive, sustainable, and technically feasible urban design projects by incorporating physical, environmental, socio-cultural, functional, inclusive and community-centric considerations.
D.	Strengthen critical thinking, design research, technical documentation, and presentation skills to prepare students for independent architectural thesis and professional practice.

Course Outcomes

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

CO1	Design complex institutional and service-oriented buildings integrating functional planning, structural systems, and building services.
CO2	Apply building bye-laws, National Building Code (NBC) provisions, sustainable design principles, and site planning strategies in architectural design.
CO3	Develop comprehensive urban design frameworks and context-sensitive and community-oriented design interventions for complex urban environments.
CO4	Demonstrate readiness for independent thesis-level architectural design through critical inquiry, design development, technical integration, and effective communication.

Syllabus

Major Design Problem (14 Weeks)

Option A: Urban Design + Institutional Design (An integrated two-phase studio: urban design framework followed by individual building design)	
Site Context	Suggested City Contexts (choose one site per studio group): Any comparable Tier-I/II city area (with design coordinator approval) exhibiting urban blight, heritage depletion, or infrastructure-led disconnection Site area for urban design: 5 – 15 hectares (50,000 – 1,50,000 sq.m) Site area for individual building: 0.5 – 2 hectares (as determined by Phase 1 framework)
Phase 1:	Groups of 5–6 students collectively analyse the selected urban precinct and

Urban Design Framework	propose a coherent urban design framework. This phase aligns specifically with Course Outcome 3 (CO3): developing comprehensive urban design frameworks and context-sensitive, community-oriented design interventions for complex urban environments. **Analysis & Documentation** ➢ Mapping of existing built fabric, land use, ownership parcels, movement networks, open spaces, built and natural assets/heritage ➢ Documentation of social patterns, informal economies, and cultural assets ➢ Identification of Character Districts and Image ➢ Identification of urban blight indicators: vacant lots, derelict structures, missing street edges, missing public space ➢ Historical overlay: comparing current fabric against older maps/archival records ➢ SWOT analysis at the precinct scale ➢ Issues identification Urban Design Proposal ➢ Concept diagram and urban design strategy statement ➢ Proposed structure/framework of urban design interventions ➢ Site/Urban Precinct Oriented Interventions/Proposals ➢ Detail Design Interventions (Urban, Neighbourhood, Site, Building Level)
Phase 1 Deliverables	Detailed Documentation & Analysis Sheets (A1/A0) SWOT Analysis and Issues Identification Sheet (A1/A0) Urban Design Framework Oriented Structure Plan/ Master Plan (A1/A0) 3D massing model (physical or digital) of the existing conditions and proposed urban framework. Detailed Urban Design Proposal Sheets at Site/Urban Precinct Level, including plans, sections, perspectives, photographs, sketches, etc. (A1/A0) Final A3 Report comprising all the stages (documentation & analysis) and respective proposals of all the groups.
Phase 2 – Individual Institutional Building Design (11 Weeks)	Following the urban design framework, each student selects one of the building sites identified in Phase 1 and develops a significant institutional building on that site. The building type is chosen to respond to the urban programme needs identified during the urban analysis. Students must demonstrate that their building design meaningfully contributes to and is informed by the Phase 1 urban framework. Building Type Options for Phase 2 The building type must be appropriate to the urban context established in Phase 1. Acceptable types include: • Civic and Cultural Centre (with performing arts, exhibition, and community facilities) • District-level Public Library and Knowledge Centre • Urban Health & Wellness Campus (outpatient, diagnostic, allied health – not a full hospital) • Creative Industries Hub (design studios, maker spaces, incubation, co-working) • Urban Mobility Hub (multi-modal interchange with commercial and civic mix) • Higher Education Campus (school of arts/design/technology – up to 500 students) • Mixed-use Urban Block with Anchor Institutional Use The final choice of building type must be approved by the design coordinator by

	the end of Week 3.
Phase 2 Deliverables	➢ Site plan at 1:500 with landscaping and urban context ➢ All floor plans at 1:200 (each floor) ➢ Minimum 3 sections at 1:200 (including at least one longitudinal and one cross-section) ➢ All elevations at 1:200 (all 4 faces minimum) ➢ Selected area detail drawings: 1 key space at 1:50 and critical junction at 1:20 ➢ Structural system drawing (key bay plan + section, 1:100) ➢ Services schematic drawings (electrical single-line, HVAC/ventilation, plumbing, fire protection) ➢ Facade study with material palette ➢ 3D visualisation / rendered views (minimum 2 exterior, 1 interior key space) ➢ Physical or digital architectural model at 1:200 or 1:500 ➢ Design process portfolio (A3 booklet documenting the evolution of the design) Area schedule and bye-law compliance statement
Option B: Campus Scale Architectural Design (A focused complex institutional design project on campus scale)	
Project Brief	Option B provides students with a clearly defined site and the challenge of designing a large, complex institutional campus from inception to detailed design. Without the preceding urban design phase, the full 14 weeks are devoted to architectural design at the campus and building scale. This option is particularly suited to studios that emphasise typological development, structural complexity, programmatic depth, and NBC/bye-law compliance. Two sub-options are offered under Option B. Students (or the studio) choose one. Both are appropriate for the ninth semester and provide a robust architectural design challenge with full site planning demands. **B1: Tertiary Care Hospital Campus** Design of a multi-speciality hospital campus of not less than 200 beds, as specified in the AR 511 syllabus. Combines highly technical functional planning (ICU, OT, diagnostics, wards) with humane healing environment design. **B2: Specialised Institutional Campus** Design of a focused institutional campus: a School of Art, Design & Technology (1,000 students), a National Institute of Technology cluster campus, or a Sports & Performance Academy. Emphasises campus planning, zoning, and typological variety.
B1: Tertiary Care Hospital Campus	Healthcare design is among the most technically demanding and socially critical building types. This problem challenges students to integrate complex functional planning, infection-control logic, structural strategy, and service integration within a humane and legible architectural language. It directly develops Course Outcome 1 (CO1): demonstrating design capabilities for service-oriented buildings with complex structural and service systems.
Site Context	The hospital site is a greenfield or brownfield plot of 3 to 5 hectares, either assigned by faculty from a real location in Jharkhand/Bihar/West Bengal or a notional site with defined surrounding context. The site should have at least two accessible road frontages.
Hospital	➢ Circulation zoning: strict separation of clean / dirty / visitor / staff /

