CURRICULUM

Outcome Based Education
(Effective from the Academic Year 2026-2027)

SCHOOL OF ARCHITECTURE

I-IV Semester M. Arch (Advanced Architecture)

RAMAIAH INSTITUTE OF TECHNOLOGY
(Autonomous Institute, Affiliated to VTU)
Bangalore -560054

About the Institute

In 1962, Dr. M. S. Ramaiah, a visionary philanthropist, established the Gokula Education Foundation with a noble mission to uplift society through education. The same year marked a pivotal moment in technical education in India with the founding of the M S Ramaiah Institute of Technology (MSRIT).

MSRIT offers an impressive array of 18 undergraduate and 15 postgraduate programs, all approved by the All India Council for Technical Education (AICTE). The National Board of Accreditation (NBA) has accredited all eligible programs at the undergraduate (UG) and postgraduate (PG) levels. In March 2021, MSRIT earned an 'A^+' grade from the National Assessment and Accreditation Council (NAAC), underscoring its unwavering commitment to academic excellence. Since 2007, the institute has proudly held Autonomous Status for its UG and PG programs, a prestigious recognition granted by the University Grants Commission (UGC) and Visvesvaraya Technological University (VTU). According to the Ministry of Education, Government of India's NIRF Ranking Framework, MSRIT ranks 75th among 1,584 leading engineering institutions and 31st among 131 architecture schools in India for 2025, highlighting its remarkable impact and leadership in education.

The institute participated in the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. To foster a research culture, the institute has established several specialized centres, including the Centre for Imaging Technologies, the Centre for Advanced Materials Technology, the Centre for Antennas and Radio Frequency Systems (CARFS), the Centre for Cyber Physical Systems, the Schneider Centre of Excellence, the Centre for Bio and Energy Materials Innovation, JSW Centre of Excellence in Power Systems and more. MSRIT boasts a faculty of 380 highly qualified members, 70% of whom hold doctoral degrees, and over 300 scholars currently pursuing Ph.D. degrees.

The Entrepreneurship Development Cell (EDC) and "Ramaiah Evolute" have been established on campus to support startup incubation. MSRIT features a dedicated Placement and Training department, a strong mentoring and proctorial system, a fully equipped sports department, and a spacious, air-conditioned library with a wide range of books and subscriptions to both international and national journals. The Digital Library provides access to online e-journals from renowned publishers, including Elsevier ScienceDirect, IEEE, Taylor & Francis, Springer Nature and Emerald. Additionally, the Institute is a member of DELNET, JRD Tata Memorial library, IISc, and the VTU Consortium for E-Resources.

The institute features a state-of-the-art auditorium, a well-equipped recording studio, and multiple advanced conference halls with videoconferencing capabilities. Additionally, MSRIT provides excellent hostel accommodations for both boys and girls, ensuring a comfortable living environment. MSRIT alumni have achieved remarkable success, holding prominent positions in India and internationally. They maintain strong connections with the institute through an engaged and active Alumni Association.

Founded on Dr. Ramaiah's unwavering commitment to knowledge and innovation, this remarkable institution continues to inspire generations of students and shape the future of engineering and technology in the country.

SCHOOL OF ARCHITECTURE

Established in 1992, the School of Architecture at Ramaiah Institute of Technology (RIT), Bengaluru, is committed to excellence in architectural education, design and research. The School provides a contemporary, interdisciplinary learning environment that integrates architectural design, building technology, sustainability, digital tools and professional exposure, preparing students to respond creatively and responsibly to the evolving built environment.

The School functions under Ramaiah Institute of Technology, an autonomous institution affiliated to Visvesvaraya Technological University (VTU), Belagavi. Its programmes are approved by the Council of Architecture (CoA), New Delhi, the statutory regulator for architectural education under the Architects Act, 1972. Teaching is design-led and is supported by site studies, workshops, industry interaction, research and experiential learning that develop critical thinking in architecture and allied disciplines.

Ramaiah Institute of Technology is accredited by the National Assessment and Accreditation Council (NAAC) with an A+ grade and is ranked 31st in the NIRF 2025 Architecture and Planning category.

The School offers a five-year Bachelor of Architecture (B.Arch.) programme with a sanctioned intake of 80, and two postgraduate programmes of two years' duration, Master of Architecture (Landscape Architecture) and Master of Architecture (Advanced Architecture), each with a sanctioned intake of 20. The School also offers a Ph.D. programme to support advanced research and scholarly inquiry in architecture. Together, the programmes engage with architectural design, sustainable practice, landscape and ecological systems, advanced and digital technologies, and contemporary architectural research.

The School's faculty comprises academicians, practising architects and specialists from allied disciplines. Their combined teaching, research and professional experience links theory, design and practice. Faculty support student development through mentoring, studio-based and innovative pedagogy, research projects and professional collaborations.

Students build a foundation in design thinking, technical knowledge, digital tools, sustainability, research and professional practice through studio work, hands-on learning, site exposure and interaction with practising professionals. The curriculum develops creativity, critical thinking, problem-solving and communication skills. Graduates pursue careers in architectural practice, urban design, landscape architecture, interior design, conservation, sustainable and computational design, project management, academia, research and consultancy, as well as entrepreneurship and advanced studies in India and abroad.

Through its combination of design, research and professional engagement, the School aims to develop architects and design professionals equipped to shape a responsive, resilient and future-ready built environment.

VISION OF THE INSTITUTE

To be an Institution of International Eminence, renowned for imparting quality technical education, cutting edge research and innovation to meet global socio-economic needs.

MISSION OF THE INSTITUTE

MSRIT shall meet the global socio-economic needs through -

1. Imparting quality technical education by nurturing a conducive learning environment through continuous improvement and customization.
2. Establishing research clusters in emerging areas in collaboration with globally reputed organizations.
3. Establishing innovative skills development, techno entrepreneurial activities and consultancy for socio-economic needs.

QUALITY POLICY

We at MS Ramaiah Institute of Technology strive to deliver comprehensive, continually enhanced, global quality technical and management education through an established Quality Management System complemented by the synergistic interaction of the stake holders concerned.

VISION OF THE DEPARTMENT

To be a leading centre of architectural education that nurtures creative and critical thinkers committed to shaping sustainable, inclusive and innovative built environments.

MISSION OF THE DEPARTMENT

1. To impart design excellence by fostering creativity and critical thinking through studio-based learning supported by contemporary technology.
2. To inculcate sustainability, social responsibility, ethical values and a global outlook in the design and practice of architecture.
3. To develop professionally competent and entrepreneurial architects through interdisciplinary learning and real-world industry exposure.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Graduates will demonstrate advanced architectural knowledge and professional competence in developing innovative, sustainable, and context-responsive design solutions using interdisciplinary approaches and emerging technologies.

PEO2: Graduates will engage in research, critical inquiry, and innovative practices in architecture and allied fields, contributing to academic, professional, and societal advancement through continuous learning.

PEO3: Graduates will practice architecture with professional ethics, environmental responsibility, effective communication, and leadership skills to address contemporary challenges in the built environment.

PROGRAM OUTCOMES (POs):

PO1: Develop advanced research aptitude and critical analytical skills to address complex architectural, environmental, and urban challenges.

PO2: Demonstrate effective communication, representation, and documentation skills through technical drawings, digital media, research writing, and professional presentations.

PO3: Apply specialized knowledge and interdisciplinary approaches in advanced architecture to create innovative, sustainable, and context-responsive design solutions.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Demonstrate advanced knowledge of architectural design, theory, technology, structure, and environmental systems to develop innovative and context-responsive architectural solutions.

PSO2: Apply digital, computational, parametric, and emerging technologies in architectural design, analysis, visualization, and research processes.

PSO3: Integrate principles of sustainability, climate responsiveness, environmental performance, and resilience in the planning and design of advanced architectural projects.

PSO4: Undertake independent research, critical inquiry, and interdisciplinary exploration to address contemporary architectural challenges and contribute to professional practice and architectural knowledge.

RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU, BELGAUM)

SCHEME OF TEACHING & EXAMINATION – I Semester M. ARCH (Advanced Architecture)

ACADEMIC YEAR 2026- 2027

S. No.	Course Code	Course Title	Category	Credits				Total Contact hours per week		
				L	T	P	Total	L	T	P
1	26AA101	Advanced Architectural Design -I	PC	0	0	9	9	0	0	9
2	26AA102	Advanced Building Materials & Construction Technology	PC	0	0	5	5	0	0	5
3	26AA103	Advanced BIM	PS	0	0	3	3	0	0	3
4	26AA104	Elective-I	PE	1	0	2	3	1	0	2
	Total			1	0	19	**20**	1	0	19

Note: PC: Professional Core, PS: Professional Support, PE: Professional Elective
1credit = 1 hour/ week of Lecture (L)
1 Credit = 1 hour/week of Tutorial (T)
1 Credit = 1 hour/ week of practical (P)

	Course Code	Course title	Credits
1.	26AA104/ AAE01	Sustainable Habitat Design	1:0:2
2.	26AA104/ AAE02	Python for Architecture	1:0:2
3	26AA104/ AAE03	Social Theory & Urban Design in Practice	1:0:2

CIE = Continuous Internal Evaluation
SEE = Semester End Examination
Evaluation Pattern: Marks allocation for SEE

Subject Code	Subject	Portfolio	Viva voce	Total
26AA101	Advanced Architectural Design Studio-I SEE (Viva voce)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA104/ AAE01	Elective-I (Sustainable Habitat Design) SEE (Term work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA104/ AAE02	Elective-I (Python for Architecture) SEE (Term work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA104/ AAE03	Elective-I (Social Theory & Urban Design in Practice) SEE (Term work)	40	10	50

Note:

1. Literature survey will be a requirement for architectural design study. Periodical review by an external jury for subjects going for viva voce.
2. National/International tours may be arranged during vacation for students, to study good examples of Advanced Architecture.
3. For all viva voce examinations one internal faculty and one external faculty will conduct the exam.
4. Portfolios have to be submitted on a prescribed date for all subjects on the date announced by the department.
5. All students have to register on the first day at the beginning of the Viva Voce exam.
6. All students have to register on the first day of Term work exams.

