RAMAIAH
Institute of Technology

CURRICULUM

(For the Academic Year 2025-2026)

SCHOOL OF ARCHITECTURE

I & II SEMESTER M. ARCH (ADVANCED ARCHITECTURE

RAMAIAH INSTITUTE OF TECHNOLOGY
(Autonomous Institute, Affiliated to VTU)
BANGALORE -54

About the Institute:

Dr. M. S. Ramaiah, a philanthropist, founded 'Gokula Education Foundation' in 1962 with an objective of serving the society. M S Ramaiah Institute of Technology (MSRIT) was established under the aegis of this foundation in the same year, creating a landmark in technical education in India. MSRIT offers 18 UG programs and 13 PG programs. All these programs are approved by AICTE. All eligible UG and PG programs are accredited by the National Board of Accreditation (NBA). The institute is accredited with **'A^+' grade by NAAC in March 2021** for 5 years. University Grants Commission (UGC) & Visvesvaraya Technological University (VTU) have conferred Autonomous Status to MSRIT for both UG and PG Programs since 2007. The institute has also been conferred autonomous status for Ph.D. program since 2021. The institute is a participant in the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. The institute has 380 competent faculties out of which 70% are doctorates. Some of the distinguished features of MSRIT are: State of the art laboratories, individual computing facility for all faculty members, all research departments active with sponsored funded projects and more than 300 scholars pursuing Ph.D. To promote research culture, the institute has established Centre of Excellence for Imaging Technologies, Centre for Advanced Materials Technology, Centre for Antennas and Radio Frequency Systems (CARFS), Center for Cyber Physical Systems, Schneider Centre of Excellence & Centre for Bio and Energy Materials Innovation. **Ramaiah Institute of Technology has obtained All India Rank 182 in "Scimago Institutions Rankings" for the year 2024.**

The Entrepreneurship Development Cell (EDC) and Section 8 company "Ramaiah Evolute" have been set up on campus to incubate startups. MSRIT has a strong Placement and Training department with a committed team, a good Mentoring/Proctorial system, a fully equipped Sports department, large air-conditioned library with good collection of book volumes and subscription to International and National Journals. The Digital Library subscribes to online e-journals from Elsevier Science Direct, IEEE, Taylor & Francis, Springer Link, etc. The Institute is a member of DELNET, CMTI and VTU E-Library Consortium. The Institute has a modern auditorium, recording studio, and several hi-tech conference halls with video conferencing facilities. The institute has excellent hostel facilities for boys and girls. MSRIT Alumni have distinguished themselves by occupying high positions in India and abroad and are in touch with the institute through an active Alumni Association.

As per the National Institutional Ranking Framework (NIRF), MoE, Government of India, Ramaiah Institute of Technology has achieved 75th rank among 1463 top Engineering Institutions & 21st Rank for School of Architecture in India among 115 Architecture Institutions, for the year 2024.

SCHOOL OF ARCHITECTURE:

Ramaiah Institute of Technology (RIT), Bangalore, is a leading institution offering undergraduate, postgraduate and research programs in the areas of engineering, management and architecture. The institute was established in the year 1962, under the aegis of Gokula Education Foundation. Its mission is to deliver global quality technical education by nurturing a conducive learning environment for a better tomorrow through continuous improvement and customization.

The School of Architecture, RIT Bangalore, was established in 1992. Since its establishment, the School has played a vital role in providing quality education. The Council of Architecture (COA) and All India Council for Technical Education (AICTE) have recognized this program.

The mission of the school is to uphold the RIT mission and to thus provide quality education to the students and mold them to be excellent architects with adequate design and management skills and noble human qualities.

Full time faculty members having postgraduate qualifications from prestigious institutions in India and abroad are teaching at The School of Architecture. Experienced and well- respected practicing architects are invited to provide their experiences as visiting faculty. New milestones are continually being set and achieved. The synergy of the progressive management, committed faculty and students are ensuring excellent academic results year after year. This is reflected in the high number of University ranks that are secured by the students of the School.

The School of Architecture is now autonomous (affiliated to VTU) providing scope for further improvement. The focus has been towards fostering novel concepts and solutions in Architectural Design. The student's response is very encouraging, and the school recognizes and appreciates such good students by awarding them. After graduation, many students have pursued higher studies in various universities in the country and abroad. There is a great demand for the school graduates in the industry and the School is developing initiatives towards co-branding of the industry and the School. Many students have started their own enterprise and architectural practices as well.

All this has been possible as a result of the efforts of the impeccable faculty of the School. The faculty is committed to the welfare and success of the students. The teachers of the school are also engaged in enhancing their knowledge and skills and many are engaged in research activities as well. The School has experts in specialized disciplines like Habitat Design, Product Design, Urban Design, Urban Planning, Landscape Architecture, and Interior Design. The faculty also actively participates in national and international conferences and publishes and presents papers.

The School as part of a consultancy had started off with the maiden project to redevelop the RIT engineering college campus and is now involved in various campus designs.

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

RIT shall meet the global socio-economic needs through

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

QUALITY POLICY

We at 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 stakeholders concerned.

VISION OF THE DEPARTMENT

To be a leading center of architectural education and innovation, addressing global challenges through interdisciplinary research cultivating visionary designers who shape resilient, inclusive, and sustainable environments for societal wellbeing.

MISSION OF THE DEPARTMENT

- The school's commitment is to prepare competent architects trained for design excellence and modern technological knowledge through a competitive teaching learning process.
- To provide an environment that shall foster the growth of intellectually capable, innovative and entrepreneurial professionals, who shall contribute to the growth of the society by adopting core values of learning exploration, rationality and enterprise.
- To inculcate a strong sense of social responsibility by developing sustainable design solutions to meet the changing and create innovative designs and technologies.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Use the knowledge and skills of Advanced Architecture to analyze real life problems and interpret the results.
PEO2: Effectively design, implement, improve and manage the integrated socio-technical systems.
PEO3: Build and lead cross-functional teams, upholding the professional responsibilities and ethical values.
PEO4: Engage in continuing education and life-long learning to be competitive and enterprising.

