

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2022
'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

Choice Based Credit System

Structure: 2021 Pattern

Syllabus: **Bachelor of Architecture IV Year**

Name of the Course: – B. Arch. (Sem. VII and Sem. VIII)

(Syllabus to be implemented from June 2024)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Choice Based Credit System structure of Fourth Year B.Arch with effect from w.e.f- A.Y. 2024-25

As per Council of Architecture ,New Delhi (COA) Guidelines

Scheme of Teaching and Examination of B.Arch. FOURTH year - Semester VII - w.e.f.-June - 2024

Subject Code	Subject category	Subject Title	Teaching scheme in Periods /Week			Examination Scheme								Total	Credits	
			60 minutes/L/P/S			Paper duration in hours	Theory				Practical/Viva-voce					
			Lectures /Week	Practical,Studio/Week	Total periods /week		ISE		ESE		ICA		ESE			
							Max.	Min.	Max.	Min.	Max.	Min.	Max.			Min.
L	P/S	T		50%	45%		50%	45%								
21 AR7-01	PC	Architectural Design- VII	1	6	7	12	-	-	150	67	100	50	150	67	400	7
21 AR7-02	BS & AE	Bldg. Construction and Material- VII	1	4	5	-	-	-	-	-	100	50	150	67	250	5
21 AR7-03	BS & AE	Theory of Structure-VII	2	-	2	3	30	15	70	31	-	-	-	-	100	2
21 AR7-04	PC	Working Drawing- II	1	3	4	-	-	-	-	-	100	50	100	45	200	4
21 AR7-05	PAEC	Research Methodology in Architecture	2	-	2	-	-	-	-	-	100	50	-	-	100	2
21 AR7-06	PC	Estimating Specifications and Costing- II	3	-	3	3	30	15	70	31	-	-	-	-	100	3
21 AR7-07	PAEC	Professional Practice -I	3	-	3	3	30	15	70	31	-	-	-	-	100	3
21 AR7-08	EC/PAEC	Elective IX -	2	-	2	-	-	-	-	-	50	25	-	-	50	2
		A. Building Bye Laws														
		B. Building Information Modelling														
21 AR7-09	EC/PAEC	Elective X -	2	-	2	-	-	-	-	-	50	25	-	-	50	2
		A. Green Buildings and Rating Systems														
		B. Design with Climate														
		Grand Total		-	30	-	90		360		500		400		1350	30

Abbreviations: L- Lectures, P- Practicals, S- Studios, ISE- In Semester Exam., ESE - End Semester exam, ICA- Internal Continuous Assessment

Subject Categories : PC - Professional Core Courses, BS & AE - Building Sciences and Applied Engineering, PE - Professional Elective, PAEC- Professional Ability Enhancement Courses, SEC - Skill

Number of subjects / Head - 09

Number of Theory Examination - 04

Number of Practical/Viva-Voce Examination - 03

Note : 1. Theory exam - ISE -Internal Tests - marks to be awarded by conducting Minimum Two Test by the subject teacher, ESE - University Theory examination

2. Practical/ Viva-Voce exam - Prograsive marks (ICA) to be awarded by the subject teacher. Practical/ Viva - Voce examination (ESE - Oral) shall be conducted by one internal and two external examiner appointed by the university