SCHEME OF TEACHING & EXAMINATION – II Semester M. ARCH (Advanced Architecture)
ACADEMIC YEAR 2026- 2027

S. No.	Course Code	Course Title	Category	Credits				Total Contact hours per week		
				L	T	P	Total	L	T	P
1	26AA201	Advanced Architectural Design -II	PC	2	0	7	9	0	0	9
2	26AA202	Building Performance Assessment (Simulation Software)	PS	2	0	3	5	0	0	5
3	26AA203	Advanced Structural Systems	PC	1	0	2	3	0	0	3
4	26AA204	Elective-II	PE	3	0	0	3	1	0	2
	Total			8	0	12	**20**	1	0	19

Note: PC: Professional Core, PS: Professional Support, PE: Professional Elective
1credit = 1 hour/ week of Lecture (L)
1 Credit = 1 hour/week of Tutorial (T)
1 Credit = 1 hour/ week of practical (P)

	Course Code	Course title	Credits
1.	26AA204/ AAE04	Net zero buildings	3:0:0
2.	26AA204/ AAE05	Virtual Reality and Augmented Reality in Architecture	3:0:0
3	26AA204/ AAE06	Land use structure & Urban Morphology	3:0:0

CIE = Continuous Internal Evaluation
SEE = Semester End Examination
Evaluation Pattern: Marks allocation for SEE

Subject Code	Subject Name	Portfolio	Viva voce	Total
26AA201	Advanced Architectural Design -II SEE (Viva voce)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA202	Building Performance Assessment (Simulation Software) SEE (Term work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA204/ AA E04	Elective-II Net zero buildings SEE (Term work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA204/ AAE05	Elective-II Virtual Reality and Augmented Reality in Architecture SEE (Term work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
26AA204/ AAE06	Elective-II Land use structure & Urban Morphology SEE (Term work)	40	10	50

Note:

1. Literature survey will be a requirement for architectural design study. Periodical review by an external jury for subjects going for viva voce.
2. National/International tours may be arranged during vacation for students, to study good examples of Advanced Architecture.
3. For all viva voce examinations one internal faculty and one external faculty will conduct the exam.
4. Portfolios have to be submitted on a prescribed date for all subjects on the date announced by the department.
5. All students have to register on the first day at the beginning of the Viva Voce exam.
6. All students have to register on the first day of Term work exams.

SCHEME OF TEACHING & EXAMINATION – III Semester M. ARCH
(Advanced Architecture)
ACADEMIC YEAR 2026- 2027

S. No.	Course Code	Course Title	Category	Credits				Total Contact hours per week		
				L	T	P	Total	L	T	P
1	AA301	Thesis Project	PC	0	0	12	12	0	0	12
2	AA302	Advanced Building Systems Integration	PS	0	0	3	3	0	0	3
3	AA303	Project Management	PC	1	0	1	2	1	0	1
4	AA304	Elective-III	PE	3	0	0	3	3	0	0
	Total			4	0	16	**20**	4	0	16

Note: PC: Professional Core, PS: Professional Support, PE: Professional Elective
1credit = 1 hour/ week of Lecture (L)
1 Credit = 1 hour/week of Tutorial (T)
1 Credit = 1 hour/ week of practical (P)

	Course Code	Course title	Credits
1.	AA304/ AAE07	Impact Assessment of Environment	3:0:0
2.	AA304/ AAE08	Prompt Engineering and Generative AI for Architecture Design	3:0:0
3	AA304/ AAE09	Advanced Theory of Design: Architecture and Human Settlements	3:0:0

CIE = Continuous Internal Evaluation
SEE = Semester End Examination
Evaluation Pattern: Marks allocation for SEE

Subject Code	Subject	Portfolio	Viva voce	Total
AA301	Thesis Project SEE (Viva Voce)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
AA302	Advanced Building Systems Integration SEE (Term Work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
AA304/ AAE07	Elective-III Impact Assessment of Environment SEE (Term Work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
AA304/ AAE08	Elective -III Prompt Engineering and Generative AI for Architecture Design SEE (Term Work)	40	10	50

Subject Code	Subject	Portfolio	Report	Total
AA304/ AAE09	Elective-III Advanced Theory of Design: Architecture and Human Settlements SEE (Term Work)	40	10	50

Note:

1. Literature survey will be a requirement for architectural design study. Periodical review by an external jury for subjects going for viva voce.
2. National/International tours may be arranged during vacation for students, to study good examples of Advanced Architecture.
3. For all viva voce examinations one internal faculty and one external faculty will conduct the exam.
4. Portfolios have to be submitted on a prescribed date for all subjects on the date announced by the department.
5. All students have to register on the first day at the beginning of the Viva Voce exam.
6. All students have to register on the first day of Term work exams.

SCHEME OF TEACHING & EXAMINATION – IV Semester M. ARCH
(Advanced Architecture)
ACADEMIC YEAR 2026- 2027

S. No.	Course Code	Course Title	Category	Credits				Total Contact hours per week		
				L	T	P	Total	L	T	P
1	AA401	Practical Training	PC	0	0	20	20	0	0	20
	Total			0	0	20	**20**	0	0	20
Note: PC: Professional Core, PS: Professional Support, PE: Professional Elective 1credit = 1 hour/ week of Lecture (L) 1 Credit = 1 hour/week of Tutorial (T) 1 Credit = 1 hour/ week of practical (P)										

CIE = Continuous Internal Evaluation
SEE = Semester End Examination
Evaluation Pattern: Marks allocation for SEE

Subject Code	Subject Name	Portfolio	Viva Voce	Total
AA401	Practical Training SEE **(**Viva Voce**)**	40	10	50

Note:

1. Literature survey will be a requirement for architectural design study. Periodical review by an external jury for subjects going for viva voce.
2. National/International tours may be arranged during vacation for students, to study good examples of Advanced Architecture.
3. For all viva voce examinations one internal faculty and one external faculty will conduct the exam.
4. Portfolios have to be submitted on a prescribed date for all subjects on the date announced by the department.
5. All students have to register on the first day at the beginning of the Viva Voce exam.
6. All students have to register on the first day of Term work exams.

SEMESTER - I

Advanced Architectural Design -I	
Course Code: 26AA101	**Credits: 0 :0: 9**
Prerequisite: Nil	**Contact Hours: 9 X 15P**
Course Coordinator: Assoc. Prof. Sudha Kumari G	

Course Content:

Unit I

Understand the basics of advanced architecture: Introduction to small projects; To conceptualize and design a pavilion that embodies the principles of net-zero energy and sustainable architecture, serving as a demonstration space for future-forward, climate-conscious design solutions. The pavilion should be designed as an engaging, functional space for public use, exhibitions, or small gatherings. Generate concepts related to net zero building, that is designed, constructed, and operated to produce as much renewable energy on-site (or through clean energy sources) as it consumes over the course of a year, thereby achieving a net balance of zero energy consumption and minimizing carbon emissions.

Unit II

Introduction to Tall Buildings and High rise development, Typologies of High-rise buildings based on their structural systems, functional use, and construction materials, particularly- Mixed use development; Indian Standards, Codes, guidelines, and regulations related to High rise development. Documentation and Case Study: Identification of a literature Case Study and an observational Case-study (preferably local), and Documentation of plan layouts and master plans. Detailed drawings focusing on integrating complexities of various layers of the high rise development, Focus on sustainable design elements in architecture.

Unit III

Site selection, site analysis, and concept formulation are interconnected stages that form the foundation of the design process. Site selection refers to identifying and choosing the most suitable location for a project, based on factors such as accessibility, topography, climate, infrastructure, and legal or cultural considerations. The insights gained from site analysis guide the next stage—concept formulation—which involves developing an overarching design idea or vision that integrates user needs, site characteristics, and contextual influences into a coherent design strategy.

Unit IV

Drawing Development: Architectural drawings including - Master Plan, Site Plan, Floor Plans, Elevations and Sections and services. Aspects to be addressed can include: Sustainable building practices, Intelligent building materials and techniques, Service integration, and Advanced building practices.

Unit V

Drawings and Renders: Architectural Drawings and 3 D renders highlighting - Circulation system integration, Logistic chain and Structural design and Building Services using advanced BIM.

Course Outcomes (COs):

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

CO1: Analyse complex architectural design parameters, including net-zero and sustainability criteria, and the Indian standards, codes and development regulations governing high-rise development. (PO1, PO3; PSO1, PSO3, PSO4)
CO2: Formulate spatial programs for advanced architectural projects through literature reviews, field studies, case-study documentation, site selection and site analysis. (PO1, PO2, PO3; PSO1, PSO3, PSO4)
CO3: Apply and critically evaluate methods of integrating services, structure and sustainable strategies into high-rise architectural designs. (PO1, PO3; PSO1, PSO2, PSO3)
CO4: Design context-responsive architectural solutions, from a net-zero pavilion to high-rise and mixed-use development, and develop the master plan, plans, elevations, sections and service drawings. (PO1, PO3; PSO1, PSO2, PSO3)
CO5: Integrate interdisciplinary knowledge using advanced BIM and digital tools to produce detailed drawings, 3D renders and models, and present the design project in a professional report. (PO2, PO3; PSO1, PSO2, PSO4)

References:

1. Tall Buildings and Vertical Urbanism is authored by A.K. Jain
2. Tall: The Design and Construction of High-Rise Architecture by Guy Marriage
3. Sustainable Buildings and Construction for India: Policies, Practices and Performance by TERI & UNEP
4. Designing Tall buildings by Mark Sarkisian
5. Structural Analysis and Designing of Tall building,Bungale S Taranath
6. Introduction to Architecture Technology by William McLean, Peter silver and Dason Whitsett
7. Industrial Architecture (Building Big)-Joyce M
8. Green Walls in High-Rise Buildings by Payam Bahrami and Antony Wood
9. Sustainable Design of Eco-Friendly Skyscraper for the Modern Society by Dr. Vinima Gambhir et al.

Evaluation Pattern: Marks allocation for SEE (Viva Voce):

Subject Code	Subject Name	Portfolio	Viva voce	Total
26AA101	Advanced Architectural Design -I SEE (Viva voce)	40	10	50

SEMESTER - I

Advanced Building Materials & Construction Technology	
Course Code: 26AA102	**Credits: 0 :0: 5**
Prerequisite: Nil	**Contact Hours: 5 X 15S**
Course Coordinator: Asst. Prof. Akshata Shagoti	

Course Content:

Unit-I

Introduction to Tall Structures and Design Principles – Overview of tall building structures and their classification. Introduction to major structural systems such as shear frames, interacting systems, partial and fully tubular systems. Floor systems in tall buildings with emphasis on composite steel, prestressed, and post-tensioned concrete systems. Foundation systems for tall buildings, including raft, pile, and caisson foundations, with basic design considerations.

Unit-II

Steel Structural Systems in Tall Structures – Structural strategies to resist wind and seismic forces using advanced steel configurations. Steel braced frames and moment-resisting frames with examples of cyclic behavior and high-rise applications. Steel shear wall and core-outrigger systems with benefits and limitations in supertall constructability. Steel tubular systems (framed, tube-in-tube, bundled tube) and diagrid systems, highlighting structural efficiency, material optimization, and architectural expression. Brief introduction to hybrid steel systems combining multiple approaches for enhanced performance.

Unit-III

High-Performance concrete in Tall building applications - Properties and applications of high-performance concrete (HPC) in tall building construction. Study of Ultra-high-strength, self-consolidating, and durable concrete types, with emphasis on their structural and workability advantages. The unit also introduces fibre-reinforced and lightweight concrete for use in key structural elements like core walls and slabs. Concrete admixtures and curing methods.