Design Requirements	emergency flows ➢ Functional adjacency matrix to be prepared and justified ➢ Structural system: RC frame with provisions for future expansion (modular grid 7.2 m or 8.4 m recommended) ➢ Services integration: medical gas pipeline, nurse call system, HVAC zoning, infection control ➢ Compliance with NABH guidelines, NBC Part 3 (Fire) and Part 7 (Health) ➢ Landscape and healing garden design as integral component ➢ Accessibility: ramp gradients, patient lift provisions, bariatric widths.
B2: Specialised Institutional Campus	This design problem requires students to plan and design a specialised higher-education campus from master plan to architectural detail. The institutional programme is richer in building typology variety (academic, residential, recreational, cultural) and demands sophisticated campus planning skills, including landscape integration, pedestrian-first movement, a phased development strategy, and architectural cohesion across multiple buildings. Campus Type Options (choose one) • School of Art, Design and Technology – with studios, workshops, galleries, and maker facilities • Sports & Performance Academy – with competition arenas, training, residential, medical and research facilities • Management and Liberal Arts College – with lecture halls, seminar rooms, library, residential, and startup incubation
Site Context	The campus site is 5 to 8 hectares, either a real site assigned by the faculty (an edge-of-city, peri-urban greenfield, or brownfield industrial site) or a notionally described site with defined topography and surroundings.
Campus Planning Requirements	➢ Master plan at 1:2000 or 1:1000 showing all buildings, open spaces, and movement ➢ Phased development strategy (Phase 1: core academic; Phase 2: residential; Phase 3: cultural/sports) ➢ Pedestrian-priority campus: vehicular access confined to periphery ➢ At least 30% of site as green/open space ➢ Rainwater management and sustainability measures ➢ Detailed architectural design of at least 2 buildings (individually designed): o Building A: largest academic building (studios + lecture theatres), 3,000–5,000 sq.m o Building B: student living unit block (hostel), 2,000–3,000 sq.m
Deliverables	➢ Campus master plan / site plan at 1:1000 (or 1:500 for smaller campus) ➢ Landscape plan with planting scheme and hardscape details at 1:500 ➢ Floor plans of main building(s) at 1:200 (all floors) ➢ All elevations at 1:200 ➢ Minimum 3 sections (longitudinal + cross) at 1:200 ➢ Structural drawings: framing plan + typical bay section at 1:100 ➢ Services schematic drawings (MEP, fire escape plan, accessibility plan) ➢ Detail drawings: 1 key space at 1:50; critical junction at 1:20 ➢ Material and facade study board ➢ 3D renderings (minimum 2 exterior views, 1 interior, 1 aerial campus view) ➢ Physical or digital architectural model at 1:200 (building) and 1:500 (campus)

	➢ NBC / local bye-law compliance statement and area schedule ➢ Functional flow/adjacency diagrams (especially for hospital option) ➢ Design process portfolio (A3 booklet)

Evaluation

Evaluation Component	Weightage (%)	Mode
Site Analysis & Typology Research (Wk 2 assessment)	5%	*Faculty review*
Concept Jury (Wk 4 – Internal)	10%	*Internal jury*
Mid-term Jury (Wk 8 – External)	25%	*External + Internal jury*
Design Development: Structure & Services Documentation	10%	*Faculty assessment*
Detail Design Drawings (quality and accuracy)	10%	*Faculty assessment*
Final Submission: Drawing Set Completeness & Presentation Quality	20%	*External jury*
Final Submission: Architectural Design Quality & Resolution	10%	*External jury*
Viva Voce: Oral Presentation & Defence of Design Decisions	10%	*External jury*

Text Books

1. Neufert, Ernst & Neufert, Peter. *Architects' Data*. 5th Edition, Wiley-Blackwell, 2019.
2. Ching, Francis D.K. *Architecture: Form, Space and Order*. 5th Edition, John Wiley & Sons, 2023.
3. De Chiara, Joseph, Panero, Julius & Zelnik, Martin. *Time-Saver Standards for Building Types*. 5th Edition, McGraw-Hill Education, 2014.
4. National Building Code of India (NBC 2016). Bureau of Indian Standards (BIS), New Delhi, Volumes 1 & 2.
5. Kevin Lynch. *Site Planning*. MIT Press, Cambridge, MA.
6. Mili Majumdar (Ed.). *Energy Efficient Buildings in India*. The Energy and Resources Institute (TERI), New Delhi.

Reference Books

1. Carmona, Matthew, Heath, Tim, Oc, Taner & Tiesdell, Steve. *Public Places Urban Spaces: The Dimensions of Urban Design*. 3rd Edition, Routledge, 2021.
2. Gehl, Jan. *Cities for People*. Island Press, 2010.
3. Olgyay, Victor. *Design with Climate: Bioclimatic Approach to Architectural Regionalism*. Princeton University Press.
4. Allen, Edward & Iano, Joseph. *Fundamentals of Building Construction: Materials and Methods*. 8th Edition, Wiley, 2023.
5. ASHRAE. *ASHRAE Handbook—HVAC Applications*. American Society of Heating, Refrigerating and Air-Conditioning Engineers (Latest Edition).
6. The Energy and Resources Institute (TERI). *GRIHA Manual: Green Rating for Integrated Habitat Assessment*. TERI, New Delhi.