Punyashlok Ahilyadevi Holkar Solapur University, Solapur																
Faculty of Science & Technology																
Choice Based Credit System structure of Fourth Year B.Arch with effect from - w.e.f -2024-25																
As per Council of Architecture ,New Delhi (COA) Guidelines																
Scheme of Teaching and Examination of B.Arch. Fourth year - Semester VIII - w.e.f. - Nov. 24																
Subject Code	subject category	Subject Title	Teaching scheme in periods per week			Examination Scheme										
			60 minutes/L/P/S			paper duration in hours	Theory				Practical/Viva-voce				Total	Credits
			lectures per week	practical/studio per week	Total periods /week		ISE		ESE		ICA		ESE			
			L	P/S	T		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
21 AR8-01	PAEC	Professional Training	-	-	-	-	-	-	-	-	50	25	150	67	200	18
21 AR8-02	PC	Architectural Documentation	-	-	-	-	-	-	-	-	50	25	-	-	50	2
		Grand Total	-	-	-	-	0		0		100		150		250	20
Abbreviations: L- Lectures, P- Practicals, S- Studios, ISE- In Semester Exam., ESE - End Semester exam, ICA- Internal Continuous Assessment																
Subject Categories : PC - Professional Core Courses, BS & AE - Building Sciences and Applied Engineering, PE - Professional Elective, PAEC- Professional Ability Enhancement Courses, SEC - Skill																
Number of subjects / Head - 02			Number of Theory Examination - 00				Number of Practical /Viva-Voce Examination - 01									
Note :	1. Theory exam - ISE -Internal Tests - marks to be awarded by conducting Minimum Two Test by the subject teacher, ESE - University Theory examination															
	2. Practical/ Viva-Voce exam - Prograsive marks (ICA) to be awarded by the subject teacher. Practical/ Viva - Voce examination (ESE - Oral) shall be conducted by one internal and two external examiner appointed by the university															
Pass percentage shall not be less than 50% in aggregate of the total marks of the year .																

Grade and Grade Point Average:

A grade assigned to each head based upon marks obtained by the student in examination of the course.

CONVERSION OF MARKS INTO GRADES SGPA				
<i>Sr.No.</i>	<i>Range of Marks</i>	<i>Grade</i>	<i>Grade Point</i>	<i>Description of Performance</i>
1	80 onwards	O	10	EXCELLENT /OUTSTANDING
2	70-79	A+	9	VERY GOOD
3	60-69	A	8	GOOD
4	55-59	B+	7	FAIR
5	50-54	B	6	ABOVE AVERAGE
6	45-49	C+	5	AVERAGE
7	<45	F	0	FAIL
8		DR		DROPPED OUT

CONVERSION OF AVERAGE GRADE POINTS INTO GRADES		
<i>Sr.No.</i>	<i>SGPA/CGPA</i>	<i>Grade</i>
1	9.5-10	O
2	8.5-9.49	A+
3	7.5-8.49	A
4	6.5-7.49	B+
5	5.5-6.49	B
6	4.5-5.49	C+
7	<4.49	F

Computation of SGPA and CGPA

- 1) The University adopts absolute grading system wherein the marks are converted to grades, and every semester result will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester.
- 2) The grading system with the letter grades and the assigned range of marks under absolute grading system are as given below:

Computation of SGPA and CGPA

1. The following expressions shall be used to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) respectively:

$$SGPA = \frac{\sum \text{Course Credits} \times \text{Grade Points for all the Courses in that Semester}}{\sum \text{Course Credits for all the Courses in that Semester}}$$

$$CGPA = \frac{\sum \text{Course Credits} \times \text{Grade Points for all Courses excluding those with F grades until that Semester}}{\sum \text{Course Credits for all Courses excluding those with F grades until that semester}}$$

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the grade cards.

Illustration for Computation of SGPA and CGPA

Sem. I

(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year							
Semester (Odd:I, Even:II)	Course Number	Credits	Marks scored	Grade Points	Grade	Credit points	SGPA
	1	2	3	4	5	(2x4) 6 (2x4)	7
SEM.I	21 AR1-01	8	45	0	F	8X0 = 0	SGPA = 132/30 = 4.40
SEM.I	21 AR1-02	6	48	5	C+	6x5 = 30	
SEM.I	21 AR1-03	2	50	6	B	2x6 = 12	
SEM.I	21 AR1-04	2	50	6	B	2x6=12	
SEM.I	21 AR1-05	4	50	6	B	4x6=24	
SEM.I	21 AR1-06	3	64	8	A	3x8 = 24	
SEM.I	21 AR1-07	3	53	6	B	3x6 = 18	
SEM.I	21 AR1-08	2	54	6	B	2x6 = 12	SGPA = 4.40
		30 (*22)				132	

(22*): Total credits of the semester excluding the credits of the courses under F grade. Considered for the calculation of CGPA of the two consecutive semesters under consideration.