Unit-IV

Façade Systems and Building Envelopes in Tall Structures – Introduction to façade and building envelope systems. Classification of façade systems: curtain walls, structural glazing, double-skin façades, and unitized panel systems. Thermal and acoustic performance requirements, with emphasis on energy efficiency, daylighting, and climate-responsive design. Integration of high-performance glazing, shading devices, and advanced materials such as ETFE ((Ethylene Tetrafluoroethylene) and photovoltaic façades. Structural considerations for wind loads, thermal movement, and seismic behavior of façades. Fire-resistant cladding strategies, waterproofing, and durability. Examples.

Unit-V

Building Services and Fire Safety in Tall Structures- Integrated building services and fire safety systems in tall buildings, ensuring functional efficiency and occupant safety. Classification of vertical transportation systems, sky lobbies, and service floors. Introduces high-rise water supply strategies. Integration of electrical and energy conservation methods. Fire protection systems, through the design and layout of wet risers, fire sump tanks, automatic sprinklers, smoke detectors, and alarm

systems, evacuation planning through fire escape stairs, fire-rated doors, and the use of fire-resistant materials.

Course Outcomes (COs):
On successful completion of the course, the student will be able to:

CO1 – To understand the fundamentals of tall structures, structural systems, floor systems, and foundation systems used in high-rise buildings. (PO1, PO3; PSO2, PSO3)
CO2 – To analyze steel structural systems and advanced lateral load-resisting systems adopted in tall structures. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO3 – To understand the properties, applications, and performance of high-performance concrete and advanced concrete technologies in tall buildings. (PO1, PO2, PO3; PSO1, PSO3, PSO4)
CO4 – To study façade systems, building envelopes, and their structural, thermal, acoustic, and energy-performance requirements in tall structures. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO5 – To understand integrated building services, vertical transportation, fire safety systems, and occupant safety measures in tall buildings. (PO1, PO2, PO3; PSO1, PSO3, PSO4)

References:

1. Barry's Advanced Construction of Buildings by Stephen Emmitt and Christopher A. Gorse
2. Bennett, Ian etal- Tall Building Structural Systems.
3. Proceedings of the Council for Tall Buildings- Vol 1 to 10.
4. Structural Steel Design: A Practice-Oriented Approach by Wang, C., & Salmon, C. (2014)
5. Steel Design by William T. Segui (2018)
6. Design of Steel Structures by Edwin H. Gaylord, Charles N. Gaylord, and James E. Stallmeyer (2011)

+Fiber-Reinforced Polymers: A Review by Muhammad Rizwan, et al. (2018)

7. Design of Reinforced Concrete Structures with Fiber Reinforced Polymers (FRP) by Mohamed M. K. (2017)
8. Structural Steel Design: A Practice-Oriented Approach by Wang, C., & Salmon, C. (2014)
9. Design of Steel Structures by Edwin H. Gaylord, Charles N. Gaylord, and James E. Stallmeyer (2011)
10. Composite Materials for Construction: Structural Design with FRP by Alain S. (2019)

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Viva voce	Total
26AA102	Advanced Building Materials & Construction Technology SEE (Term Work)	40	10	50

SEMESTER - I

Advanced BIM	
Course Code: 26AA103	**Credits 0 : 0 : 3**
Prerequisite: Nil	**Contact Hours: 3 X 15P**
Course Coordinator: Asst. Prof. Aruna Gopal	

Course Content:

Unit I

Overview of BIM Concepts: Definition, history, and evolution of BIM in the AEC industry, Types of files, introduction to user interface

Unit II

Setting up BIM Project: Setting up the project file, Navigation and viewing techniques, Modeling of Architectural elements, modify and manage settings**.**

Unit III

Design Process in BIM: Creating 2D elements, adding annotations, Advance modeling techniques and massing, Content creation.

Unit IV

Annotations and Visualization: Rendering settings, applying materials and export options. Create and manage sheets. Tools for project collaborations and documentation.

Unit V

Design output: Setting site topography and linking of files.
Create sample projects for a residential or commercial building and produce standard working drawing and rendered views.

Course Outcomes (COs):

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

CO1- To understand the basic principles and key terminology of Building Information Modeling. (PO3; PSO2, PSO4)
CO2- To gain hands-on experience with BIM tools and software for creating and managing digital models. (PO1, PO3; PSO1, PSO2)
CO3- To work on conceptual models, create custom contents into the project and explore the complex modeling techniques. (PO1, PO3; PSO1, PSO2, PSO4)
CO4- To use BIM tools for presentations, collaborations and documentation. (PO1, PO2, PO3; PSO1, PSO2, PSO4)
CO5- To apply and demonstrate a sample BIM project with modeling, documentation and visualization skills. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

References:

1. Introduction to Architecture Technology by William McLean, Peter silver and Dason Whitsett
2. BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers- Chuck Eastman, Paul Teicholz, Rafael Sacks, & Kathleen Liston
3. BIM and Construction Management: Proven Tools, Methods, and Workflows - Brad Hardin & Dave McCool
4. Green BIM: Successful Sustainable Design with Building Information Modeling - Eddy Krygiel & Bradley Nies
5. A Designer's Guide to Building Information Modeling: A Practical Overview for Design Professionals- Calvin Luebkeman & David Briscoe
6. Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations- Philip G. Bernstein & James H. Pittman
7. BIM in Small-Scale Sustainable Design Projects- Michael Uhm & Seungbae Lee
8. Design Integration Using Autodesk Revit 2024- Authors: Daniel John Stine & Aaron Hansen
9. The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction - Dominic Holzer.

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
26AA103	Advanced BIM SEE (Term work)	40	10	50

SEMESTER – I

Elective I (Sustainable Habitat Design)	
Course code: 26AA104/ AAE01	**Credits: 1:0:2**
Pre-requisite: Nil	**Contact Hours: 3 x 15S**
Course Coordinator: Assoc. Prof. Sudha Kumari G	

Course Content:

Unit I

Understanding Cities and Sustainable Development: Reading the city in relation to social structure, cognition, lived experience, and urban form; Concept and principles of Sustainable; Development: environmental protection, social equity, and economic viability in urban contexts; Introduction to socio-spatial relationships and urban morphology with emphasis on sustainability, environmental performance, and inclusive development.

Unit II

Habitat, Built Environment, and Sustainability: Habitat design in relation to planning and architecture. Principles of sustainable habitat development, including resource efficiency, climate responsiveness, and human well-being.; Habitat design as an extension of architecture and planning, focusing on sustainable settlement patterns.

Unit III

Evolution of Urban Thought and Sustainability: Evolution of urban form and settlement concepts across cultures and in India; Utopian and reformist ideas in urban planning and development.; Changing paradigms of sustainability, climate adaptation, and resilience in urban planning and design practices.

Unit IV

Urban Analysis for Sustainable Development: Basic approaches to urban analysis and surveys; Concepts of imageability, townscape, and perception of urban environments (Kevin Lynch, Gordon Cullen) as tools to assess environmental quality, livability, and social inclusiveness; Selected contemporary examples illustrating sustainable urban development practices

Unit V

Contemporary Urban Challenges and Sustainable Futures: Emerging social, environmental, and community-related issues in urban areas; Sustainable development strategies at multiple scales: neighborhoods, campuses, city centers, transport corridors, and waterfronts; Emphasis on climate resilience, inclusive public spaces, low-carbon development, and community participation.

Course Outcomes (COs):

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

CO1: Explain and interpret the concept of sustainable development in urban contexts by relating social structure, spatial form and lived experience of cities to environmental, social and economic sustainability. (PO3; PSO1, PSO3, PSO4)
CO2: Analyse habitat and built-environment patterns using sustainable development principles, and evaluate their implications for resource efficiency, climate responsiveness and human well-being. (PO1, PO3; PSO1, PSO3, PSO4)
CO3: Critically assess the evolution of urban and settlement concepts across cultures and in India, and relate utopian and reformist ideas to contemporary sustainability and climate-adaptation challenges. (PO1, PO2, PO3; PSO1, PSO3, PSO4)
CO4: Apply urban analysis methods and tools such as imageability and townscape to evaluate the environmental quality, livability and inclusiveness of urban areas. (PO1, PO3; PSO1, PSO3, PSO4)
CO5: Formulate sustainable development strategies for contemporary urban social, environmental and community issues across multiple spatial scales, with emphasis on resilience and inclusivity. (PO1, PO2, PO3; PSO1, PSO3, PSO4)

Reference books:
1. Kevin Lynch- Imageability of City
2. CamilloSitte -City Planning according to Artistic principles
3. Kevin Lynch -Good City Form
4. Rob Krier -Urban street and Squares
5. Gordon Cullen -Townscapes
6. Time-Savers Standards for Urban Design.

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
26AA104/ AAE01	Elective-I Sustainable Habitat Design SEE (Term work)	40	10	50

SEMESTER – I

Elective I (Python for Architecture)	
Course code: 26AA104/ AAE02	**Credits: 1:0:2**
Pre-requisite: Basic Python, Fundamentals of Architecture/Urban Studies	**Contact Hours: 3 x 15S**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

Unit I

Introduction to Python for Architecture & NLTK Basics- Python for design computation and data analysis; Architectural data formats (CSV, JSON, GeoJSON, XML); Introduction to Natural Language Processing (NLP) in architecture; NLTK: Installation, corpora, tokenization, stemming, lemmatization; Parsing architectural texts and extracting design concepts.

Unit II

Regression and Classification Models for Architectural Data- Linear Regression and applications in environmental modeling (e.g., daylight, energy use), Logistic Regression in binary classification (e.g., site suitability: suitable/unsuitable), Multiclass Classification: zoning types, building types, heritage classification, Feature scaling and model evaluation (confusion matrix, accuracy, precision).

Unit III

Filtering and Noise Reduction in Architectural Datasets- Introduction to signal filtering in environmental data (e.g., temperature, noise levels); Smoothing techniques: Moving Average, Kalman filter (basic concept); Data cleaning, handling missing values, and outlier detection; Visualization of time-series architectural data.

Unit IV

Soft Computing: ANN, CNN, Bias, and Entropy- Introduction to Soft Computing in architecture, Artificial Neural Networks (ANN): Basics and applications in pattern recognition (e.g., spatial layouts), Convolutional Neural Networks (CNN): Basics and use in image-based analysis (e.g., facade classification), Bias-Variance Tradeoff, Information Theory concepts: Entropy and its use in architectural decision systems.

Unit V

Decision Trees and Random Forests in urban planning and policy modeling; Rule-based classification and interpretable models; Integration of NLTK with Decision Trees (text-based classification); Capstone Project: Defining a research question and applying a suitable ML pipeline.