PROGRAM OUTCOMES (POs):

PO1: Ability to create architectural designs that satisfy both aesthetic and technical requirements.

PO2: Adequate knowledge of the histories and theories of architecture and the related arts, technologies and human sciences.

PO3: Knowledge of the fine arts as an influence on the quality of architectural design.

PO4: Adequate knowledge of urban design, planning and the skills involved in the planning process.

PO5: Understanding of the relationship between people and buildings, and between buildings and their environment, and the need to relate buildings and the spaces between them to human needs and scale.

PO6: Understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors.

PO7: Understanding of the methods of investigation and preparation of the brief for a design project.

PO8: Understanding of the structural design, constructional and engineering problems associated with building design.

PO9: Adequate knowledge of physical problems and technologies and the function of buildings so as to provide them with internal conditions of comfort and protection against the climate

PO10: The necessary design skills to meet building users' requirements within the constraints imposed by cost factors and building regulations.

PO11: Adequate knowledge of the industries, organizations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Apply interdisciplinary knowledge of art, science, materials, and environmental technologies to design and develop architectural projects that are sustainable, context-sensitive, and aligned with ecological and functional needs.

PSO2: Identify, formulate, and address complex challenges in the industrial and service sector through sustainable design strategies, while critically evaluating their societal, cultural, and global impacts.

PSO3: Demonstrate ethical and professional responsibility in leading sustainable project planning and construction management, using innovative tools and technologies to realize inclusiveness, resilience, and low-impact built environments.

BOARD OF STUDIES FOR THE TERM 2025 – 2026

Sl.no	Name	Designation
1	Prof. Dr. Rajshekhar Rao	Chairperson
2	Dr. Deepika Shetty	VTU Nominee
3	Ar. Vidyadhar S. Wodeyar	External Industry Expert
4	Ar. Prasad G	External Industry Expert
5	Dr. Rama RS	Academician
6	Dr. Chidambara Swamy	Academician
7	Ar. Subbiah T S	Alumni External Industry Expert
8	Dr. Anup Naik	Member
9	Ar. Prem Chandavarkar	Member
10	Dr. Rashmi Niranjan	Member
11	(Dr.) Meghana K Raj	Member
12	Er. (Dr) Vijayanand M	Member

SCHOOL OF ARCHITECTURE

TEACHING STAFF

Sl No	Name	Qualification	Designation
1	Prof. Dr. Rajshekhar Rao	M. Arch (Landscape Architecture) PhD	Professor & HOD
2	Dr. Monalisa Bhardwaj	M.Arch (General Architecture) PhD	Associate Professor
3	Ashwini Mani	M.Arch (Advanced Architecture)	Tenure Faculty
4	(Dr.) Akshata Shagoti	M.Arch (Architectural Design)	Assistant Professor

ADMINISTRATIVE STAFF

1	Mr. Nagesh B.L	Dip. in Mech. Engg.	Instructor
2	Ms. Swathi	M.com	SDA

SUPPORT STAFF

1	Mr. Ramachandra Chari	Attender
2	Mrs. Parvathy	Attender

RAMAIAH INSTITUTE OF TECHNOLOGY, BANGALORE
(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU, BELGAUM)
SCHEME OF TEACHING & EXAMINATION

	M. Arch (Advanced Architecture) **Scheme of Teaching & Examination 2025 -2026**									
	I - Semester									
	Code	**Subject**	**L**	**T**	**P**	**Total Credits**	**Contact Hours**	**Examination**	**CIE Marks**	**SEE Marks**
PCC	AA 101	ADVANCED ARCHITECTURAL DESIGN STUDIO-I	0	0	7	9	11	SEE (Viva voce)	50	50
PCC	AA 102	ADVANCED BUILDING MATERIALS & CONSTRUCTION METHODS	0	0	5	5	5	SEE (Viva voce)	50	50
PSC	AA 103	ADVANCED BIM	0	0	3	3	6	SEE (Term work)	50	50
PEC	AA 104	ELECTIVE-I	3	0	0	3	3	SEE (Viva voce)	50	50
		Total				**20**	**25**			
Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective.										

Professional Elective I

	Course Code	**Course title**	**Credits**
1.	AA E01	Sustainable Habitat Design	3:0:0
2.	AA E02	Application of AI, ML & Python in Architecture	3:0:0
3	AA E03	Social Theory and Urban Design	3:0:0

CIE = CONTINUOUS INTERNAL EVALUATION

SEE = SEMESTER END EXAMINATION

EVALUATION PATTERN: Marks allocation for SEE

Subject Code	Subject	Design	Drawing	Viva voce	Model	Total
AA 101	Advanced Architectural Design Studio-I (SEE Viva voce)	20	15	10	5	50

Subject Code	Subject Name	Portfolio	Material study	Total
AA 102	Advanced Building Materials & Construction Methods (SEE Viva voce)	40	10	50

Subject Code	Subject Name	Portfolio	Total
AA 103	Advanced BIM (SEE Term work)	50	50

Subject Code	Subject	Report	Total
AA 104/ AAE01	Elective-I (Sustainable Habitat Design) (SEE Viva voce)	50	50

Subject Code	Subject	Portfolio	Total
AA 104/ AAE02	Elective-I (Application of AI, ML & Python in Architecture) (SEE Viva voce)	50	50

Subject Code	Subject	Report	Total
AA 104 /AAE03	Elective-I (Social Theory & and Urban Design) (SEE Viva voce)	50	50

Note:

- Literature survey will be a requirement for architectural design study. Periodical review by an external jury for subjects going for viva voce.
- National/International tours may be arranged during vacation for students, to study good examples of Advanced Architecture.