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Industrial/guest lectures (Architecture Professionals)
Participation in relevant Competitions
Site Visits/ Case Study Visits
Self-learning, through literature studies
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	**CO1**	**CO2**	**CO3**	**CO4**
Day-to-Day Progressive Evaluation	√	√	√	√
End-Sem Performance	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping Course Outcomes onto Program Outcomes

Course Outcome #	**Program Outcomes**											
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**P O8**	**PO 9**	**PO 10**	**PO11**	**PO12**
CO1	3	2	2	2	2	2	2	1	1	1	2	1
CO2	3	2	3	2	2	2	2	1	1	1	1	1
CO3	2	3	2	3	2	2	3	3	2	3	2	2
CO4	1	2	1	2	3	2	2	2	3	3	1	2

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery Methods**	**Course Outcome**
CD1	Lectures by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4
CD2	Industrial/guest lectures (Architecture Professionals)	CO1, CO2, CO3, CO4
CD3	Participation in relevant Competitions	CO1, CO2, CO3, CO4
CD4	Site Visits/ Case Study Visits	CO1, CO2, CO3, CO4
CD5	Self-learning, through literature studies	CO1, CO2, CO3, CO4
CD6	Simulation	CO1, CO2, CO3, CO4

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr Rizwan Kazmi

COURSE INFORMATION SHEET

Course code: **ARP 26462**
Course title: **DISSERTATION**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 0 T:0 P:4
Class schedule per week: 04
Class: B. Arch
Semester / Level: VIII
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A	To identify and choose a minor research cum dissertation topic that is based on the personal academic interest of the students and is in coherence with the identified B. Arch thesis cum dissertation project.
B.	To build skills in searching and exploring relevant materials and techniques for conducting research.
C.	To build skills in reading, analysing, comparing, and synthesising information that reinforces their ability to think critically and independently.
D.	To develop the ability to learn and apply scientific methods, tools and techniques and thus engage with architecture beyond form-making.
E.	To understand and comprehend architectural ideas, problems, and contexts while conducting the minor research and connect the research findings with future design work.
G.	To apply knowledge on application of presentation techniques [for presenting dissertation/outcome of the study] and techniques of Thesis/Dissertation/Project Report writing.

Course Outcomes

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

CO1.	To understand the basics of research and its related methodological approach for identifying a focused research topic in architecture.
CO2.	To frame a clear problem statement, research questions, objectives, conduct literature reviews and analyse related architectural case studies to draw meaningful observations.
CO3	To use appropriate research methods to gather and interpret information and analyze the development of the aspect of research on a timeline and understand its current trends.
CO4	To use the research as a base for developing and evolving one or more aspects of design and present a well-organised dissertation with logical flow and supported arguments in the form of a report and link the same with the selected B.Arch thesis project work.

Syllabus

Module 1: B. Arch Thesis Project Proposal (3 Weeks)
Each student shall submit three proposals for the thesis project, which he/she wants to undertake in order of preference from which the final topic may be selected. It is advised to consider 'LIVE Architectural Projects' in making the selection. Each of the submitted proposals must furnish the following information and details:
(a) Title of Project
(b) Authority proposing the project

(c) Site area, location
(d) Project brief along with the scope of work.

Module 2: Minor Dissertation (10 Weeks)
Each student shall prepare a minor research/dissertation on any topic in architecture relevant to any chosen objective or any aspect of the Thesis Project. The minor dissertation shall be a research-based conceptual study directly associated with the thesis topic. The progress of the work will be reviewed periodically by the associated faculty members. It shall be submitted in the form of a technical report with appropriate in-text citations, references, bibliography etc., the highlights of which shall be presented as a seminar at the end of the semester.

Module 3: Publication (Semester End)
By the end of the semester, students are expected to submit a written paper of approximately 3500 words. The paper must adhere to standard referencing conventions and technical writing norms.

Note:

- Dissertation course will function as a preparatory framework for the Xth-semester B. Arch thesis project. Students may be encouraged to select the topic, vetted by the faculty members, and which will eventually culminate in the Architectural Design Thesis of the subsequent Xth semester B.Arch Thesis Project.
- The emphasis of this course must be on critical understanding, logical reasoning and structured writing. The course would establish a vital link between theoretical inquiry and architectural application. It will provide a strong theoretical foundation, and clarity of thought aimed at orienting the students to conduct structured research in a focused manner.
- The course is designed to cultivate advanced research competencies in students that will enable them to engage in critical thinking and conducting in-depth analysis and objective research on a topic of their interest.
- Towards the end of the dissertation the student should be able to identify, list, evolve through research the design criterions and aspects [spaces/users/characters of buildings, etc.] which must be considered for application in the selected B. Arch Thesis project.
- Final assessment of the students' work may be based on the written Paper as well as oral communication. However, greater weightage may be given for writing skills and research content of the study.

Textbooks:

1. Anderson, J. and Poole, M. (1998). *Thesis and assignment writing*. Brisbane: John Wiley.
2. Borden, I. and Ray, K. R. (2006). *The dissertation: an architecture student's handbook*. 2nd Ed. Oxford: Architectural Press.
3. Groat, Linda and Wang, David. *Architectural Research Methods*, John Wiley and Sons.