Course outcomes (COs):

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

CO1: Process and analyse textual, numerical and visual architectural data in formats such as CSV, JSON, GeoJSON and XML using Python for design and planning tasks. (PO1, PO3; PSO2, PSO4)

CO2: Apply regression and classification algorithms to architectural problems such as energy modelling, site suitability and zoning classification, and evaluate model performance using accuracy, precision and the confusion matrix. (PO1, PO3; PSO1, PSO2, PSO3, PSO4)

CO3: Clean, filter and smooth noisy environmental and urban datasets, including handling missing values and outliers, to support accurate interpretation and predictive modelling. (PO1, PO3; PSO2, PSO3)

CO4: Implement soft computing techniques such as ANN and CNN to analyse architectural patterns and image-based design data. (PO1, PO3; PSO1, PSO2, PSO4)

CO5: Integrate NLP using NLTK with decision-tree models to classify and interpret architectural texts, research documents and policy data, and develop a capstone project that applies a suitable machine-learning pipeline to a defined research question. (PO1, PO2, PO3; PSO2, PSO4)

References:

1. *Python Machine Learning* by Sebastian Raschka
   Natural Language Processing with Python by Steven Bird, Ewan Klein, and Edward Loper (NLTK Book)
2. *Deep Learning with Python* by François Chollet
3. Tools/Libraries:
4. Python (Jupyter Notebooks)
5. NLTK
6. Scikit-learn
7. Pandas, NumPy, Matplotlib, Seaborn
8. TensorFlow/Keras
9. OpenCV (optional for image data)

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
26AA104/ AAE02	Elective-I Python for Architecture SEE (Term work)	40	10	50

SEMESTER – I

Elective I (Social Theory & Urban Design in Practice)	
Course code: 26AA104/ AAE03	**Credits: 1:0:2**
Pre-requisite: Nil	**Contact Hours: 3 x 15S**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

Unit I

Classical Theoretical Perspectives –Karl Marx (capitalism and class); Friedrich Engels (urban working-class conditions); Ferdinand Tönnies (community and association); Émile Durkheim (social solidarity); Georg Simmel (urban experience and social distance); Max Weber (social structure of the city and urban community).

Unit II

Contemporary Theoretical Perspectives I – Robert Park: human ecology; interaction of population, culture, technology, and environment; processes shaping urban social organization.

Unit III

Contemporary Theoretical Perspectives II –Ecology and human ecology (comparative overview); Louis Wirth (urbanism as a way of life); Ernest Burgess (concentric zone theory); Homer Hoyt (sector theory); Harris and Ullman (multiple nuclei theory).

Unit IV

Applied Urban Theory – Local City Context (Exercise Based) –Interpretation of concepts such as class structure, community, social solidarity, urban experience, and spatial organization in relation to architectural typologies and built form**.** Exercises include mapping of building types, documentation of materiality and spatial configuration, analytical sketches, photographs, and brief written interpretations linking social theory with architectural expression.

Unit V

Neighborhood-level field studies focusing on architectural typologies and the materiality of the built form and their relationship to social life and everyday practices; The unit examines building types, construction materials, density, land use patterns, and public spaces to understand their influence on social interactions, community behavior, and spatial inclusivity. Exercises include guided urban walks, documentation and analysis of built form and materials, mapping of socio-spatial relationships, and interpretative studies linking architectural expression to social dynamics.

Course Outcomes (COs):

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

CO1: Explain classical theoretical perspectives on the city with reference to class, community, social solidarity and urban experience.
(PO1, PO2, PO3; PSO1, PSO4)
CO2: Interpret Robert Park's human ecology approach to the interaction of population, culture, technology and environment in urban social organization. (PO1, PO2, PO3; PSO1, PSO3, PSO4)

CO3: Differentiate ecological models of urban spatial structure, including the concentric zone, sector and multiple nuclei theories. (PO1, PO2, PO3; PSO1, PSO4)
CO4: Apply urban social theories to interpret architectural typologies and built form in a local city context. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO5: Analyse the relationship between architectural typologies, materiality, land use and public spaces and the social life of a neighbourhood. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

References:

1. The City Cultures Reader – Edited by Iain Borden, Tim Hall, and Malcolm Miles. Published by Routledge, 2003.
2. City, Class, and Power (Sociology, Politics & Cities) – By Manuel Castells. Published by Palgrave Macmillan, 1978.
3. City of Quartz: Excavating the Future in Los Angeles – By Mike Davis. Published by Verso, 1990.
4. Spaces of Capital: Towards a Critical Geography – By David Harvey. Published by Blackwell/Wiley, 2001.
5. Spaces of Hope – By David Harvey. Published by the University of California Press, 2000.
6. The Death and Life of Great American Cities – By Jane Jacobs. Published by Vintage, 1961.
7. The Urban Sociology Reader – Edited by Jan Lin and Christopher Mele. Published by Routledge, 2012.

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
26AA104/ AAE03	Elective-I Social Theory & Urban Design in Practice SEE (Term work)	40	10	50

SEMESTER – II

Advanced Architectural Design -II	
Course code: 26AA201	**Credits: 2:0:7**
Pre-requisite: Nil	**Contact Hours: 9 X 15P**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

Unit I

Understanding the design of public infrastructure such as airport, metro, bus terminals, pavilions, convention centres; site details and analysis, zoning, site plan, entry/exit, parking, pickup, drop off, Service entry/exit, service parking, loading/unloading. Building bye-laws, norms, fire and safety regulations, design standards guidelines, and regulations needed for industrial infrastructure.

Unit II

Documentation and case study, the conceptual drawings to be taken up for design and detailing either as individual blocks or as a whole, supported with working models. Drawings will be detailed as plans, sections and elevations, and 3D representations to demonstrate the total project.

Unit III

Concept and Design: Site study and analysis, Formulation of the spatial program, concept sketches for service layout and materials study required for the Architectural Design project. Design aspects can include- sustainable building practices, intelligent building techniques and advanced building practices, and appropriate materials and construction.

Unit IV

Architectural Drawings: Master Plan, Floor plans, Sections and Elevations, services, landscape details and integration with structures.

Unit V

Models and Renders: 3-D renders or models using BIM or advanced tools. Students can explore 3d printing for model making.

Course Outcomes (COs):

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

CO1: Analyse site, zoning, circulation and regulatory requirements, including bye-laws, fire and safety norms and design standards, for public infrastructure projects. (PO1, PO2, PO3; PSO1, PSO3, PSO4)
CO2: Evaluate case studies of public infrastructure to derive design parameters for the architectural design project. ((PO1, PO2, PO3; PSO1, PSO3, PSO4)
CO3: Formulate a spatial programme and design concept integrating sustainable, intelligent and advanced building practices. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO4: Develop detailed architectural drawings for a public infrastructure project integrating services, landscape and structural systems. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO5: Construct 3D models and renders using BIM, advanced digital tools or 3D printing to communicate the design proposal. (PO1, PO2, PO3; PSO1, PSO2, PSO4)

References:

1. Public Transportation and Urban Development" by Cervero, and selected case studies.
2. Architecture of Transport" by J.P. Zukowsky
3. "Transit Oriented Development" by Robert Cervero
4. "Designing Urban Transformation" by Aseem Inam
5. Selected academic papers on transport and urban mobility (provided throughout the course).

Evaluation Pattern: Marks allocation for SEE (Viva Voce):

Subject Code	Subject Name	Portfolio	Viva voce	Total
26AA201	Advanced Architectural Design -II SEE (Viva voce)	40	10	50

SEMESTER – II

Building Performance Assessment (Simulation Software)	
Course code: 26AA202	**Credits: 2:0:3**
Pre-requisite: Nil	**Contact Hours: 5 X 15P**
Course Coordinator: Asst. Prof. Akshata Shagoti	

Course Content:

Unit I

Introduction to elements of building performance assessment using concept of dynamic thermal and building system simulations, which are used to predict energy use and reduce energy demand and carbon emissions in sustainable building design. Basic principles for designing effective ventilation systems; solar radiation influences heating, cooling.

Unit II

Introduction to Energy Modelling Software through digital tools used for building performance assessment, energy modelling, daylight analysis, and thermal comfort studies in sustainable architectural design. Study of Climate Consultant for climate analysis and passive design strategies; Autodesk Revit with Green Building Studio for BIM-integrated energy analysis; OpenStudio for advanced energy simulation and parametric studies; and IES Virtual Environment (IESVE) for thermal, daylight, solar, and HVAC performance analysis. Application of building performance analysis tools in evaluating energy efficiency and sustainable building design.

Unit III

Introduction to Daylighting and Solar Analysis Tools on how to test building orientation, window size and placement, and shading devices during early design stages. Visual outputs and performance feedback for improving daylight quality, reducing energy use, and increasing visual comfort using tools used to study daylight and solar performance in buildings.

Unit IV

Introduction to Thermal Comfort Analysis Tools on to- how to assess indoor conditions such as temperature, humidity, air movement, and heat radiation. The unit introduces tools ranging from simple, user-friendly software for early design decisions to advanced simulation systems that model airflow and heat transfer in detail.

Unit V

Case study: study of two well-known buildings where design decisions were guided by performance simulations. Students will examine how energy, daylight, and thermal analysis influenced the final design and how simulation tools were used to improve building performance and sustainability outcomes.

Course Outcomes (COs):

The student will be able to:

CO1: Understand and explain key building performance parameters such as thermal behavior, solar radiation, daylighting, and natural ventilation. (PO1,PO2,PO3; PSO1,PSO2,PSO3,PSO4)

CO2: Identify and compare major building energy modelling tools used in architectural practice. (PO1,PO2,PO3; PSO1,PSO2,PSO3,PSO4)

CO3: Understand the principles of daylighting and solar analysis in architectural design. (PO1,PO2,PO3; PSO1,PSO2,PSO3,PSO4)
CO4: Apply thermal comfort analysis to support energy-efficient and user-centered design decisions. (PO1,PO2,PO3; PSO1,PSO2,PSO3,PSO4)
CO5: Synthesize simulation outcomes with architectural design strategies in precedent studies. (PO1,PO2,PO3; PSO1,PSO2,PSO3,PSO4)

References:

1. Energy Plus Documentation, U.S. Department of Energy.
2. URL: Energy Plus Documentation
3. Crawley, D.B., et al. (2001). Energy Plus: Energy Simulation Program. ASHRAE Transactions, 107(1), 1101-1107.
4. Lomas, K.J., & Fiala, D. (2004). Simulation of the effects of temperature on comfort in buildings. Building and Environment, 39(6), 693-703.Clarke, J.A. (2001). Energy simulation in building design. Butterworth-Heinemann. ISBN: 978-0750626497.truck, R., & Weitz, A. (2009).
5. Design Builder: A graphical interface for building energy simulations. ASHRAE Transactions, 115(1), 1050-1060.Klemens, E., & Causone, F. (2013).
6. Modeling building energy systems with TRNSYS. International Journal of Energy and Environmental Engineering, 4(1), 1-11. Macumber, D., & O'Connor, D. (2012).
7. OpenStudio: A comprehensive open-source energy modeling platform. ASHRAE Journal, 54(10), 47-56.
8. CIBSE Guide A – *Environmental Design*, Chartered Institution of Building Services Engineers.