● For all viva voce examinations one internal faculty and one external faculty will conduct the exam.
● Portfolios have to be submitted on a prescribed date for all subjects on the date announced by the department.
● All students have to register on the first day at the beginning of the Viva Voce exam.
● All students have to register on the first day of Term work exams.

SCHEME OF TEACHING & EXAMINATION – M. ARCH
(ADVANCED ARCHITECTURE)
ACADEMIC YEAR 2025- 2026

		M. Arch (Advanced Architecture) **Scheme of Teaching & Examination 2025 -2026**								
		SEMESTER II								
	Code	**Subject**	**L**	**T**	**P**	**Total credits**	**Contact hours**	**Examination**	**CIE marks**	**See marks**
PCC	AA 201	ADVANCED ARCHITECTURAL DESIGN STUDIO-II	2	0	7	9	12	SEE (Viva-voce)	50	50
PSC	AA 202	BUILDING PERFORMANCE ASSESSMENT (SIMULATION SOFTWARE)	2	0	3	5	7	SEE (Term work)	50	50
PCC	AA 203	ADVANCED STRUCTURAL SYSTEMS	1	0	1	3	3	SEE (Term work	50	50
PEC	AA 204	ELECTIVE-II	3	0	0	3	3	SEE (Term work)	50	50
		TOTAL				**20**	**20**			
Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective.										

Professional Elective II

	COURSE CODE	**COURSE TITLE**	**CREDITS**
1	AAE04	Net zero buildings	3:0:0
2	AA E05	Virtual Reality and Augmented Reality in Architecture	3:0:0
3	AA E06	Land use structure & urban morphology	3:0:0

(ADVANCED ARCHITECTURE)

M. Arch (Advanced Architecture) Scheme of Teaching & Examination 2025 -2026										
III- Semester										
	Code	**Subject**	**L**	**T**	**P**	**Total Credits**	**Contact Hours**	**Examination**	**CIE Marks**	**SEE Marks**
PCC	AA 301	THESIS PROJECT	0	0	12	12	12	SEE (Viva-voce)	50	50
PSC	AA 302	ADVANCED BUILDING SYSTEMS INTEGRATION	0	0	3	3	3	SEE	50	50
PCC	AA 303	PROJECT MANAGEMENT	1	0	1	2	3	SEE	50	50
PEC	AA 304	ELECTIVE-III	3	0	0	3	3	SEE (Term work)	50	50
		Total				**20**	**21**			
Note: PCC: Professional Core, PSC: Professional Support, PEC: Professional Elective.										
Professional Elective III										
	Course Code	**Course title**								**Credits**
1.	AA E07	Impact Assessment of Environment								3:0:0
2.	AA E08	Virtual Reality and Augmented Reality in Architecture								3:0:0
3	AA E09	Advanced Theory of Design: Architecture and Human Settlements, Theory of Urbanism, Landscape Urbanism								3:0:0

Evaluation Pattern: Marks allocation for SEE Viva Voce

Subject Code	Subject	Design	Viva Voce	Total
AA 301	THESIS PROJECT	40	10	50

(ADVANCED ARCHITECTURE)

M. Arch (Advanced Architecture) Scheme of Teaching & Examination 2025 -2026										
IV- Semester										
	Code	**Subject**	**L**	**T**	**P**	**Total Credits**	**Contact Hours**	**Examination**	**CIE Marks**	**SEE Marks**
PCC	AA 401	PRACTICAL TRAINING	0	0	17	17	17	SEE Viva Voce	50	50
PEC	AA 402	ELECTIVE-IV	0	0	3	3	3	SEE	50	50
		Total				20	20			

Evaluation Pattern: Marks allocation for SEE Viva Voce

Professional Elective III			
	Course Code	**Course title**	**Credits**
1.	AA E010	Legal Aspects & Legislation	3:0:0
2.	AA E011	Parametric urban mapping	3:0:0
3	AA E012	Project Resource Management	3:0:0

Subject Code	**Subject Name**	**Portfolio**	**Viva Voce**	**Total**
AA 401	Practical Training **(**SEE Viva Voce**)**	40	10	50

SEMESTER - I

Advanced Architectural Design Studio-I	
Course Code: AA 101	**Credits: 2 :0: 7**
Prerequisite: Nil	**Contact Hours: 11 Hrs./ Wk.**
Course Coordinator:	

Course Objectives

- To introduce the students to complexities of advanced architectural design.
- To enable skills for designing advanced architectural projects with sustainable strategies.
- To enable students to employ advanced BIM for developing complex architectural drawings.

Course Contents

Unit I

Understand the basics of advanced architecture: 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.

Unit II

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

Project introduction: High rise design project with mixed use typology, Site selection, Site Study and analysis, development of concept. Concept drawings of plans & details of services.

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):

CO1: Develop the ability to understand and analyse complex architectural designs parameters and the development regulations governing it.
CO2: Develop spatial programs for advanced architectural projects through literature reviews, field studies, and case studies.

CO3: Analyse and Apply methods of integrating- services, structure, and sustainable strategies into high rise architectural designs.
CO4: Apply and integrate understandings of high rose buildings to create architectural designs and develop architectural drawings.
CO5: Integrate knowledge of interdisciplinary subjects to develop detailed drawings, 3-D renders, models for given the design project..