Reference Books:

1. Becker, Howard S. *Writing for Social Scientists: How to Start and Finish Your Thesis, Book, or Article*.
2. Fink, A. (1998). *Conducting research literature reviews: from paper to the Internet*. Thousand Oaks: Sage.
3. Murray, R. (2005). *Writing for academic journals*. Berkshire: Maidenhead, Open University Press.
4. Turabian, Kate L. *A Manual for Writers of Research Papers, Theses, and Dissertations: Chicago Style for Students and Researchers*.
5. Zeisel, John. *Inquiry by Design: Tools for Environment: Behavior Research*. Monterey, CA: Brooks/Cole Publishing Co.

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

Course Delivery methods
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Self- learning such as use of NPTEL materials and internets

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO1 0	PO11	PO12
CO1	3	2	2	2	2	2	2	1	1	1	3	2
CO2	1	3	1	2	1	1	2	1	1	1	3	2
CO3	1	1	2	2	2	2	2	1	1	1	3	2
CO4	2	1	3	1	2	2	2	1	1	1	2	2

Mapping Between COs and Course Delivery (CD) methods

CD	Course Delivery methods	Course Outcome
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2
CD2	Seminars	CO1, CO2, CO3, CO4
CD3	Mini projects/Projects (Dissertation Formulation)	CO2, CO3, CO4
CD4	Tutorials/Assignments (Progressive Studio Reviews)	CO1, CO2, CO3, CO4
CD5	Self-learning such as use of NPTEL materials and internets	CO1, CO3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Smriti Mishra & Dr. Rewati Raman

SEMESTER 9

Fifth Year (9th Semester)							
Subject Code	**Subject**	**L (Periods/ Week)**	**T (Periods/Week)**	**P (Periods/Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Sessional Subjects							
ARP 26511	Architectural Apprenticeship	0	0	0	9	0	Office Training
ARP 26512	Field Studies and Comprehensive Viva	0	0	0	9	0	Office Training
				Total Credit	**18**		
				Total Contact Hours		**0**	

COURSE INFORMATION SHEET

Course code: **ARP 26511**
Course title: **ARCHITECTURAL APPRENTICESHIP**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 9 L:0 T:0 P:9
Class schedule per week: 0
Class: B.Arch
Semester / Level: IX
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To introduce students to the fundamental processes of designing buildings and their execution on-site, through live projects and handling of issues related to construction and construction management.
B.	To develop the apprentice's confidence in interacting with various key players in building design and construction processes
C.	To harness skills related to the preparation of Working and detail drawings, quantity survey, etc., and the usual conflicts of various building services and the possible solutions for the project, both at the design stage and execution on-site.

Course Outcomes

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

CO 1.	Understand the various aspects of design and execution of a real-life project
CO 2.	Exposure of working in a practical field with the usual complexities
CO 3.	Exposure to various aspects of the Tendering process and its relevance in the construction field, and interaction with various key players in the construction process.

Syllabus

Each candidate shall have to prepare a detailed report along with necessary drawings, readings, observations, and log sheets about the following aspects:

1. Log Sheet and Office Certificate: A student shall fill the log sheets as a record of his everyday work with due authentication and shall submit the same, along with the certificate and confidential report from the Employer.
2. Students have to submit all the working details prepared by each of them, during the apprenticeship period, duly authenticated by the office, along with a quantity survey of a small project/part of a project or any special work done during this period, such as a lighting scheme, glazing details for energy efficiency, acoustical details, etc.

For preparing the reports, students have to follow the guidelines as stated below:

• They must prepare separate reports strictly as per the subject and content stated in the syllabus

• They must submit hard copies of all the documents on the date of submission to the department for evaluation by the panel of faculty members.

Students have to start preparing these reports while working in the office where they are undergoing the apprenticeship, as no separate time will be provided after the apprenticeship period for preparing them.

Further, they will also have to be ready for the Grand Viva, which will assess their overall knowledge across academic and practical aspects, as learned during the apprenticeship period, after the evaluation of the reports.

Text books: NA

Reference books: NA

Gaps in the syllabus (to meet Industry/Profession requirements) : NIL

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design : NIL

POs met through Topics beyond syllabus/Advanced topics/Design: NA

Course Delivery Methods
Practical experience gained in an architectural office, including field training

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
End-Sem Performance	100

Assessment Components	**CO1**	**CO2**	**CO3**
End-Sem Performance	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO1 0	PO11	PO 12
CO1.	3	1		1	1	2	3	3	2	2	1	2
CO2.	1	2	1			L	1	2	2	3	3	1
CO3	1			1	1	2	2	2	3	1	1	1

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Shama Parween

COURSE INFORMATION SHEET

Course code: **ARP 26512**
Course title: **FIELD STUDIES AND VIVA**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 9 L:0 T:0 P:9
Class schedule per week: **0**
Class: B.Arch
Semester / Level: IX
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To develop the ability to critically appraise a completed and already used building
B.	To develop the skill of translating user feedback for the built environment in the design process
C.	To develop the ability to supervise and execute work at the site.
D.	To evaluate the overall development of a student in various aspects of Architectural Design, detailing, services, execution, etc., covering various subjects of the program

Course Outcomes

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

CO 1.	Understand the various aspects of a building or a project in terms of basic function, services, aesthetics, etc., which are in use
CO 2.	Understand the built environment from the user's point of view and translate the findings in future design
CO 3.	Exposure to various aspects of supervision in the construction process.
CO 4.	Self-understanding of the overall knowledge base of the student, who is about to step into the job market, after graduating from the institute, on successful completion of the program.