Evaluation Pattern: Marks allocation for SEE (Term Work):

Subject Code	Subject	Portfolio	Report	Total
26AA202	Building Performance Assessment (Simulation Software) SEE (Term Work)	40	10	50

SEMESTER – II

Advanced Structural Systems	
Course code: 26AA203	**Credits: 1:0:2**
Pre-requisite: Nil	**Contact Hours: 3 x 15P**
Course Coordinator: Asst. Prof. Vijayanand	

Course Content:

UNIT I

Advanced Structural Systems and Materials: Overview of advanced structural systems used in contemporary architecture, such as long-span, high-rise, shell, space frame, tensile and hybrid systems. Introduction to high-performance materials including high-strength concrete, structural steel, engineered timber and composites. Study of innovative structural solutions and their influence on architectural form.

UNIT II

Structural Behaviors, Analysis and Optimization: Basic understanding of load paths, load distribution and stress behavior in structural systems. Introduction to structural analysis methods and efficiency measures relevant to architectural design. Use of parametric modelling and optimization techniques to explore efficient structural forms.

UNIT III

Dynamic and Seismic Design with Computational Tools: Behaviors of structures under dynamic loads such as wind and earthquakes. Principles of seismic-resistant design and an introduction to performance-based design. Use of computational tools to simulate and understand structural response at the design stage.

UNIT IV

Sustainable and Smart Structures: Material efficiency, lifecycle assessment and environmental impact of structural systems. Introduction to smart and adaptive structures that respond to changing conditions. Energy-efficient structural strategies and the integration of renewable energy systems within building structures.

UNIT V

Innovations, Case Studies and Future Trends: Case studies of landmark structures demonstrating performance-based innovation and of collaboration between architects, structural engineers and other disciplines in complex projects. Emerging trends in structural design, materials and construction technology.

Course outcomes (COs):

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

CO1 – Explain advanced structural systems, high-performance materials and innovative structural solutions used in architecture. (PO1, PO2, PO3, PSO1, PSO2, PSO3, PSO4)
CO2 – Apply structural analysis, optimisation and parametric modelling techniques to assess load distribution, stress and structural efficiency. (PO1, PO2, PO3, PSO1, PSO2, PSO3, PSO4)

CO3 – Analyse the dynamic and seismic response of structural systems using computational tools and performance-based design principles. (PO1, PO2, PO3, PSO1, PSO2, PSO3, PSO4)
CO4 – Evaluate structural solutions for material efficiency, lifecycle performance and environmental impact. (PO1, PO2, PO3, PSO1, PSO2, PSO3, PSO4)
CO5 - Appraise landmark structures for performance-based innovation and multidisciplinary integration. (PO1, PO2, PO3, PSO1, PSO2, PSO3, PSO4)

References:

1. Engel, H. *Structure Systems*. Hatje Cantz Publishers, 2007.
2. Schlaich, M., & Bergermann, R. *Light Structures: Structures of Light*. Birkhäuser, 2004.
3. Ashby, M. F., Shercliff, H., & Cebon, D. *Materials: Engineering, Science, Processing and Design*. Butterworth-Heinemann, 2019.
4. Hibbeler, R. C. *Structural Analysis*. Pearson, 2022.
5. Adeli, H., & Kamal, M. M. *Optimization of Large Structural Systems*. Springer, 1998.
6. Bechthold, M. *Innovative Surface Structures: Technologies and Applications*. Taylor & Francis, 2008.
7. Smith, I. F. C. *Smart Structures: Analysis and Design*. Wiley, 2013.
8. Nawy, E. G. *Prestressed Concrete: A Fundamental Approach*. Pearson, 2010.
9. Buchanan, A. H., & Honey, B. G. *Energy Efficiency in Buildings: Principles, Performance and Simulation*. Routledge, 2015.

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	**Marks**	**Course outcomes addressed**
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4
Internal Test-III	30	CO4, CO5
The average of the three internal tests shall be taken for 30 marks.		
Other Components	**Marks**	**Course outcomes attained**
Assignment-1	10	CO1, CO2, CO3
Assignment-2	10	CO3, CO4, CO5
Semester End Examination (SEE) (Scaled to 50 Marks)	100	CO1, CO2, CO3, CO4, CO5

SEMESTER – II

Elective II (Net Zero Buildings)	
Course code: 26AA204/ AAE04	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 x 15S**
Course Coordinator: Assoc. Prof. Sudha Kumari G	

Course Content:

Unit I

Net Zero Buildings: Understand the Concept of Net Zero Energy Buildings: principles of energy efficiency, renewable energy integration, and sustainable construction. Net-zero buildings in mitigating climate change and reducing the carbon footprint of the built environment.

Unit II

Analyse Building Energy Consumption and Efficiency: Identify the energy loads from heating, cooling, lighting, and appliances. Strategies to improve energy efficiency, such as thermal insulation, high-performance glazing, air sealing, and energy-efficient HVAC systems.

Unit III

Renewable Energy Integration in Net Zero Buildings: Solar energy: Photovoltaic (PV) systems and solar thermal systems, Wind energy: Small-scale wind turbines for buildings Geothermal energy: Ground-source heat pumps and heating/cooling systems, Energy storage solutions: Batteries and thermal storage systems, integrating renewable energy systems into building design, Energy storage systems: To achieve net-zero goals

Unit IV

Passive design principles for energy optimization: Energy Modeling and Simulation for Net Zero Buildings, Smart Building Technologies for Energy Management, Carbon Footprint Reduction and Sustainability in NZEB

Unit V

NZEB standards, Net Zero Energy Building Certification Systems, Design and Planning for Net Zero Energy Buildings, Case Studies and Emerging Trends in Net Zero Buildings

Course Outcomes (COs):

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

CO1: Explain the concept and principles of Net Zero Energy Buildings (NZEB), including energy efficiency, renewable energy integration and their role in reducing the carbon footprint of the built environment. (PO3; PSO1, PSO3)

CO2: Apply energy-efficiency strategies (insulation, high-performance glazing, air sealing, efficient HVAC) and integrate renewable energy systems (PV, solar thermal, wind, geothermal) in building design. (PO1, PO3; PSO1, PSO3)

CO3: Analyse energy storage solutions such as batteries and thermal storage and their role in ensuring consistent energy supply and optimising renewable energy use. (PO1, PO3; PSO1, PSO3)

CO4: Apply passive design principles, energy modelling and simulation, and smart building technologies to optimise energy performance and reduce carbon footprint. (PO1, PO3; PSO1, PSO2, PSO3)

CO5: Evaluate net-zero buildings and case studies against industry standards and certification systems such as LEED and Passive House for energy efficiency and renewable energy systems. (PO1, PO2, PO3; PSO3, PSO4)

Reference books:

1. "Net Zero Energy Design: A Guide for Commercial Architecture" by Thomas Hootman
2. "The Passive Solar House: Using Solar Design to Heat and Cool Your Home" by James Kachadorian
3. Building Performance Analysis" by Peter Simmonds
4. Energy Efficiency in Buildings" by David W. A. Reay
5. "Sustainable Construction: Green Building Design and Delivery" by Charles J. Kibert
6. "Journal of Building Performance"
7. "Renewable and Sustainable Energy Reviews" Energy and Buildings".

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
26AA204/ AAE04	Elective-II Net zero buildings SEE (Term Work)	40	10	50

SEMESTER – II

Elective II (Virtual Reality and Augmented Reality in Architecture)	
Course code: 26AA204/ AAE05	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 x 15P**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

UNIT I

Getting Started with XR and Digital Modeling: Introduction to XR: VR, AR, MR, and XR, how design moves from 2D to 3D to BIM to XR, Using Rhino and SketchUp for basic 3D design, Using Revit or ArchiCAD for detailed building models, Introduction to XR headsets and visualization software.

Tools: Any platform chosen by the student (Rhino, SketchUp – for simple 3D modeling, Revit, ArchiCAD – for BIM, Twinmotion, Enscape – for viewing designs in VR/AR).

UNIT II

Making 3D Models Ready for VR and AR- Creating Interactive VR Experiences- How to clean up 3D models from Rhino, SketchUp, and Revit; Fix shapes, reduce size, and add simple materials; How to export models for VR/AR (like FBX or OBJ files); Simple idea of model types (Mesh and NURBS); models light by using fewer polygons; Introduction to realistic materials (PBR)
Tools Covered: Any platform chosen by the student (Rhino, SketchUp, Revit; Unity or Unreal, for VR/AR).

UNIT III

Augmented Reality (AR) for Architecture- Bring models from Rhino, SketchUp, or Revit into Unity or Unreal, set up VR scenes with lights, background (sky), and sound, make objects interactive (click to show info or trigger animations), Use Unity Reflect to view live BIM data in VR
Tools Covered: Any platform chosen by the student (Rhino, SketchUp, Revit; Unity, Unreal Engine; Unity Reflect).

UNIT IV

Using AR (Augmented Reality) in Architecture- What is AR and how it works, two types of AR: with a marker and without a marker, Use models from Rhino or SketchUp in phone-based AR, Place BIM models on real sites using AR, Learn basic AR tools: ARKit, ARCore, Vuforia, Unity
Tools Covered: Any platform chosen by the student (Rhino, SketchUp, Revit, Unity, ARKit, ARCore, Vuforia).

UNIT V

Applications, Ethics, and Project- XR in architectural practice: design, heritage, planning, Ethics in immersive environments: data ownership, accessibility, BIM + XR for Digital Twins; Project execution and presentation.
Tools Covered: Any platform chosen by the student (Unity, Unreal, Enscape, Twinmotion), Integration of BIM and 3D modeling software as appropriate.