Sem.II

(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year							
Semester (Odd:I,Even:II)	Course Number	Credits	Marks scored	Grade Points	Grade	Credit points	SGPA
	1	2	3	4	5	(2x4) 6 (2x4)	7
SEM.II	21 AR2-01	8	43	0	F	8X0 =0	SGPA = 139/30 = 4.63
SEM.II	21 AR2-02	6	50	6	B	6x6 = 36	
SEM.II	21 AR2-03	2	54	6	B	2x6 = 12	
SEM.II	21 AR2-04	2	84	10	O	2x10=20	
SEM.II	21 AR2-05	4	50	6	B	4x6=24	
SEM.II	21 AR2-06	3	51	6	B	3x6= 18	
SEM.II	21 AR2-07	3	49	5	C+	3x5 = 15	
SEM.II	21 AR2-08	2	55	7	B+	2x7 = 14	SGPA= 4.64
		30 (*22)				139	

(22*): Total credits of the semester excluding the credits of the courses under F grade. Considered for the calculation of CGPA of the two consecutive semesters under consideration.

CGPA = 132 + 139 (TOTAL SGPA SEM.I + SEM.II) / 22+22 (EARNEDCREDITS) = 6.15

CGPA = 6.15

If the Student secures letter grades as detailed below after reappearance to SEE, then the SGPA and CGPA shall be calculated as indicated below.

Sem. I

(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year							
Semester (Odd:I,Even:II)	Course Number	Credits	Marks scored	Grade Points	Grade	Credit points	SGPA
	1	2	3	4	5	(2x4) 6 (2x4)	7
SEM.I	21 AR1-01	8	50	6	B	8X6 =48	SGPA = 132+48/30 = 6.00
		30				148	SGPA = 6.00

Sem.II

(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year							
Semester (Odd:I,Even:II)	Course Number	Credits	Marks scored	Grade Points	Grade	Credit points	SGPA
	1	2	3	4	5	(2x4) 6 (2x4)	7
SEM.II	21 AR2-01	8	55	7	B+	8X7 =56	SGPA = 139+56/30 = 6.50
		30				139	Sgpa = 6.50

CGPA = 180 + 195 (TOTAL SGPA SEM.I + SEM.II) / 30+30(EARNEDCREDITS) = 6.25

CGPA = 6.25

2. (b) CGPA Calculation of the Programme: An Illustrative Example

SEMESTER	IST YEAR	IIND YEAR	IIIRD YEAR	IVTH YEAR	VTH YEAR	TOTAL
CREDITS OF THE SEMESTER	60	60	60	50	40	270
CGPA	6.25	7.50	6.50	8.00	10.00	38.5

CGPA = (60X6.25 + 60X7.50+60X6.5+50X8+40X10) / 270 = 2015/270 = 7.46

CGPA = 7.46

B. ARCH -SEM.VII**21 AR7– 01: ARCHITECTURAL DESIGN – VII**

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	06	06	ISE	ESE	ICA	ESE	
Total	07	07	--	150	100	150	400

Course Objective:

- To develop an analytical understanding of architectural factors influencing design, including function, construction, materiality, climate, social dynamics, cultural contexts, and economic considerations.
- To integrate technological advancements into architectural design processes, applying them to design structures with considerations for building services, interior layouts, and landscape elements.
- To cultivate proficiency in campus planning and site development, applying sociological, economic, cultural, and climatic factors to effectively organize spatial layouts and integrate site services.
- To enhance communication skills in articulating the architectural design process, from data collection and analysis to the presentation of solutions, demonstrating clarity, coherence, and professionalism in design proposals.