Syllabus

Each student shall have to prepare a detailed report along with necessary drawings, sketches, measurement records, readings, observations, and survey analysis about the following aspects:

1. Critical appraisal of any building that his office has designed and executed. The building should be in use, and the students may record users' reactions to support their appraisal, in addition to photographs, drawings, etc.
2. Site Supervision and practices: A detailed report of any part of a building, which is to be supervised in person, by the student/ his supervisor. If the student does not have an opportunity to supervise their office work, they can submit a site report on any other work. It may include checking site measurements, preparing a bill, Preparing Site instructions, and checking the executed work.

The Comprehensive/Grand Viva will be held in the Architecture department after completion of all formalities and the evaluation process for Architectural Apprenticeship and Field Studies. This exercise is to be conducted by a panel of departmental faculty members, chaired by the HOD.

1. All the subjects (both Theory and Sessional) are thus taught in the B.Arch. program, as well as practical knowledge earned during the Apprenticeship
2. Additional knowledge on new developments in terms of technology, material, regulations, etc., which may have a direct or indirect effect on the architectural profession.

Textbooks:NA

Reference books: NA

Gaps in the syllabus (to meet Industry/Profession requirements): NIL

POs met through Gaps in the Syllabus: NA

Topics beyond syllabus/Advanced topics/Design: NIL

POs met through Topics beyond syllabus/Advanced topics/Design: NA

Course Delivery Methods
Practical experience gained in an architectural office, including field training

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
End-Sem Performance	100

Assessment Components	CO1	CO2	CO3	CO4
End-Sem Performance	✓	✓	✓	✓

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO 12
CO1.	3	1	3	1	1	2	3	3	2	2	1	2
CO2.	1	2	1	2	2	L	1	2	2	3	3	1
CO3	1	3	3	1	1	2	2	2	3	1	1	1
CO4	3	2	1	3	2	2	2	1	1	2	3	3

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Shama Parween

SEMESTER 10

Fifth Year (10th Semester)							
Subject Code	**Subject**	**L (Periods/Week)**	**T (Periods/Week)**	**P (Periods/Week)**	**Credit**	**Contact Hrs.**	**Category of Course**
Program Core - Theory Subjects							
ARP 26551	Professional Practice and Tendering Process	3	0	0	3	3	DC
ARP 26552	Construction Project Management	3	0	0	3	3	DC
MOOC Courses							
MCARP XXXXX	MOOC Course	0	0	0	3	3	MOOC
Program Core - Sessional Subjects							
ARP 26561	Architectural Design Thesis/ Project	0	0	18	18	18	Dept L/S
				Total Credit	**27**		
						27	
				Total Contact Hours			

COURSE INFORMATION SHEET

Course code: **ARP 26551**
Course title: **PROFESSIONAL PRACTICE & TENDERING PROCESS**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 03 L: 3 T:0 P:0
Class schedule per week: 03
Class: B. Arch.
Semester / Level: X
Branch: Architecture and Planning
Name of Teacher:

Course Objectives
This course enables the students:

A	To understand and appreciate the professional, vocational and legal aspects of architectural practice and profession in India.
B	To understand aspects of architectural practice, along with scope of services, professional ethics and social responsibilities of an architect
C.	To understand a know-how about the establishment and management of a private architectural office and familiarize with project and office management aspects
D.	To inform about the different types of tenders and contracts, its merits and demerits, tendering process and suitability w.r.t different types of architectural projects. Also to expose on the significance, purpose and types of architectural competitions.

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

CO1.	Understand the various aspects of Professional Practice and intricacies of execution of a project
CO2.	Understand the merits and demerits of different options available for an architect to enter into the profession and identify their own path
CO3	Develop an understanding about the suitability of different types of Tenders and know about the tendering procedures for construction field
CO4	Understand the professional, vocational and legal aspects of architectural practice and profession.

Syllabus

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Architectural Profession and role of architects**	Role of Architect: Definition, tasks, professional responsibility. About Council of Architecture (CoA): Provisions of the Architects Act 1972, Role and Functions of the Council of Architecture; Professional conduct and ethics, Penalty for improper use of title. Client & Architect Relationship: Agreements, types of services, scope of work, schedule of services and payments	5
Module 2	**Office Management and Procedures**	Setting up Practice: types of architectural practice setups and its merits and demerits: Sole proprietorship, partnership, limited liability partnership (LLP). Office Administration: Filing, correspondence, drawing records, documentation, various taxation systems Interdisciplinary coordination (Structural, MEP,	10

		Landscape); project management roles	
Module 3	**Architectural professional association and its role:**	Architectural professional association, its role and responsibilities. Objectives of the Indian Institute of Architects; Bye-laws of IIA, types of IIA membership	8
Module 4	**Professional Legalities and Legislation**	Architectural Competitions: Its purpose, types, eligibility and guidelines for participation, prizes, assessment, etc. Mediation, Reconciliation and Arbitration: Disputes, types of arbitration, role of arbitrator Easement: Types of easements; dominant and servient owners; essential conditions for enjoyment of easement; Rules, regulations and acts related to building construction: Development Control Tools; Development Plans, Zoning Regulations and Building Bye-laws; Local Laws; Land acquisition; Intellectual Property Rights (Copyrights)	9
Module 5	**Tender Procedures and Contractual Documentation**	Various types of tenders and Contracts: Item rate, Lump-sum, etc. along their merits and demerits; process of inviting tenders and N.I.T, Pre-tender qualifications and tender evaluation process. Indian Contract Act and general conditions and principles of contract; preparation of contract documents; duties and liabilities of architects, clients and contractors; articles of agreement, execution of work payment, interim certificates, defect liability period, retention amount and virtual completion; interim, virtual and final certificate issued by the Architect, earnest money deposit, security deposits, defect liability period, retention amount, mobilization money, indemnification.	8