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	Design	Viva voce	Total
AA 101	**Advanced Architectural Design Studio-I (SEE Viva Voce)**	40	10	50

SEMESTER - I

Advanced Building Materials & Construction Methods	
Course Code: AA 102	**Credits: 0 :0: 5**
Prerequisite: Nil	**Contact Hours: 5 Hrs./ Wk.**
Course Coordinator:	

Course Objectives:

- To introduce advanced construction methods and 3D printing technologies.
- To familiarise students with advanced building materials, high-performance structures, and innovations in facades and cladding materials.
- To educate about environmentally friendly materials and techniques to enhance sustainability and energy efficiency in construction projects.

Course Contents

Unit – I

Concrete Technology & Applications of High-Performance Concrete: ultra-high-strength concrete, high-durability concrete, and self-consolidating concrete, Fiber-reinforced concrete: steel fiber-reinforced concrete and synthetic fiber-reinforced concrete. Special concrete: lightweight concrete, insulating concrete, and fire-resistant concrete, concrete admixtures and their properties.

Unit –II

Steel Structures: Advanced steel alloys: high-strength steel, stainless steel, and weathering steel, Structural steel design: connections, beams, columns, and trusses Composite steel structures: steel-concrete composite beams and columns Corrosion protection of steel structures.

Unit –III

Timber Engineering & Engineered wood products: laminated veneer lumber (LVL), glulam beams, and cross-laminated timber (CLT), Timber connections: bolted, nailed, and glued connections, Timber frame construction: traditional and modern timber-frame systems, Fire protection of timber structures.

Unit –IV

Composite Materials: Fiber-reinforced polymers (FRP): carbon fiber, glass fiber, and fiber composites Polymer matrix composites: thermos-setting and thermoplastic composites Manufacturing processes of composite materials: hand lay-up, vacuum bagging, and autoclave curing Applications of composite materials in construction and detailing.

Unit –V

Introduction to Nano materials in Construction: Nanomaterials in Concrete, Nanomaterials for Coatings and Surface Treatments, Nanotechnology in Insulation and Energy Efficiency,

Nanomaterials for Structural Strengthening Environmental and Sustainability Benefits, Health, Safety, and Cost Consideration.

Course Outcomes:

1. **CO1** - To learn about advanced concrete like high-performance concrete (HPC), self-compacting concrete (SCC), and fiber-reinforced concrete (FRC).
2. **CO2** - To understand the application, of structural steel & design safe efficient steel structures using appropriate codes & standards
3. **CO3** - To analyze and design timber structures while considering material properties, environmental factors, and sustainability.
4. **CO4** - To understand the application of FRP composites in structural elements to enhance strength, stiffness, and durability.
5. **CO5** -To understand the application of Nano materials in improving the performance, durability, and sustainability in construction technology

References:

1. Barry's Advanced Construction of buildings by Stephen Emmitt and Christopher A. Gorse
2. Structural Steel Design: A Practice-Oriented Approach by Wang, C., & Salmon, C. (2014)
3. Steel Design by William T. Segui (2018)
4. Design of Steel Structures by Edwin H. Gaylord, Charles N. Gaylord, and James E. Stallmeyer (2011)
5. Timber Engineering by David B. L. (2017)
6. Design of Wood Structures by Donald E. Breyer, Kelly E. Cobeen, Kenneth J. Fridley, and David G. Pollock (2019)
7. Timber Construction Manual by Thomas A. H. (2016)
8. Fiber-Reinforced Polymers: A Review by Muhammad Rizwan, et al. (2018)
9. Design of Reinforced Concrete Structures with Fiber Reinforced Polymers (FRP) by Mohamed M. K. (2017)
10. Composite Materials for Construction: Structural Design with FRP by Alain S. (2019)
11. Nanotechnology in Construction by J. L. R. (2020)
12. Nanomaterials in Concrete and Construction by Nuno M. (2020)
13. Nanotechnology in Construction: Materials and Applications by M. S. Shaikh and M. K. (2019)

Evaluation Pattern: Marks allocation for SEE Viva Voce

Subject Code	Subject Name	Portfolio	Material study	Total
AA 102	**Advanced Building Materials & Construction Methods (SEE Viva Voce)**	40	10	50

SEMESTER - I

Advanced BIM	
Course Code: AA 103	**Credits 0 : 0 : 3**
Prerequisite: Nil	**Contact Hours: 6 Hrs./ Wk.**
Course Coordinator:	

Course Objectives:

- To equip students to comprehend the principles, concepts, and terminology of BIM & recognize the importance of BIM in the construction industry.
- To enable students to Create and manage 3D digital models using BIM software.
- To teach students to utilise BIM as a communication tool to resolve design conflicts.

Course contents

Unit I

Overview of BIM Concepts: Definition, history, and evolution of BIM in the AEC industry, BIM vs. Traditional Methods: Comparing CAD drafting and BIM workflows.

Unit II

BIM Software Tools: Introduction to BIM Software: Overview of tools and Basic Modeling Techniques: Creating and modifying 3D models.

Unit III

Design Process in BIM: From conceptual to detailed design, Construction Documentation: Creating 2D drawings - integration of architectural, structural, and MEP (Mechanical, Electrical, Plumbing) systems in BIM.

Unit IV

Advanced BIM Applications: Building Performance Analysis using BIM: Energy and daylighting, simulations.

Unit V

BIM Implementation and Management: 4D BIM (Scheduling): Linking time data with models for sequencing, 5D BIM (Cost Estimation): Budgeting with integrated tools, 6D BIM (Sustainability & Facility Management): Supporting life-cycle and sustainability goals.

Course Outcomes (COs):

CO1- To understand the basic principles and key terminology of Building Information Modeling.
CO2-To gain hands-on experience with BIM tools and software for creating, analyzing, and managing digital models.

CO3- To work on the integration of architectural, structural, and MEP (Mechanical, Electrical, Plumbing) systems in BIM.
CO4- To apply BIM tools for energy modeling, sustainability analysis, and efficient environmental impacts.
CO5- To utilise BIM for project planning, scheduling, cost estimation, and resource management to improve project delivery.