Course Outcome:

At the end of semester students shall be able to:

- Demonstrate an analytical understanding of various factors influencing architectural design.
- Integrate technological advancements into architectural design processes.
- Develop comprehensive design solutions for complex buildings and campuses.
- Develop proficiency in campus planning and site development.
- Effectively communicate the architectural design process.

Course Curriculum:

Unit 1	Major Design Problem	Architectural Design suggested Topics
		<ul style="list-style-type: none"> • Essential Buildings - Housing Schemes, Transport Nodes, shopping mall, Urban Centres, and Rehabilitation Centre etc. • Buildings for Leisure - Star Hotels, Club Houses, Resorts, Tourist Centres, Community Centres, Amusement Parks, Entertainment Parks, Multiplexes Etc. • Special Purpose buildings - Science Centre, Film City, IT Parks, Power Stations, Aquariums, Memorials Etc. • Institutional buildings -Schools, Colleges etc.
		Suggested Design Methodology:
		<p>Research and Analysis:</p> <ul style="list-style-type: none"> • Gather data and conduct research on the project requirements, site conditions, environmental factors, cultural context, and client preferences. • Analyse the collected information to identify key design drivers, challenges, and opportunities. <p>Conceptualization:</p> <ul style="list-style-type: none"> • Generate design concepts inspired by the research and analysis phase. • Explore various architectural ideas and spatial configurations that address the project goals and reflect the identified factors. <p>Design Development:</p> <ul style="list-style-type: none"> • Refine selected design concepts through iterative development. • Incorporate findings from case studies, considering functional requirements, structural feasibility and aesthetic considerations. • Utilize tools such as sketches, diagrams and physical models to visualize and refine design proposals.

		<p>Integration of Technology:</p> <ul style="list-style-type: none"> Integrate technological advancements into the design process, such as 3D Sketchup, parametric design tools and sustainability analysis software. Utilize digital tools and techniques to enhance design exploration, documentation, and communication. <p>Sustainability and Environmental Considerations:</p> <ul style="list-style-type: none"> Integrate sustainable design principles and strategies to minimize environmental impact and maximize energy efficiency. Consider passive design techniques, renewable energy systems and material selection criteria to enhance the project's sustainability.
		<p>Design problem of built-up area about 4000 sqm. Plot areas can vary from 3-4 times of the built-up area.</p>
Unit 2	Minor Design Problem	<p>Design - 18 hours and 3 days assignment of built-up area of 1000-1200sqm. (Time bound design assignment)</p>

Submission/Assignments format:

Study documentation, reports and data collection in file form/drawing form.
Pre-Design Process Drawings.
Design portfolio.
Study models, Design Models.

Reference Books:

1. Anthony Di Mari and Nora Yoo, " Operative Design: A Catalogue of Spatial Verbs", BIS Publishers.
2. Bruno Munari, "Design as Art", Penguin UK, 25-Sep-2008.
3. Charles George Ramsey and Harold Sleeper, "Architectural Graphic Standards", 1992, Wiley.
4. Debkumar Chakrabarti, "Indian Anthropometric Dimensions for Ergonomic Design Practice", 1997.
5. Frank Ching, James F. Eckler, "Introduction to Architecture", 2012, John Wiley & Sons, US.
6. Frank D.K. Ching, " Architecture: Form, Space, and Order", 4th Edition, Sep. 2014, John Wiley & Sons.
7. John Hancock Callender, "Time-Saver Standards for Architectural Design Data", 1982, McGraw-Hill.
8. Neufert Architects' Data by Ernst Neufert.
9. Francis D.K. Ching –Elements of Architecture.
10. Walter Gropius – Total Architecture.
11. Site Planning by Kevin Linch, Gary Hack.