Course outcomes (COs):

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

CO1: Explain VR, AR, MR and XR technologies and their role in the architectural design and visualization workflow. (PO1, PO2, PO3; PSO1, PSO2, PSO4)
CO2: Prepare 3D and BIM models for VR and AR through model clean-up, polygon reduction, PBR materials and appropriate export formats. (PO1, PO3; PSO1, PSO2, PSO4)
CO3: Develop interactive VR environments by integrating 3D and BIM models into real-time engines. (PO1, PO2, PO3; PSO1, PSO2, PSO4)
CO4: Implement marker-based and marker less AR applications to overlay architectural models on physical sites. (PO1, PO2, PO3; PSO1, PSO2, PSO4)
CO5: Design an immersive XR project for an architectural application addressing usability, accessibility and ethical considerations. (PO1, PO2, PO3; PSO1, PSO2, PSO4)

References:

1. *The Language of Mixed Reality* – Jesse Damiani
2. *The BIM Handbook* – Eastman et al.
3. *Augmented Reality for Designers* – T. Hollerer
4. Official docs: Unity, Unreal, Rhino.Inside, SketchUp Viewer AR
5. Mortenson, M. E. *Virtual Reality and Augmented Reality in Industry*. Wiley-Blackwell, 2015.
6. Santana, F., & Knippel, E. *Architectural Visualization with Unreal Engine*. Packt Publishing, 2020.
7. Bartle, R. *Designing Virtual Worlds*. New Riders, 2003.
8. Linowes, J., & Babilinski, K. *Augmented Reality for Developers: Build Practical Augmented Reality Applications with Unity, ARCore, and Vuforia*. Packt Publishing, 2017.
9. Zlatanova, S., & Ledoux, H. (Eds.). *Urban and Regional Data Management: UDMS 2013*. CRC Press, 2013.
10. Kensek, K. M., & Noble, D. E. (Eds.). *Building Information Modeling: BIM in Current and Future Practice*. Wiley, 2014.
11. Wang, X., & Schnabel, M. A. (Eds.). *Collaborative Design in Virtual Environments*. Springer, 2008.
12. Dieck, M. C. T., & Jung, T. (Eds.). *Augmented Reality and Virtual Reality: The Power of AR and VR for Business*. Springer International Publishing, 2018.
13. Hale, K. S., & Stanney, K. M. (Eds.). *Handbook of Virtual Environments: Design, Implementation, and Applications*. CRC Press, 2015.

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
26AA204/ AAE05	Elective -II Virtual Reality and Augmented Reality in Architecture SEE (Term Work)	40	10	50

SEMESTER – II

Elective II (Land Use Structure and Urban Morphology)	
Course code: 26AA204/ AAE06	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 x 15P**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

Unit I

Interpreting the urban geography: Introduction to urban geography – Understanding Urban Geography through: Cognition, perception and spatial representation. Students are introduced to AI-enabled and data-driven techniques—such as GIS-based spatial analysis, machine learning for pattern recognition, mobility data analysis, and predictive urban modeling—to interpret urban behavior and spatial dynamics. These tools support sustainable planning by enabling evidence-based decisions, scenario testing, and optimization of urban systems for environmental performance, accessibility, and social well-being.

Unit II

Morphology of habitat structures: Students are introduced to ideal-space diagrams and city form analysis using both traditional morphological methods and AI-driven tools. Digital mapping, spatial analytics, and machine-learning-based pattern recognition are explored to evaluate historical and contemporary urban forms. These approaches enable comparative analysis, and the development of data-informed, sustainable urban design strategies.

Unit III

Mapping sacred geography: Students are introduced to contemporary methods of mapping the sacred using GIS, remote sensing, spatial databases, and AI-driven analytical tools. These techniques enable the documentation, visualization, and interpretation of intangible cultural values and their spatial manifestations.

Unit IV

Rhythms of the city: Modern work rituals and the definition of fragmented zones, time space and lives. Nightlife and electronic definition of time. Significance, Signs and meaning of structure. Imagined places, collage of time space representations in Literature, Cinema and the Performing Arts. Students are introduced to AI-enabled and data-driven methods—such as temporal GIS, mobility and activity data analysis, and pattern recognition—to map and interpret urban rhythm

Unit V

Urban growth and system of cities: Growth of metropolitan and mega cities: scale, complexity. Metropolitan growth– Trends, characteristics, challenges, socio-economic and political issues in India and other Asian Geographies. Case studies from India and other Asian geographies are used to examine diverse trajectories of urbanization under conditions of rapid growth, demographic change, and climate vulnerability. AI-driven and data-based approaches—such as urban growth modeling, satellite imagery analysis, spatial big data, and predictive analytics—are introduced to study metropolitan expansion and system-level interactions.

Course Outcomes (COs):

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

CO1: Interpret urban spatial behaviour through concepts of cognition, perception and spatial representation, supported by GIS and AI-enabled techniques. (PO1, PO2, PO3; PSO1, PSO2, PSO4)
CO2: Analyse historical and contemporary urban forms using traditional morphological methods and AI-driven spatial analytics. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO3: Apply GIS, remote sensing and AI-driven tools to map sacred geographies and their intangible cultural values. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO4: Examine urban rhythms of work, nightlife and everyday life using temporal GIS, mobility data and cultural representations. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO5: Evaluate metropolitan growth trajectories in India and other Asian geographies using urban growth modelling and spatial data analytics. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

Reference books:

1. The Image of the City by Kevin Lynch — A foundational text on urban form, perception, and city structure.
2. Urban Morphology: An Introduction to the Study of the Physical Form of Cities by Vítor Oliveira — Introduces theories and methods of urban morphology and spatial structure.
3. Good City Form by Kevin Lynch — Explores urban spatial organization, land use, and the quality of urban environments.
4. The Social Logic of Space by Bill Hillier and Julienne Hanson — A major work linking urban morphology with spatial analysis and land-use patterns.
5. Cities of Tomorrow by Peter Hall — Discusses the evolution of urban planning, land-use structure, and city development models.
6. Spiro Kostoff, “City shaped”, Bulfinch, Reprint Edition, 1993.
7. SumitaGhosh, “Introduction to settlement geography”, Orient BlackSwan, 1998.
8. Michael Pacione, “Urban Geography: A Global perspective”, Routledge; 1st Edition, 2009.
9. Paul L Knox,“Urbanization”, Pearson, 2012.
10. Diana L. Eck, “India: A Sacred Geography”, Three Rivers Press, 2013

Evaluation Pattern: Marks allocation for SEE (Term Work):

Subject Code	Subject	Portfolio	Report	Total
26AA204/ AAE06	Elective-II Land use structure & Urban Morphology SEE (Term Work)	40	10	50

SEMESTER –III

THESIS PROJECT	
Course Code: AA301	**Credits: 0:0:12**
Prerequisite: Nil	**Contact Hours: 12 x 15P**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

UNIT I

Thesis Topic Selection and Synopsis: Identification of a thesis topic through critical review of contemporary architectural, urban, environmental and socio-cultural issues. Establishing the relevance, need and justification of the topic with reference to context, user groups and stakeholders. Formulation of the research question or design problem, and preparation of a synopsis stating aim, objectives, scope, limitations, expected outcomes and a work schedule. Selection and preliminary assessment of the site.

UNIT II

Literature Review, Case Studies and Methodology: Systematic review of literature, including research publications, standards, codes, bye-laws, guidelines and policy documents relevant to the topic. Selection, documentation and comparative analysis of live and literature case studies on parameters such as planning, form, function, structure, services, climate response and user experience. Formulation of the project methodology and research framework, including data collection tools such as surveys, interviews, mapping and measured drawings.

UNIT III

Data Analysis, Synthesis and Design Development: Analysis of site and contextual data covering physical, climatic, ecological, socio-economic, cultural, regulatory and infrastructural aspects. Synthesis of findings into area programme, space requirements, design criteria and inferences. Development of design concept, zoning and design alternatives, with evaluation leading to a preliminary design. Integration of sustainability principles including passive design, energy and water efficiency, material choices, landscape and nature-based approaches.

UNIT IV

Design Innovation, Technical Resolution and Performance Analysis: Detailed design development with innovative responses to the identified problem in planning, form, structure, materials, construction technology or services. Resolution of structural systems, building services, universal accessibility, fire and life safety, and compliance with applicable codes. Performance assessment using appropriate tools such as daylight, thermal, energy and ventilation simulations or green-rating benchmarks, with iterative refinement of the design. Presentation through drawings, models, 3D visualization and technical details.

UNIT V

Thesis Report, Critical Appraisal and Final Presentation: Structuring and writing the thesis report covering introduction, literature review, case studies, methodology, analysis, design development and outcomes. Critical appraisal of the design outcomes against the stated aim and objectives.

Formulation of conclusions, recommendations and scope for further work, with referencing and citation as per an accepted style and adherence to academic integrity norms. Preparation of final drawings, models and presentation for the viva voce before the jury.

Course outcomes (COs):

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

CO1: Justify the relevance of a selected thesis topic through a synopsis stating its aim, objectives, scope and limitations. (PO1,PO2,PO3; PSO1, PSO3, PSO4)
CO2: Evaluate relevant literature, standards and case studies to establish the methodology and design parameters for the thesis project. (PO1,PO2,PO3; PSO1, PSO2, PSO3, PSO4)
CO3: Apply analytical techniques to site, contextual and case study data to develop a sustainable design programme and concept. (PO1,PO2,PO3; PSO1, PSO2, PSO3, PSO4)
CO4: Design an innovative architectural solution integrating technical systems, validated through performance analysis. (PO1,PO2,PO3; PSO1, PSO2, PSO3, PSO4)
CO5: Defend the thesis outcomes through a structured report and jury presentation comprising critical appraisal, conclusions and recommendations.
(PO1,PO2,PO3; PSO1, PSO2, PSO3, PSO4) .

References:

1. Groat, L., & Wang, D. *Architectural Research Methods*. Wiley, 2013.
2. Creswell, J. W., & Creswell, J. D. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications, 2018.
3. Neuman, W. L. *Social Research Methods: Qualitative and Quantitative Approaches*. Pearson, 2014.
4. Blessing, L. T. M., & Chakrabarti, A. *DRM, a Design Research Methodology*. Springer, 2009.
5. Yin, R. K. *Case Study Research and Applications: Design and Methods*. SAGE Publications, 2018.
6. Lawson, B. *How Designers Think: The Design Process Demystified*. Architectural Press, 2006.
7. Bryan, B., & Erskine, J. *Design Studio: Crafting Creative Processes*. Routledge, 2013.
8. Biggs, J., & Tang, C. *Teaching for Quality Learning at University*. McGraw-Hill Education, 2011.
9. Lang, J., & Moleski, W. H. *Functionalism Revisited: Architectural Theory and Practice and the Behavioral Sciences*. Routledge, 2017.
10. Borden, I., & Ruedi, K. *The Dissertation: An Architecture Student's Handbook*. Routledge, 2014.

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	**Marks**	**Course outcomes addressed**
Review-I	30	CO1, CO2, CO3
Review-II	20	CO3, CO4, CO5

Semester End Examination (SEE): VIVA-VOCE		50	CO1, CO2, CO3, CO4, CO5
Portfolio	**Viva-voce**		
40	**10**		

SEMESTER –III

Advanced Building Systems Integration	
Course Code: AA302	**Credits: 0:0:3**
Prerequisite: Nil	**Contact Hours: 3 X 15S**
Course Coordinator: Asst. Prof. Akshata Shagoti	

Course Content:

UNIT I

Building Envelope Systems and Environmental Performance: Theoretical understanding of the building envelope as an integrated environmental moderator; Fundamental relationships between climate, energy, comfort, and envelope design, Passive design strategies (orientation, shading, and thermal mass, natural ventilation) and their theoretical basis, Active envelope systems and their role in energy performance, Performance-based evaluation of envelope systems.