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 Name	Portfolio	Total
AA 103	Advanced BIM (SEE Term work)	50	50

SEMESTER – I

ELECTIVE I (Sustainable Habitat Design)	
Course code: AA 104/AAE01	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 Hrs./ Wk.**
Course Coordinator:	

Course objectives

- To equip students with the knowledge and skills to design and plan urban built environments and habitat, while promoting the well-being of their inhabitants.
- The course will focus on the integration of sustainability principles in architecture, urban design, and the growing demand for livable spaces.

Course contents

Unit I

Reading the city. Social structure, cognition, experience, and urban form. Dimensions of urban design. Grain texture scale, socio-spatial schema, Urban design vocabulary.

Unit II

Habitat Design, Urban Design, and their relation with planning and architecture. Views of the Design of habitat as extension architecture (mega architecture) and as an architectural expression of planning.

Unit III

Evolution of concepts of urban form and design in different cultures and in India. Utopian concepts. Concepts in urban Design and planning.

Unit IV

Rise of Advocacy Planning, Changing Role of NGOs and Urban Social Movement in India. Urban design survey - inventories; techniques/approaches to urban design. Imageability, townscape, and elements of urban design (Gordon Cullen, Kevin Lynch) Historical examples of urban design projects. Suggested seminar topics/term papers.

Unit V

Emerging issues – social and communal conflicts in urban areas. Urban design at the micro level: campus planning, city centers, transportation corridors, and residential neighborhoods; waterfronts.

Course Outcomes (COs):

CO1: To provide students with a comprehensive understanding on the Relationship Between Social Structure and Urban Form.
CO2: To understand the interrelationships between Habitat Design, Urban Design, and Planning.
CO3: To equip students with an understanding on Evolution of Urban Form and Design Across Cultures & Explore Utopian Concepts.
CO4: To develop practical research and design skills to address current challenges in urban planning and development.
CO5: To address the myriad socio-spatial conflicts in urban areas and create multifaceted architectural design.

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 Viva Voce

Subject Code	Subject	Report	Total
AA 104/AAE01	ELECTIVE-I **(Sustainable Habitat Design)**	50	50

SEMESTER – I

ELECTIVE I (Application of AI, ML &Python in Architecture)	
Course code: AA 104/ AAE02	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 Hrs./ Wk.**
Course Coordinator:	

Architecture (VR & AR)

Course objectives:

The course aims to explore the use of Virtual Reality and Augmented Reality in architecture for immersive visualization, interactive design walkthroughs, client presentations, site planning, and real-time collaboration.

Course contents

UNIT I

Learn the fundamentals of Virtual Reality (VR) and Augmented Reality (AR), including their tools, applications in design, and ethical considerations. Explore VR platforms for creating immersive environments and AR tools for site planning and client presentations while critically examining their societal impact. Gain an understanding of the technology behind these immersive experiences, along with ethical principles such as user privacy, inclusivity, and responsible content creation.

UNIT II

Create immersive 3D models and design walkthroughs for real-time architectural exploration. Implement best practices for lighting, texture, and navigation in virtual environments.

UNIT III

Apply VR/AR in site planning to overlay digital models on real-world environments for analysis. Create interactive models that allow users to explore and modify design elements in real time.

UNIT IV

Develop real-time interaction in immersive environments for design feedback and changes. Visualize construction processes, timelines, and site visits using VR/AR. Enhance collaboration and communication during construction and design phases.

UNIT V

Use VR/AR for remote collaboration and real-time design iteration with multiple stakeholders. Engage clients through immersive presentations, virtual staging, and real-time feedback loops. Foster collaborative design refinement in a shared virtual space

Course outcomes (COs):

The student will be able to

CO1 - Understand the basics of Virtual Reality (VR) and Augmented Reality (AR), their tools, and applications in design

CO2 - Create immersive 3D models and design walkthroughs for real-time architectural exploration.

CO3 - Apply VR/AR for site planning by overlaying digital models on real-world environments for analysis.

CO4 - Develop real-time interaction in immersive environments to provide design feedback and visualize construction processes.

CO5 - Use VR/AR for remote collaboration, real-time design iteration, and client engagement in a shared virtual space.

References:

1. Dieck, M. C. T., & Jung, T. *Augmented Reality and Virtual Reality: Empowering Human, Place and Business*. Springer International Publishing, 2019.
2. Mortenson, M. E. *Virtual Reality and Augmented Reality in Industry*. Wiley-Blackwell, 2015.
3. Fuchs, P., Moreau, G., & Guitton, P. *Virtual Reality: Concepts and Technologies*. CRC Press, 2011.
4. Lee, J., & Joshi, P. S. *Mastering Unreal Engine 4.X: Building Professional VR and AR Experiences*. Packt Publishing, 2016.
5. Santana, F., & Knippel, E. *Architectural Visualization with Unreal Engine*. Packt Publishing, 2020.
6. Bartle, R. *Designing Virtual Worlds*. New Riders, 2003.
7. Linowes, J., & Babilinski, K. *Augmented Reality for Developers: Build Practical Augmented Reality Applications with Unity, ARCore, and Vuforia*. Packt Publishing, 2017.
8. Zlatanova, S., & Ledoux, H. (Eds.). *Urban and Regional Data Management: UDMS 2013*. CRC Press, 2013.
9. Kensek, K. M., & Noble, D. E. (Eds.). *Building Information Modeling: BIM in Current and Future Practice*. Wiley, 2014.
10. Wang, X., & Schnabel, M. A. (Eds.). *Collaborative Design in Virtual Environments*. Springer, 2008.
11. Dieck, M. C. T., & Jung, T. (Eds.). *Augmented Reality and Virtual Reality: The Power of AR and VR for Business*. Springer International Publishing, 2018.
12. Hale, K. S., & Stanney, K. M. (Eds.). *Handbook of Virtual Environments: Design, Implementation, and Applications*. CRC Press, 2015.