21 AR 7-02: BUILDING CONSTRUCTION & MATERIAL – VII

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	04	04	ISE	ESE	ICA	ESE	
Total	05	05	---	---	100	150	250

Course Objective:

- To focus on superstructures of long span structures.
- To introduce principles of Precast Building technology.
- To learn construction technology for earthquake resilience.
- To understand low-cost building technology developed by organizations
- To introduce various methods of demolition of structures and retrofitting of structures.
- To familiarize with thermal, sound insulating materials, Fire proofing and retarding materials and low-cost building materials developed by various organizations and their building applications.

Course Outcome:

At the end of semester student should be able to

- Equip with knowledge and skills in superstructures of long span structures.
- Understand principles of Precast Building technology for efficient and fast construction.
- Implement construction techniques for earthquake resilience and disaster management, with a focus on earthquakes.
- Familiarize with organizations and principles in low-cost material research for sustainable building solutions.
- Apply methods of demolition and retrofitting structures for safety and structural integrity.
- Equip with knowledge of thermal, sound insulating, fireproofing, and low-cost building materials, along with their applications developed by various organizations.

Building Construction:

Unit 1	Introduction to long span roofs	Study of long span steel structures, the principles and geometric forms of a) shell roofs b) space structure c) pneumatic structure d) tensile structure e) geodesic domes f) Vaults, Folded plates (introductory)
		Constructional aspects of portal frames in R.C.C. and steel, base and apex joints
Unit 2	Pre-cast building Technology	Introduction to pre-stressing and post tensioning of building components, Modular co-ordination, Precast building and constructions
Unit 3	Earth quake Resistant structures	Overview of earthquake resisting structural systems. Application of Moment resisting frames, crossed braced frames and shear wall for Earthquake resistance structures.
Unit 4	Low-cost Building Technology	Low-cost building techniques developed by various organisations – CBRI, Auroville Earth Institute
Unit 5	Demolition & Retrofitting	Demolition of the structures by various methods retrofitting of structures – Shoring and underpinning

Building Materials:

Unit	Topic	Details
Unit 1	Thermal and sound insulting materials	Properties and application.
Unit 2	Fire proofing and retarding materials	Properties and application.
Unit 3	Cost Effective building Materials	Various materials and its application.

Submission Format:

Sheet Work on –

1. Principle and methods of construction in graphic format of shell roofs, space structure, pneumatic structure, tensile structure, geodesic dome etc.
2. Plan and section of portal frames with different building materials used and details of joints.
3. Pre-tensioning and post-tensioning methods adopted for various precast building elements to be used in construction, its lifting, erection and joining.
4. Technologies adopted for earthquake resistant structures.
5. Sketches on low-cost technologies developed by CBRI, Auroville Earth Institute
6. Types of shoring, methods of underpinning

Journal and sketches on building construction and material.

ESE weightage - 60% Building Construction, 40% For Building Material.

Reference Books:

1. Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.
2. Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed. London: B.T. Batsford Ltd.
3. McKay, W. B. (2005). Building Construction Metric Vol. I–IV. 4th Ed. Mumbai: Orient Longman.
4. Moxley, R. (1961). Mitchell's Elementary Building Construction. London: B. T. Batsford.
5. Rangwala, S. C. (1963). Building Construction: Materials and types of Construction. 3rd Ed. New York: John Wiley and Sons.
6. Chudley, R. (2008). Building Construction Handbook. 7th Ed. London: Butterworth-Heinemann.
7. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers.
8. Rangwala, S. C. (1963). Engineering Materials. 3rd Ed. New York: John Wiley and Sons

21 AR7 – 03: THEORY OF STRUCTURE – VII

Teaching Scheme per week		Credits	Examination scheme				
Lecture (L)	02	02	Theory exam		Practical/Oral exam		Total
Practical/Studio(P/S)	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	----	----	100

Course Objective:

- To help students understand the concept of long-span structures, advanced structures, concrete mix design, and pre-stress structures.