Text Books:

1.Namavati, R. (2016). Professional Practice. Lakhani Book Depot, Mumbai
2. Deobhakta, M. and Deobhakta, M., (2007). Architectural Practice in India; Madhav; Council of Architecture.
3. Ar. V.S. Apte, (2008). Architectural Practice and Procedure; Mrs. Padmaja Bhide

Reference books:

1. Apte, V. S. (2008). Architectural Practice and Procedure. Pune : Padmaja Bhide.
2. Chappell, D. M. And Willis, A. (2005). The architect in practice. 9th Ed. Oxford : Blackwell Publications.
3. Charles, E. (1996). TQM and ISO 9000 for architects and designers. New York : McGraw-Hill. 4. COA. (1989). Architects (Professional conduct) Regulations, Architectural Competition guidelines. Council of Architecture Publications.
5. COA. (2025). Handbook of Professional Documents. Council of Architecture.
6. Lewis, R. K. (1985). Architect? : a candid guide to the profession. Cambridge : MIT Press.
7. Piotrowski, A. and Williams, J. (2001). The Discipline of Architecture. University of Minnesota Press.
8. Architects Handbook", A Ready Reckoner – Charanjit S.Shah
9. Professional Practice of Architecture Prof. S.C. Garg and Dr. Yogesh K. Garg; Satya Prakashan 2014
10. "Handbook on Professional Practice". The Indian Institute of Architects.
11. Architect's Act 1972.

12. Handbook of Professional Documents. 2020, released by the Council of Architecture, India.
13. Manual of Architectural Practice 2022. released by the Council of Architecture, India
14. URDPFI Guidelines, 2014. Volume I & II. released by the Ministry of Housing and Urban Affairs
15. Model Building Bye-Laws (MBBL) 2016, released by the Ministry of Housing and Urban Affairs (MoHUA)

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Quiz I	10
Quiz II	10
Mid-Semester Examination	25
End Sem Examination Marks	50
Assignment	05

Assessment Components	CO1	CO2	CO3	CO4
Quiz I	✓	✓		✓
Quiz II			✓	✓
Mid-Semester Examination	✓	✓		
End Sem Examination	✓	✓	✓	✓
Assignment	✓	✓	✓	✓

Indirect Assessment –
1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes
Mapping of Course Outcomes onto Program Outcomes

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12

#												
CO1.	3	1		1	1	2	3	3	2	2	1	2
CO2.	1	2	1			L	1	2	2	3	3	1
CO3	1			1	1	2	2	2	3	1	1	1
CO4	3	3	2	2	1		3		3	2	2	

Mapping Between COs and Course Delivery (CD) methods			
CD	**Course Delivery methods**	**Course Outcome**	**Course Delivery Method**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3, CO4	
CD2	Tutorials/Assignments	CO1, CO2, CO3, CO4	
CD3	Seminars	CO1, CO2, CO3, CO4	
CD4	Mini projects/Projects		
CD5	Laboratory experiments/teaching aids		
CD6	Industrial/guest lectures	CO3, CO4	
CD7	Industrial visits/in-plant training		
CD8	Self- learning such as use of NPTEL materials and internets		
CD9	Simulation		

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Smriti Mishra

COURSE INFORMATION SHEET

Course code: **ARP 26552**
Course title: **CONSTRUCTION PROJECT MANAGEMENT**
Pre-requisite(s): None
Co- requisite(s): None
Credits: 3 L: 3 T: 0 P: 0
Class schedule per week: 03
Class: B. Arch
Semester / Level: X
Branch: Architecture & Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	To understand the importance of construction project management and the various knowledge domains involved.
B.	To prepare a Work Breakdown Structure (WBS) and develop bar charts for medium-scale construction projects.
C.	To analyse resource allocation and cost requirements using bar charts.
D.	To apply network analysis techniques (CPM/PERT) to determine the critical path of a project.
E.	To compare the financial feasibility of different project alternatives.
F.	To evaluate the optimum cost–time relationship for small-scale projects.
G.	To understand and apply different project monitoring techniques.

Course Outcomes

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

CO 1.	**Enumerate** the attributes of a construction project, roles and responsibilities of a project manager, project life cycle phases, stakeholders, and their management.
CO 2.	**Describe** key project management domains including scope, time, cost, quality, safety, and contract management.
CO 3.	**Develop** project schedules by identifying activities, sequencing, and determining the critical path.

SYLLABUS

Module No.	*Module name*	*Detailed Contents*	*No. of Lecture*
Module 1	**Introduction to Construction Project Management**	• Introduction to projects, construction preparedness, and management principles • Objectives and scope of construction project management & project stakeholders • Overview of different project management knowledge domains • Triple constraint of Project Management (scope, Time & Cost) and Types of construction projects • Roles and responsibilities of the Project Manager & significance of construction management • Project Environment & Project life cycle and stages, and Resources for Construction • Project management process groups (initiation,	5

		planning, execution, monitoring & control, and closure)	
Module 2	**Bar Chart & Milestone chart**	• Introduction to construction planning and various scheduling techniques • Different planning steps and preparation of Work Breakdown Structure (WBS) • Steps in construction time management • Traditional scheduling techniques: concepts of bar charts and milestone charts • Preparation of bar charts for project scheduling • Cost and resource scheduling using bar charts (with examples) • Advantages and limitations of bar charts	10