Evaluation Pattern: Marks allocation for SEE Viva Voce

Subject Code	Subject	Portfolio	Total
AA 104/ AAE02	ELECTIVE-I **(Application of AI, ML & Python in Architecture)**	50	50

SEMESTER – I

ELECTIVE I (Social Theory & and Urban Design)	
Course code: AA 103 /AAE03	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 Hrs./ Wk.**
Course Coordinator:	

Course objectives:

- To expose students to diverse theoretical discourses on urban form.
- To give critical understanding of the city and its underlying forces through various social theories and the role of people and their culture in city identity.

Course contents

Unit I

Classical Theoretical Perspectives- Karl Marx; (Capitalism and class); Friedrich Engels (Living conditions of the urban working class in post-industrialized towns); Ferdinand Tonnies (Community and Association), Emile Durkheim (Social solidarity); Georg Simmel (Urban experience, Social distance, Philosophy of money); Max Weber (Social structure of city and urban community).

Unit II

Contemporary Theoretical Perspectives-1 Robert Park (Human ecology, Symbiotic versus Societal organization, Dynamics and processes of human community: population, material culture (technological development), nonmaterial culture (customs and beliefs), Natural resources of the habitat, Societal pyramid.

Unit III

Contemporary Theoretical Perspectives-2 Differences between ecology and human ecology); Louis Wirth (urban theory on urbanism as a function of population density, size and heterogeneity); Ernest Burgess (Concentric Zone Theory); Homer Hoyt (Sector Theory); Harris and Ullman: Multiple Nuclei Theory).

Unit IV

Political Economy: Political and economic forces in a society with reference to works of Henri Lefebvre; Michael Storper and David Walker; Manuel Castells; David Harvey;Logan and Molotch(City as Growth Machine);Saskia Sassen (Global City); John Friedmann (World City Hypothesis); Michael Dear (Los Angeles School/ Chicago School).

Unit V

Social Life in the Public Realm (Discourses in the West): Michel de Certeau (Everyday life in the city); Fredrick Law Olmsted (The civilizing effect of park space in cities); Richard Sennett (Fall of the Public Man); Wilson &Kelling (Broken Windows Theory); Carr et al. (The Nature of Public Life);

Mike Davis (The Fortress LA: The Militarization of Public Space); William Whyte (Social life in small urban public spaces), Jane Jacobs (eyes on the street; sidewalk ballet).

Course Outcomes (COs):

CO1: To understand the evolution of urban form in the global context.
CO2: To enable understanding a city through political, economic, social, and cultural lenses.
CO3: To analyse a city and its underlying forces through various social theories.
CO4: To analyse Ability a city in terms of it's people, community & identity.
CO5: To understand a city through public lens.

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 Viva Voce:

Subject Code	Subject	Report	Total
AA 104 /AAE03	ELECTIVE-I **(Social Theory & and Urban Design)**	50	50

SEMESTER – II

ADVANCED ARCHITECTURAL DESIGN STUDIO-II	
Course code: AA 201	**Credits: 2:0:7**
Pre-requisite: Nil	**Contact Hours: 12 Hrs./ Wk.**
Course Coordinator:	

Course objectives:

- To demonstrate the students capability of synthesizing architecture, engineering systems, and social sciences through a capstone project that
- To showcase creative and critical thinking abilities and skills developed through the course.

Course contents

Unit I

Understanding the design of Public Transportation infrastructure such as airport, metro, Bus terminals, 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 service integration, advanced building practices, and appropriate materials and construction.

Unit IV

Architectural Drawings:Master Plan, Floor plans, Sections and Elevations, Interior design detailing, coordination of all services, landscape details and integration with structures

Unit V

Models and Raenders: 3-D renders or models using BIM or advanced tools.

Course Outcomes (COs):

CO1: Ability to independently handle an Architectural Design Project, research the requirements of a project, prepare a brief, try alternative approaches/ concepts, and evaluate them on a way to make a final comprehensive proposition.

CO2: Develop an architectural design for built forms and unbuilt spaces, understanding of how to choose appropriate tools and techniques to inform sustainable and environmental design principles in design.
CO3: Apply and integrate the learning of detailing space, space planning principles in logistic infrastructure designing to develop a master plan.
CO4: Integrate circulation, services, and structural aspects in design and evolve interior details.
CO5: To Learn new concepts, Develop skills, Gain new perspectives, and networking through attending workshops on industrial infrastructure and sustainable design.

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	VIVA VOCE	SEE	Total
AA 201	Advanced Architectural Design Studio-II (See Viva Voce)	50	50	50

SEMESTER – II

BUILDING PERFORMANCE ASSESSMENT (SIMULATION SOFTWARE)	
Course code: AA 202	**Credits: 2:0:3**
Pre-requisite: Nil	**Contact Hours: 6 Hrs./ Wk.**
Course Coordinator:	

Course objectives:

- To develop the necessary theoretical knowledge and practical skills to effectively apply building performance assessment tools in design, analysis, and research contexts.
- Emphasis is placed upon simulating the building's thermal to make it more sustainable.

Course contents

Unit I

Introduction to elements of building performance assessment: select an appropriate environmental strategy; consider the effects of solar radiation on heating, cooling, and daylighting systems; To design appropriate ventilation strategies; conduct dynamic thermal and plant simulations; and predict and reduce the energy demand and carbon emissions of a building.