UNIT II

Renewable and Climate-Responsive Building Systems: Theoretical principles of renewable energy systems in buildings, including solar, wind, and hybrid systems; Integration of renewable systems in smart and high-performance buildings; Passive and active climate-responsive design strategies; Building energy modeling and performance optimization; Water and waste management systems for sustainable architecture. Case studies of high-performance, climate-adapted buildings

UNIT III

Principles of systems integration in large-scale and complex buildings: Coordination of HVAC, structural, electrical, and architectural systems; Life-cycle assessment and performance-based design; Computational and BIM-based approaches to system integration; Risk management and troubleshooting in integrated systems

UNIT IV

Smart building technologies: IoT, sensors, automated controls, and digital twins; Adaptive and responsive building systems; Data-driven design and performance monitoring; Human-centered and comfort-focused approaches; Case studies on smart building applications and emerging trends

UNIT V

Principles of energy-efficient building design: Building rating systems (LEED, BREEAM, GRIHA, etc.), Performance metrics, monitoring, and optimization strategies, Integration of sustainable systems in design, operation, and maintenance, Future trajectories in sustainable architecture and regenerative design

Course outcomes (COs):

The student will be able to

CO1: Analyze and evaluate building envelope systems for thermal, acoustic, and environmental performance in diverse contexts. (PO1, PO2, PO3; PSO1,PSO2,PSO3,PSO4)

CO2: Design and assess renewable and climate-responsive building systems that optimize environmental performance and sustainability. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO3: Apply systems integration principles to coordinate complex building systems for functional, sustainable, and high-performance outcomes. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO4: Critically evaluate smart building concepts and develop design strategies integrating technology for efficiency and occupant comfort. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)
CO5: Synthesize theoretical foundations of energy efficiency to design and evaluate sustainable building systems for contemporary architecture. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

References:

1. Banham, R. *The Architecture of the Well-Tempered Environment*. University of Chicago Press, 1984.
2. Givoni, B. *Passive and Low Energy Cooling of Buildings*. Wiley, 1994.
3. Szokolay, S. V. *Introduction to Architectural Science: The Basis of Sustainable Design*. Routledge, 2014.
4. Ramaswamy, M. *Mechanical and Electrical Equipment for Buildings*. Wiley, 2019.
5. Kwok, A. G., & Grondzik, W. T. *The Green Studio Handbook: Environmental Strategies for Schematic Design*. Routledge, 2018.
6. Eastman, C., Teicholz, P., Sacks, R., & Liston, K. *BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers*. Wiley, 2018.
7. Yudelson, J. *Green Building A to Z: Understanding the Language of Green Building*. New Society Publishers, 2007.
8. Guy, Simon – *Sustainable Architecture*
9. Smith, Peter – *Smart Buildings and Intelligent Environments*
10. Lechner, Norbert – *Heating, Cooling, Lighting: Sustainable Design Methods*
11. Gero, John – *Computational Models in Architecture*
    Davis, Mike – *Building Performance Simulation for Design and Operation*
12. Kibert, Charles – *Sustainable Construction: Green Building Design and Delivery*
13. Al-Homoud, M. – *Building Envelope Systems for Energy Efficiency*
14. Becque, Sandra – *Renewable Energy Integration in Buildings*

Evaluation Pattern: Marks allocation for SEE (Term work):

Subject Code	Subject	Portfolio	Report	Total
AA302	Advanced Building Systems Integration SEE (Term Work)	40	10	50

SEMESTER –III

Project Management	
Course Code: AA303	**Credits: 1:0:1**
Prerequisite: Nil	**Contact Hours: 2 X 15S**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

UNIT I

Introduction to project management: Introduction to project, its stages, and construction project management: project, organization, need for management of building/construction projects, principles and objectives of project management, brief understanding about study areas in project management. Types of construction projects. Project, program, and portfolio management, difference between a Project manager and a project engineer/project leader, The duties of a project manager/project leader, project life cycle, and project management process.

UNIT II

Basics of project management: Project life cycle, types of projects, phase of project, project management and its relevance, stakeholders of a project, structure of project organization, management levels, failures, and success of a project.

UNIT III

Roles of Project Manager: Roles & Responsibilities of Project/ Construction Managers, Scope Management in Construction: Scope Planning, Definition, Verification, and Control Project Management Stages: Project planning, project scheduling, and project controlling.

UNIT IV

Project planning & scheduling: Introduction, time cost, and resource management, project planning, work breakdown structure (W.B.S.), planning terminologies, time scheduling techniques, network theories -CPM, PERT, project crashing.

UNIT V

Project monitoring and control: Introduction, scope verification & control, feasibility report, schedule control, cost control, quality control, performance reporting, risk control and contract administration.

Course outcomes (COs):

The student will be able to

CO1 – Understand the comprehensive concepts of project management, stages of a project, and principles required for successful project execution. (PO3; PSO1)

CO2 – Evaluate the factors contributing to project success or failure and apply management techniques to oversee projects across various phases and organizational levels. (PO1, PO3; PSO1, PSO4)

CO3 – Understand the roles of the Project Manager, and effectively manage scope through planning and Project managing phases. (PO2, PO3; PSO1)

CO4 – Identify the required technology in project planning. (PO3; PSO2)
CO5 - Demonstrates the projects effectively including the management of scope, time, cost, and quality satisfying the needs for which the project was undertaken. (PO1, PO2, PO3; PSO1, PSO2)

References:

1. Association for Project Management. *APM Body of Knowledge*. Association for Project Management, 2012.
2. Guide, A. *Project Management Body of Knowledge (PMBOK® Guide)*. Project Management Institute, 2017.
3. Krishnamurthy, K.G., and Ravindra, S.V. *Construction and Project Management*. 2008.
4. Hendrickson, C., Hendrickson, C.T., and Au, T. *Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects, and Builders*. Chris Hendrickson, 1989.
5. Hendrickson, C. *Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects, and Builders*. Department of Civil and Environmental Engineering, 2003.
6. Punmia, B.C., and Khandelwal, K.K. *Project Planning and Control with PERT & CPM*. Firewall Media, 2002.
7. Jha, K.N. *Construction Project Management: Theory and Practice*. Pearson Education India, 2015.

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	**Marks**	**Course outcomes attained**
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
Other Components		
Assignment-1	10	CO1, CO2, CO3
Assignment-2	10	CO3, CO4, CO5
Semester-End Examination (SEE) (Scaled to 50 Marks)	100	CO1, CO2, CO3, CO4, CO5

SEMESTER –III

Elective-III - Impact Assessment of Environment	
Course Code: AA304/ AAE07	**Credits: 3:0:0**
Prerequisite: Nil	**Contact Hours: 3 X 15S**
Course Coordinator: Assoc. Prof. Sudha Kumari G	

Course Content:

UNIT I

Introduction to environmental management; concepts of ecosystem; ethics and environment; environmental management tools. Environmental movements in the world. Environmental pollution and environmental concerns in India. Impact of human settlements, industries, dams, national parks, etc. on the environment. Evolution of EIA across the world and India.

UNIT II

Environmental Impact Assessment - Definitions, purpose, steps, hierarchy, impact indicators and forecasting environmental changes. Strategic environmental assessment (SEA): Rationale and scope, process, benefits and constraints. Environmental clearance procedure in India.

UNIT III

EIA documentation and processes: Stages; impact prediction, evaluation, and mitigation; impact on decisions; public participation; requisites and review of EIS.

UNIT IV

Environmental management plan – strategies, approaches of environmental protection. Environmental monitoring. Environmental auditing: Objectives and scope, types, methodology.

UNIT V

EIA notifications by MoEFCC. Environmental and town planning legislations dictating the EIA procedures: (Air act; Water act, EPA act). Role of a landscape architect in EIA.

Course outcomes (COs):
The student will be able to

CO1: Explain the fundamental concepts of environmental management, including ecosystem ethics, environmental tools, and the evolution of EIA globally and in India. (PO3; PSO1, PSO3)
CO2: Analyze the steps, hierarchy, and processes involved in Environmental Impact Assessment, including Strategic Environmental Assessment and environmental clearance procedures in India. (PO1, PO3; PSO3, PSO4)
CO3: Evaluate EIA documentation processes such as impact prediction, mitigation, public participation, and Environmental Impact Statements (EIS). (PO1, PO2, PO3; PSO3, PSO4
CO4: Apply environmental management strategies and monitoring methods, including environmental auditing, to develop comprehensive environmental protection plans. (PO1, PO2, PO3; PSO1, PSO3)
CO5: Create integrated solutions addressing environmental challenges by synthesizing knowledge of MoEF & CC notifications, legislative frameworks, and the role of landscape architects in EIA.

(PO1, PO2, PO3; PSO1, PSO3, PSO4)

References:

1. Spens, M. The Complete Landscape Design and Gardens of Geoffrey Jellicoe. Thames & Hudson, 1994.
2. Turnbull, W. Jr. The Poetics of Gardens. MIT Press, 1992.
3. Glasson, J., Therivel, R., & Chadwick, A. Introduction to Environmental Impact Assessment. Routledge, 2013.
4. Canter, L. W. Environmental Impact Assessment. McGraw-Hill, 1996.
5. Sadler, B., & McCabe, M. Strategic Environmental Assessment: Concepts and Practices. Earthscan, 2002.
6. Noble, B. F. Introduction to Environmental Impact Assessment: A Guide to Principles and Practice. Oxford University Press, 2014.

Evaluation Pattern: Marks allocation for SEE (Term Work)

Subject Code	Subject	Portfolio	Report	Total
AA302	Advanced Building Systems Integration SEE (Term Work)	40	10	50

SEMESTER –III

ELECTIVE-III **Elective-III - Prompt Engineering and Generative AI for Architectural Design**	
Course Code: AA304/ AAE08	**Credits: 3:0:0**
Prerequisite: Nil	**Contact Hours: 3 X 15S**
Course Coordinator: Asst. Prof. Ashwini Mani	

Course Content:

UNIT I

Foundations of Generative AI in Architecture: Introduction to artificial intelligence, machine learning, and generative models. Evolution of computational design to generative AI in architecture. Types of generative AI: text-to-image, text-to-3D, image-to-image, multimodal systems. Understanding model behavior, limitations, hallucination, bias, and uncertainty. Role of AI as a design assistant versus design author.

UNIT II

Prompt Engineering Principles and Design Intent: Prompt engineering as a design skill: structure, syntax, semantics, and context-setting. Translating architectural intent into textual, visual, and parametric prompts. Visual prompting using sketches, diagrams, site images, and precedent studies. Evaluation and refinement of AI outputs based on architectural criteria.

UNIT III

Generative AI in Architectural Design Workflows: Application of generative AI in site analysis, conceptual design, massing studies, façade exploration, climate-responsive and sustainable design ideation. Integration with CAD, BIM, and parametric platforms. AI-assisted diagramming, storytelling, and design narratives.