Module 3	**Network Techniques (CPM & PERT)**	• Introduction to network theory and its application in construction project management
		• Terminologies and definitions: activity, event, dummy, and network rules
		• Network representation methods: Activity on Arrow (AOA) and Activity on Node (AON)
		• Network event numbering (Fulkerson Rule)
		• Development and structuring of complex networks with examples
		Critical Path Method (CPM):
		• Elements of a CPM network
		• Identification of critical path
		• Types of floats
		• Forward pass and backward pass calculations
		• Numerical problems
		• Introduction to project management software tools
		Program Evaluation and Review Technique (PERT):
		• Conceptual differences between CPM and PERT
		• Time estimation (optimistic, most likely, pessimistic)
		• Event times and slack
		  • Probability-based time computations using normal distribution
		  • Numerical problems
			8

Module 4	**Project Feasibility and Monitoring Techniques**	• Project formulation and project evaluation • Feasibility studies: technical, financial, and economic aspects • Financial analysis and project alternative selection techniques • Time value of money **Investment appraisal methods:** • Payback Period • Net Present Value (NPV) • Internal Rate of Return (IRR) • Benefit–Cost Ratio • Break-even analysis **Project Monitoring Techniques:** • Progress Measurement Methods • Progress Curve (S-curve) method	9

		• Line of Balance (LOB) technique • Bar Chart (Gantt Chart) Tracking • Earned Value Management (EVM) • Quality and Safety Monitoring	
Module 5	**Cost and Resource Optimization Techniques**	• Project cost components: direct and indirect costs • Cost slope, cost–time relationship and project crashing • Time–cost analysis and optimization techniques • Resource planning and usage profiling • Resource histograms and interpretation • Resource allocation strategies • Resource smoothing and levelling techniques • Project updating and control	8

Text books:

1. B. C. Punmiya & K. K. Khandelwal – *Project Planning and Control with PERT/CPM*
2. S. P. Mukhopadhyay – *Project Management for Architects and Civil Engineers*
3. Peurifoy, R. L. & Schexnayder, C. J. – *Construction Planning, Equipment, and Methods*
4. K. K. Chitkara – *Construction Project Management: Planning, Scheduling and Controlling*
5. 4 D. Upadhayay; "*Construction Management"*

Reference books:

1. Prasanna Chandra – *Projects: Planning, Analysis, Selection, Implementation and Review*
2. PMI – *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*
3. K. K. Chitkara – *Construction Project Management*
4. J. K. Sharma – *Operations Research: Theory and Applications*
5. Halpin, D. W. & Woodhead, R. W. – *Construction Management*

Gaps in the syllabus (to meet Industry/Profession requirements): Nil

POs met through Gaps in the Syllabus : NA

Topics beyond syllabus/Advanced topics/Design: Nil

POs met through Topics beyond syllabus/Advanced topics/Design: Nil

	Course Delivery methods
CD1	Lecture by use of boards/LCD projectors and PPT presentations
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Industrial/guest lectures
CD5	Self- learning such as use of NPTEL materials and internets
CD6	Live Construction Project Site Visits

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	**% Contribution during CO Assessment**
Mid Sem Examination Marks	25
End Sem Examination Marks	50

Quiz (02 nos. of 10 marks each)	20
Assignment / Quiz (s)	05

Assessment Compoents	**CO1**	**CO2**	**CO3**
Mid Sem Examination Marks	√	√	√
End Sem Examination Marks	√	√	√
Quiz (02 nos. of 10 marks each)	√	√	√
Assignment	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1.	3	1		1	1	2	3	3	2	2	1	2
CO2.	1	2	1			L	1	2	2	3	3	1
CO3	1			1	1	2	2	2	3	1	1	1

Mapping Between COs and Course Delivery (CD) methods		
CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD PPT presentation	CO1, CO2, CO3
CD2	Tutorials/Assignments	CO2, CO3
CD3	Seminars	CO1, CO2
CD4	Industrial/guest lectures	CO1, CO2, CO3
CD5	Self- learning such as use of NPTEL materials and internets	CO1, CO2, CO3
CD6	Live Construction Project Site Visits	CO1, CO2,

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Ashutosh Kumar

COURSE INFORMATION SHEET

Course code: **ARP 26561**
Course title: **ARCHITECTURAL DESIGN THESIS PROJECT**
Pre-requisite(s): Candidate must have cleared all papers upto 8th sem.
Co- requisite(s): None
Credits: 18 L:0 T:0 P:18
Class schedule per week: 18
Class: B.Arch
Semester / Level: X
Branch: Architecture and Planning
Name of Teacher:

Course Objectives

This course enables the students:

A.	Apply scientific methods, tools, and techniques to conduct post-occupancy evaluation (POE) of buildings, built complexes, and the built environment through case studies, and derive inferences for developing design guidelines
B.	Develop and articulate architectural design concepts across multiple scales, ranging from building to urban contexts.
C.	Integrate theoretical knowledge, design principles, and skills acquired in previous semesters into a comprehensive design project, demonstrating preparedness for academic assessment as well as professional practice.
D.	Apply appropriate methodologies and techniques for effective Thesis / Dissertation / Project Report writing, adhering to academic and professional standards.

Course Outcomes

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

CO 1.	Demonstrate advanced design capabilities in addressing complex architectural problems across multiple scales.
CO 2.	Develop design solutions for live projects by incorporating local context, socio-environmental parameters, and contemporary approaches to urban aesthetics.
CO 3.	Integrate knowledge of building services, working drawings, construction techniques, and specialized design attributes into a comprehensive architectural proposal.
CO 4.	Compile, articulate, and present a complete design solution in the form of a structured report using appropriate graphical, visual, and verbal communication methods.