Unit II

Introduction to Energy Modelling Software: Autodesk Revit with Green Building Studio (BIM-integrated): Streamlines energy analysis within the familiar Revit environment. Open Studio: A robust tool for advanced energy modelling, particularly beneficial for complex projects. However, advanced use may require some programming knowledge. IES Virtual Environment for Architects (IESVE): User-friendly interface with strong visualization tools for comprehensive energy analysis. Ecotect Analysis (Standalone): Offers a comprehensive suite of building performance simulations, including energy modelling, daylighting, and thermal comfort analysis.

Unit III

Introduction to Daylighting and Solar Analysis Tools: Daylighting and solar analysis tools provide user-friendly platforms that support architects and designers in evaluating natural light performance within buildings. These tools facilitate the simulation of daylight penetration and solar radiation, enabling informed design decisions early in the project. They allow for detailed visualizations and performance feedback, helping optimize building orientation, window placement, and shading strategies. Some are designed for quick, conceptual analysis in the early design phases, while others offer in-depth simulation capabilities ideal for advanced lighting studies. These resources are essential in promoting energy efficiency, visual comfort, and sustainable design practices.

Unit IV

Introduction to Thermal Comfort Analysis Tools: Thermal comfort analysis tools are essential for evaluating indoor environmental conditions and ensuring occupant well-being. These tools enable comprehensive simulations of building performance, assessing factors such as temperature, humidity, airflow, and radiation. They range from user-friendly platforms suitable for early-stage design to advanced computational systems capable of detailed airflow and thermal dynamics modeling. Some tools integrate with broader building simulation environments, while others operate as standalone

engines or plugins, offering flexibility for various design workflows. Together, they support the creation of energy-efficient, comfortable indoor environments through data-driven decision-making.

Unit V

Case study: Design adapting to simulation in two famous buildings.

Course Outcomes (COs):

CO1: Understand the building sciences in terms of energy systems such as heating, cooling, lighting, and other mechanical equipment.
CO2: Understand and apply the competence in the use of a range of industry-standard environmental simulation tools and the ability to apply them to inform building design
CO3: Utilize energy modeling and simulation technologies to analyze the energy and thermal performance of buildings
CO4: Develop energy simulation models for design projects
CO5: Study on various cases on design adapting to stimulation.

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. Open Studio: A comprehensive open-source energy modeling platform. ASHRAE Journal, 54(10), 47-56.

Evaluation Pattern: Marks allocation for CIE

Subject Code	Subject Name	CIE Marks	SEE	TOTAL
AA 202	Building Performance Assessment (Simulation Software)	50	50	100

SEMESTER – II

ADVANCED STRUCTURAL SYSTEMS	
Course code: AA 203	**Credits: 2:0:1**
Pre-requisite: Nil	**Contact Hours: 3 Hrs./ Wk.**
Course Coordinator:	

Course objectives:
The course focuses on advanced structural systems, innovative materials, optimization techniques, and sustainable design for efficient and resilient engineering solutions.

Course Contents:

UNIT I

Structural systems in architecture and engineering, High-performance materials, Innovative structural solutions.

UNIT II

Structural analysis methods, Optimization techniques, parametric design and modeling, Structural efficiency metrics, Load distribution and stress analysis.

UNIT III

Computational tools in structural engineering**,** Dynamic structural systems**,** Seismic resistance design**,** Performance-based design (PBD).

UNIT IV

Material efficiency and lifecycle analysis, Smart structures and adaptive systems, Energy-efficient structural solutions, Integration of renewable energy in structures, Environmental impact analysis.

UNIT V

Performance-based structural innovations**,** Case studies of landmark structures**,** Future trends in structural engineering**,** Multi-disciplinary integration.

Course outcomes (COs):

The student will be able to

CO1 – Understand the Structural systems in architecture and engineering.

CO2 – Identify the structural analysis methods, Optimization techniques, parametric design and modeling.

CO3 – Develop performance based design.

CO4 – Analyze the Material efficiency, lifecycle analysis and Environmental impact analysis.

CO5 - Outline the Performance-based structural innovations

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.

Evaluation Pattern: Marks allocation for SEE (Term Work)

Subject Code	Subject	Portfolio	Report	Total
AA 303	Advanced Structural Systems	40	10	50

SEMESTER – II

ELECTIVE II (Net Zero Buildings)	
Course code: AA 204/AAE04	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 Hrs./ Wk.**
Course Coordinator:	

Course objectives

To provide students with an in-depth understanding of Net Zero Energy Buildings (NZEB), focusing on creating buildings that generate as much energy as they consume over the course of a year.it emphasizes on energy efficiency, renewable energy integration, passive design, and other aspects critical to achieving Net Zero status. It will cover topics such as building performance optimization, energy modeling, smart building technologies, and carbon footprint reduction, with a focus on industry standards and certifications like LEED.

Course Contents

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):

CO1: To Understand the Concept and Principles of Net Zero Energy Buildings (NZEB)
CO2: Design and Implement Energy-Efficient Strategies and Integrate Renewable Energy Systems in Building Design:
CO3: To acquire knowledge of energy storage solutions and their role in ensuring consistent energy supply and optimizing renewable energy use.
CO4: Understand and Apply Passive Design Principles for Energy Optimization
CO5: Competence in applying industry standards for energy efficiency and renewable energy systems, including LEED and Passive House standards.

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 CIE (Term work)

Subject Code	Subject Name	Term-work	Total
AA 204/ AAE04	ELECTIVE II (Net Zero Buildings)	100	100

SEMESTER – II

ELECTIVE II (Virtual Reality and Augmented Reality in Architecture)	
Course code: AA 204/AA E05	**Credits: 3:0:0**
Pre-requisite: Nil	**Contact Hours: 3 Hrs./ Wk.**
Course Coordinator:	

Course objectives

The course aims to explore the use of Virtual Reality and Augmented Reality in architecture for immersive visualization, interactive design walkthroughs, client presentations, site planning, and real-time collaboration

Course Contents:

UNIT I

Learn the basics of Virtual Reality (VR) and Augmented Reality (AR), their tools, and applications in design. Explore VR platforms for immersive environments and AR tools for site planning and client presentations. Understand the technology behind these immersive experiences.