UNIT IV

AI for Visualization, Performance, and Sustainability: AI in environmental analysis, daylighting concepts, material optimization, and energy-aware design prompts. Scenario generation for climate resilience and urban sustainability. Generative AI for post-occupancy insights, user experience simulation, and design optimization. Limitations of AI in quantitative performance evaluation.

UNIT V

Ethics, Practice, and Future Directions: Ethical consideratons in generative AI: authorship, originality, copyright, data bias, and cultural sensitivity. Legal implications and professional responsibility in architectural practice. AI and the future of architectural labor, creativity, and pedagogy. Critical review of AI-driven architectural projects and speculative futures. Developing an informed, ethical, and strategic approach to AI adoption in design practice.

Course outcomes (COs):

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

CO1: Explain the principles, types and limitations of generative AI models, including hallucination, bias and uncertainty, with reference to their relevance in architectural design. (PO1,PO2,PO3;PSO1,PSO2,PSO3,PSO4)

CO2: Apply prompt engineering principles to translate architectural design intent into structured textual, visual and parametric prompts. (PO1,PO2,PO3;PSO1,PSO2,PSO3,PSO4)

CO3: Analyze the integration of generative AI tools with CAD, BIM and parametric platforms across site analysis, conceptual design, massing, façade exploration and design narratives. (PO1,PO2,PO3;PSO1,PSO2,PSO3,PSO4)

CO4: Evaluate AI-generated design scenarios for environmental performance, climate resilience and sustainability, recognizing the limits of AI in quantitative performance assessment. (PO1,PO2,PO3;PSO1,PSO2,PSO3,PSO4)

CO5: Critique AI-driven architectural projects with respect to authorship, originality, copyright, data bias, cultural sensitivity and professional responsibility. (PO1,PO2,PO3;PSO1,PSO2,PSO3,PSO4)

References:

1. Neil Leach – Architecture in the Age of Artificial Intelligence — foundational exploration of how AI impacts architectural practice, creativity, and design thinking.
2. Imdat As & Prithwish Basu (eds.) – The Routledge Companion to Artificial Intelligence in Architecture — comprehensive coverage of AI theory, tools, methods, and architectural applications.
3. Daniel Koehler – Compositional Intelligence: Architectural Typology Through Generative AI — investigates generative AI models in architectural typology and urban design.
4. Asterios Agkathidis, Markus Hudert & Carlos Medel-Vera (eds.) – Architecture in the AI Era for Research, Practice, and Pedagogy — cutting-edge methods for integrating generative AI in spatial design processes.
5. Asterios Agkathidis – AI-Assisted Architectural Design: Generative Form-Finding Methods Using Artificial Intelligence — practical guide to leveraging AI for form exploration and generative design workflows.
6. Springer (ed.) – Artificial Intelligence-Aided Design for Sustainability — focuses on AI's role in sustainable design and performance-oriented architectural processes.
7. Herbert A. Simon – The Sciences of the Artificial — classic design theory text linking computational thinking and artificial systems to architectural problem-solving.
8. Stuart J. Russell & Peter Norvig – Artificial Intelligence: A Modern Approach — authoritative AI textbook covering core models and techniques foundational to prompt engineering (useful for deeper technical grounding).

Evaluation Pattern: Marks allocation for SEE (Term Work)

Subject Code	Subject	Portfolio	Report	Total
AA304/ AAE08	Prompt Engineering and Generative AI for Architectural Design SEE (Term Work)	40	10	50

SEMESTER –III

ELECTIVE-III **Elective-III - Advanced Theory of Design: Architecture and Human Settlements**	
Course Code: AA304/ AAE09	**Credits: 3:0:0**
Prerequisite: Nil	**Contact Hours: 3 X 15S**
Course Coordinator: Prof. Dr. Monalisa	

Course Content:

UNIT I

Human Settlements, Sustainability, and Intelligent Systems: Principles of sustainable settlements, regenerative design, circular economy concepts, low-carbon development, and the role of artificial intelligence in environmental analysis and settlement planning.

UNIT II

Urbanism, Data, and Socio-Spatial Equity: City form and structure: morphology, land-use patterns, density, and infrastructure networks analyzed through computational tools. Urban dynamics including migration, growth, informality, and spatial transformation supported by GIS, urban analytics, and AI-based simulations. Social equity in urban design: gentrification, inclusivity, accessibility, and ethical implications of AI in planning.

UNIT III

Urban Ecology, Climate Resilience, and Computational Sustainability: Green and blue infrastructure systems, nature-based solutions, and ecosystem services in urban environments. AI-assisted environmental modeling for climate-responsive design, heat island mitigation, flood management, and energy optimization. Public spaces as socio-ecological and climate-adaptive infrastructures.

UNIT IV

Architecture, Identity, and Intelligent Urban Technologies: Context-sensitive design approaches including critical regionalism, vernacular intelligence, and climate-responsive traditions augmented by digital tools. Smart cities, Internet of Things (IoT), Building Information Modeling (BIM), generative design, and artificial intelligence in balancing cultural continuity, sustainability, and technological innovation.

UNIT V

Global Practices, Research Methods, and Future Trajectories: Case studies of successful, experimental, and failed urban interventions with emphasis on sustainability metrics and technological integration. Research methodologies in advanced architectural and urban theory, including computational research, parametric modeling, simulation-based design, and data ethics. Future directions in artificial intelligence–driven architectural practice.

Course outcomes (COs):

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

CO1- Explain the principles of sustainable and regenerative settlements, circular economy and low-carbon development, including the role of AI in settlement planning. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

CO2- Analyse city form, urban dynamics and socio-spatial equity using GIS, urban analytics and AI-based simulations. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

CO3- Evaluate green-blue infrastructure and nature-based solutions for climate resilience using AI-assisted environmental modelling. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

CO4- Formulate context-sensitive design strategies integrating vernacular and climate-responsive traditions with smart technologies, BIM and generative design. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

CO5- Critique global urban interventions using sustainability metrics, computational research methods and data ethics. (PO1, PO2, PO3; PSO1, PSO2, PSO3, PSO4)

References:

1. Imdat As, Prithwish Basu & Pratap Talwar (Eds.) – *Artificial Intelligence in Urban Planning and Design* – comprehensive coverage of AI tools, implementation, impacts, and case studies in urban design, city planning, and intelligent systems.
2. Carl Bovill – *Sustainability in Architecture and Urban Design* – essential grounding in sustainability principles for architecture and urbanism, covering ecology, urban scale impacts, and environmental strategies.
3. Federico Cugurullo et al. (Eds.) – *Artificial Intelligence and the City: Urbanistic Perspectives on AI* – explores how AI intersects with urban society, infrastructure, planning, and sustainability trends.
   Mitra Kanaani (Ed.) – *The Routledge Companion to Smart Design Thinking in Architecture & Urbanism for a Sustainable, Living Planet* – wide-ranging resource on smart design, sustainable living environments, and digital technologies in urban design.
4. Uday Chatterjee et al. (Eds.) – *Advances in Urbanism, Smart Cities, and Sustainability* – integrates smart cities, AI, IoT, GIS, and sustainable urban systems with diverse global perspectives.
5. Ata Chokhachian, Michael U. Hensel & Katia Perini (Eds.) – *Informed Urban Environments: Data-Integrated Design for Human and Ecology-Centred Perspectives* – focuses on data-driven design, urban adaptation, and ecology-centered planning.
6. Springer – *Smart and Sustainable Cities and Buildings* – research-backed collection on smart, resilient, and sustainable built environments (conference proceedings).
7. Simon Elias Bibri – *Advances in the Leading Paradigms of Urbanism and Their Amalgamation* – integrates ecological urbanism, compact cities, and data-driven smart sustainable urbanism.
8. Springer – *Urban-Rural Dialogue in Green City Design* – addresses urban ecology and socio-ecological systems for green city strategies.
9. Springer – *Towards the Framework of Livable and Resilient Cities* – covers sustainable architecture, green energy, and urban resilience frameworks.

Evaluation Pattern: Marks allocation for SEE (Term Work)

Subject Code	Subject	Portfolio	Report	Total
AA304/ AAE09	Advanced Theory of Design: Architecture and Human Settlements SEE (Term work)	40	10	50

SEMESTER IV

Practical Training	
Course Code: AA401	**Credits: 0:0:20**
Prerequisite: Nil	**Contact Hours: Internship**
Course Coordinator: Prof. Dr. Monalisa	

Course Contents

- Study and critical analysis of completed live projects designed by the Advanced architect. Gaining hands-on experience in a real-world architectural setting.
- Understanding the day-to-day operations of an architectural firm.
- Learning about project management, client relations, and team collaboration
- Working with other disciplines (e.g., engineering, landscape architecture, urban planning) to address complex design challenges.
- Through site visits gain practical knowledge, Exposure to Client-Architect relationship.

Practical Training Project Report (Mandatory)

- Preparation and submission of a Practical Training Project Report equivalent to a postgraduate project work.
- The report shall document one major live project (or a coherent package of work from two projects) undertaken during professional training.
- The report shall include: Introduction to the architectural firm and project background; Project brief, scope, and design intent; Design development process and drawings; Building materials, construction technology, and systems integration; Site involvement, coordination with consultants, and execution stages; Critical analysis of architectural, technical, and professional decisions; Reflections on learning outcomes and professional growth

Course Outcomes (COs):

CO1: Analyze the organizational structure, workflow and day-to-day operations of an architectural practice, including project management, client relations and team collaboration. (PO1,PO2,PO3; PSO1,PSO4)

CO2: Evaluate completed live projects of practicing architects with respect to brief, design intent, technical resolution and professional decision-making. (PO1, PO2, PO3; PSO1, PSO3, PSO4)

CO3: Prepare working drawings, construction details and coordinated drawing sets for on-site execution, conforming to applicable codes and standards.PO1, PO2, PO3; PSO1, PSO2, PSO4)

CO4: Integrate inputs from allied disciplines and site conditions into decisions on building materials, construction technology, systems and execution stages. (PO1, PO2, PO3; PSO1, PSO3)

CO5: Compile a Practical Training Project Report and Professional Portfolio that critically documents a major live project and reflects on professional growth, and defend it through viva voce. (PO1, PO2, PO3; PSO1, PSO3)

Performance shall be evaluated through Viva voce

The Viva Voce examination shall be conducted based on the following:

- Professional Training Portfolio
- Critical analysis report of two live projects
- Practical Training Project Report

Note: Students should work under an Architect who is a registered architect from the Council of Architecture. The Certificate should be signed and the registration number must be mentioned.

Evaluation Pattern: Marks allocation for SEE (Viva Voce):

Subject Code	Subject Name	Portfolio	Viva Voce	Total
AA401	Practical Training SEE **(**Viva Voce**)**	40	10	50