Syllabus

The Thesis Project is a comprehensive academic exercise that synthesizes all knowledge and skills acquired throughout the B.Arch program. Students are required to progress through a series of structured stages, each involving submission and presentation for review.
Following the Introduction to Thesis Project & Research Methodology, the subsequent stages are outlined below.

1. Stage I: Site Analysis, Case Studies & Project Requirements
Objectives

- To understand the site and its context in depth
- To derive design guidelines from real-world examples
- To establish a clear and justified project brief

Submission Requirements: Detailed Site Analysis, Physical characteristics (location, topography, climate, vegetation), Environmental factors (sun path, wind direction, noise, etc.), Socio-cultural and

contextual aspects, Must follow the prescribed presentation guidelines, Case Studies: Minimum 2 live case studies and Minimum 1 literature case study, Conducted using Post-Occupancy Evaluation (POE) methods, Should include analysis and design inferences, Project Requirements, Detailed area program, Functional requirements and spatial relationships, Justification based on case study findings.

2. Stage II: Concept Design
Objectives
- To translate research into design ideas
- To establish the conceptual direction of the project

Submission Requirements: Design concept and guiding principles, Site plan with zoning and circulation, Building organization and massing strategies, Schematic floor plans of all buildings, Conceptual drawings: Elevations, Sections, Views, Physical study / massing models (digital model may be submitted in addition), rendered views (optional).

3. Stage III: Design Development
Objectives
- To develop the design in detail
- To integrate technical and functional aspects

Submission Requirements: Detailed site plan, Floor plans of all buildings and levels, Furniture layout for typical areas, detailed elevations, and sections. Study model, Interior perspectives/views, Walkthrough (optional)

It is mandatory to present 2 sheets that explain how the research conducted during the dissertation has been incorporated into the project design. (Minimum 2 sheets should be presented at this stage for the same)

Electives (Students can select **any one** of the offered electives for their thesis project)

(i) Working Drawings (minimum 2), Services Drawings (minimum 2) (1:50 or 1:100 scale)
(ii) Landscape drawings for the project
(iii) Estimation and costing of any one building block
(iv) Energy efficiency analysis of any one building block/clusters/ site

4. Stage IV: Finalization of Design
Objectives
- To refine and finalize the design proposal

Submission Requirements: All drawings from previous stages, revised drawings incorporating review feedback, and final design submission for approval, physical block models (at scale appropriate to scale of the project), rendered views, interior views of key spaces, walkthrough (optional).

5. Stage V: Project Synopsis
Objectives
- To summarize the key aspects of the thesis project

Submission Requirements: Submission of soft and hard copies of the Thesis Synopsis
Should include: Project overview, Key design concepts, Salient features

6. Stage VI: Thesis Report
Objectives
- To document the entire thesis process comprehensively

Submission Requirements: Submission of 3 copies of the Final Thesis Report
Must include Introduction and objectives, Case studies and analysis, Site analysis, Design development, Final drawings, Format must follow institutional guidelines

7. Stage VII: Final Jury Presentation

Objectives

- To evaluate the student's overall performance and design capability

Presentation Components

Students must present: Project introduction, Case studies and literature review, Site analysis, Final design proposal, Block models, Detailed models and Rendered views(exterior and interior) and, walk throughs.

Evaluation: Conducted by an External Jury Panel. Assessment based on: Design quality, technical resolution, Presentation skills, Documentation

Textbooks:

Reference books:

Gaps in the syllabus (to meet Industry/Profession requirements) : Nil

POs met through Gaps in the Syllabus : Nil

Topics beyond syllabus/Advanced topics/Design : Nil

POs met through Topics beyond syllabus/Advanced topics/Design : Nil

Course Delivery methods
Lecture by use of boards/LCD projectors/OHP projectors
Tutorials/Assignments
Seminars
Mini projects/Projects
Laboratory experiments/teaching aids
Industrial/guest lectures
Industrial visits/in-plant training
Self- learning such as use of NPTEL materials and internets
Simulation

Course Outcome (CO) Attainment Assessment tools & Evaluation procedure

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Lab Quiz-1	10
Lab Quiz-2	10
Lab Viva	20
Day-to-Day Progressive Evaluation	30
End-Sem Performance	30

Assessment Components	CO1	CO2	CO3	CO4
Lab Quiz-1	√	√	√	√
Lab Quiz-2	√	√	√	√
Lab Viva	√	√	√	√
Day-to-Day Progressive Evaluation	√	√	√	√
End-Sem Performance	√	√	√	√

Indirect Assessment –

1. Student Feedback on Faculty
2. Student Feedback on Course Outcome

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO 12
CO1.	3	1	2	1	1	2	3	3	2	2	1	2
CO2.	1	2	1	2	2	1	1	2	2	3	3	1
CO3	1	2	2	1	1	2	2	2	3	1	1	1
CO4	3	2	1	2	3	1	3	2	1	2	3	1

CD	**Course Delivery methods**	**Course Outcome**
CD1	Lecture by use of boards/LCD projectors/OHP projectors	CO1, CO2, CO3
CD3	Seminars	CO1, CO2
CD4	Mini projects/Projects	CO1, CO2, CO3, co4
CD5	Laboratory experiments/teaching aids	CO1, CO2, CO3
CD6	Industrial/guest lectures	CO1, CO2,
CD8	Self- learning such as use of NPTEL materials and internets	CO2, CO3
CD9	Simulation	CO1, CO2

Course Designers		
Experts from Industry	***Experts from Higher Technical Institutions***	***Internal Experts***
Ar. Sandeep Jha, AXIS Architects, Ranchi Ar. Subhrendu Das, Practice Design, Kolkata	Prof. Dr. Abir Bandyopadhyay, NIT Raipur	Dr. Shama Parween