UNIT II

Create immersive 3D models and design walkthroughs for real-time architectural exploration. Implement best practices for lighting, texture, and navigation in virtual environments.

UNIT III

Apply VR/AR in site planning to overlay digital models on real-world environments for analysis. Create interactive models that allow users to explore and modify design elements in real time.

UNIT IV

Develop real-time interaction in immersive environments for design feedback and changes. Visualize construction processes, timelines, and site visits using VR/AR. Enhance collaboration and communication during construction and design phases.

UNIT V

Use VR/AR for remote collaboration and real-time design iteration with multiple stakeholders. Engage clients through immersive presentations, virtual staging, and real-time feedback loops. Foster collaborative design refinement in a shared virtual space

Course outcomes (COs):

The student will be able to

CO1 - Understand the basics of Virtual Reality (VR) and Augmented Reality (AR), their tools, and applications in design

CO2 - Create immersive 3D models and design walkthroughs for real-time architectural exploration.

CO3 - Apply VR/AR for site planning by overlaying digital models on real-world environments for analysis.

CO4 - Develop real-time interaction in immersive environments to provide design feedback and visualize construction processes.

CO5 - Use VR/AR for remote collaboration, real-time design iteration, and client engagement in a shared virtual space.

References:

13. Dieck, M. C. T., & Jung, T. *Augmented Reality and Virtual Reality: Empowering Human, Place and Business*. Springer International Publishing, 2019.
14. Mortenson, M. E. *Virtual Reality and Augmented Reality in Industry*. Wiley-Blackwell, 2015.
15. Fuchs, P., Moreau, G., & Guitton, P. *Virtual Reality: Concepts and Technologies*. CRC Press, 2011.
16. Santana, F., & Knippel, E. *Architectural Visualization with Unreal Engine*. Packt Publishing, 2020.
17. Bartle, R. *Designing Virtual Worlds*. New Riders, 2003.
18. Linowes, J., & Babilinski, K. *Augmented Reality for Developers: Build Practical Augmented Reality Applications with Unity, ARCore, and Vuforia*. Packt Publishing, 2017.
19. Zlatanova, S., & Ledoux, H. (Eds.). *Urban and Regional Data Management: UDMS 2013*. CRC Press, 2013.
20. Kensek, K. M., & Noble, D. E. (Eds.). *Building Information Modeling: BIM in Current and Future Practice*. Wiley, 2014.
21. Wang, X., & Schnabel, M. A. (Eds.). *Collaborative Design in Virtual Environments*. Springer, 2008.
22. Dieck, M. C. T., & Jung, T. (Eds.). *Augmented Reality and Virtual Reality: The Power of AR and VR for Business*. Springer International Publishing, 2018.
23. Hale, K. S., & Stanney, K. M. (Eds.). *Handbook of Virtual Environments: Design, Implementation, and Applications*. CRC Press, 2015.

Evaluation Pattern: Marks allocation for CIE (Term work)

Subject Code	Subject Name	Term-work	Total
AA 204/ AA E05	ELECTIVE II (Virtual Reality and Augmented Reality in Architecture)	100	100

SEMESTER – II

ELECTIVE II (Land Use Structure and Urban Morphology)

Course code: AA 204/AAE06	Credits: 3:0:0
Pre-requisite: Nil	Contact Hours: 3 Hrs./ Wk.
Course Coordinator:	

Course objectives

To understand urban morphology through perception, cognition and spatial aspects of a city structure.

Course contents

Unit I

Interpreting the urban geography: Introduction to urban geography – Triggers and Outcomes of urbanization. Study of patterns of distribution and interaction within cities, from quantitative, qualitative, structural, and behavioral perspectives. Understanding Urban Geography through: Cognition, perception and spatial representation. Cognitive mapping- Contemporary and traditional methods.

Unit II

Morphology of habitat structures: Renaissance and the Re-confinement of space. Industrial Revolution, Technologies, and the 19th-century transformation of world views. Compression of time-space and the birth of Suburbia, Idealized Space, Romanticism, and the Garden City Movement. Ideal-Space diagram and city form.

Unit III

Mapping sacred geography: Astronomy and city structure. Vastu Shastra and the integrated worldview. Sacred Geographies, Sacred Cities, Precincts and Spaces. Sacred Rivers, Ghats, Mounds, Trees, and Other Totems in Urban Space. Mapping the Sacred.

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.

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.

Course Outcomes (COs):

CO1: Analyze and understand the city distribution patterns and urban geography through cognition, perception, spatial representation, and cognitive mapping using both contemporary and traditional methods.
CO2: Understand the historical transformation of habitat structures, and the impact of idealized space concepts in city planning.
CO3: Outline the relationship between astronomy, city structure, and sacred geography, through Mapping.
CO4: Acquire knowledge about the rhythms of urban life through various modern work rituals.
CO5: Understanding the Urban growth and system of cities.

Reference books:

1. Spiro Kostoff, “City shaped”, Bulfinch, Reprint Edition, 1993.
2. SumitaGhosh, “Introduction to settlement geography”, Orient BlackSwan, 1998.
3. Michael Pacione, “Urban Geography: A Global perspective”, Routledge; 1st Edition, 2009.
4. Paul L Knox,“Urbanization”, Pearson, 2012.
5. Diana L. Eck, “India: A Sacred Geography”, Three Rivers Press, 2013

Evaluation Pattern: Marks allocation for CIE

Subject Code	Subject Name	Term-work	Total
AA 204/ AAE06	ELECTIVE II (Land Use Structure and Urban Morphology)	100	100