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Course Outcome:

- At the end of the semester, students will be able to,
- Understand the application of structural systems in the building
- Understand the concept of long-span structures.
- Understand concrete mix design and calculations with application.
- Understand pre-stress concrete design and application.

Course Curriculum:

Unit-1	Structural system	Basic understanding of lateral loads and load combination. Study of various Structural systems and methods of construction Selection criteria of structural system and methods of construction of building types
Unit-2	Introduction to advanced structure	Long-span beams, Long-span Trusses, Long-span roofs, Long-span arches. Cable-supported structures. Cable Supported Structures. Folded Plate Structures. Space frames. Portal frames.
Unit-3	RCC theory of flat slab	With column capital and drop Only drop Flat – plate
Unit-4	Concrete Mix Design	Material properties for high-strength concrete such as sand, metal, water, cement, and admixture as per IS code. Mix design procedure as per IS code.
Unit-5	Prestress concrete	Principles and Design of Pre-tensioning and post-tensioning Application of pre-stress concrete and prestressing in the building design.

Assignments:

Topic-wise assignments

References:

1. Reinforced concrete – limit state method by A. K. Jain
2. Concrete Technology – M.S. Shetty
3. Concrete Technology – D.R. R. P. Rethaliya
4. Limit state design of reinforced concrete by B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain
5. Reinforced Concrete – Vol – II by Dr. H. J. Shah
6. IS 456-2000 Plain and reinforced concrete – Code of practice

21 AR7-04 – Working Drawing - II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01		01	Theory Exam		Practical oral exam	
Practical/Studio -P/S	03	03	ISE	ESE	ICA	ESE	
Total	04	04	--	--	100	100	200

R.C.C. Framed Structure

Course Objective:

- To Introduce the idea of Design Development and detailing and its relevance in converting ‘concept design’ to working drawing and hence the realization of design on site.
- To introduce the student’s preparation of working drawing of RCC structure based on the principle of interpretation and reading of drawings for execution.

Course Outcome:

At the end of the semester, students should be able:

- To convert ‘concept design’ to working drawing and hence the realization of design on site.
- To produce comprehensive working drawings for RCC framed structures, incorporating all necessary elements and adhering to relevant codes and standards.

Course Curriculum:

- These drawings should enable the site staff to transform the drawing into actual construction with the help of sufficient data.
- Working drawing for R.C.C. framed structure of previous design problem with min. G+1 structure and minimum area of 500 Sq.m. and above.

Unit 1	Site Plan	The entire site, including boundary lines, Site dimensions, existing structures (if any), and proposed building placement
Unit 2	Centreline / Face line Plan, Excavation Plan, Foundation Plan	The centreline of the building, aiding for alignment and orientation, excavation plan required for foundation work, including depth and extent. Foundation plan -the type and layout of foundations, including footings and columns.
Unit 3	All RCC elements	Plinth beam, Ground Beam, Floor beam and beams at different levels; Other RCC elements like a porch, Weather protection, architectural projections etc.
Unit 4	All floor plans	Working drawing of floor plan, Including roof/ Terrace Plan.
Unit 5	Elevations & Sections	Working drawings of elevations showing exterior features, openings, and finishes for execution.
		Section and detailed sections showing all building elements, section through the toilet, lift, and staircase compulsory.
Unit 6	Architectural Details	Include specific details for areas such as kitchens, staircases, and other architectural elements, ensuring proper construction and functionality.
Unit7	Layout Plan for Services	Any two specific service details such as – (Electrical, Water supply, Sanitation, Rain water Harvesting etc.) showing working drawings and specifications.

Submission / Assignment: Sketches and Portfolio

Reference Books:

Time saver standards by Callender.
Time saver standards by E & OE
Time saver standards by Nuferts.

21 AR7 -05 –Research Methodology in Architecture

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	--	--	100	--	100

Course Objective:

- Define a thesis topic in architecture, understanding relevant theories and practicalities.
- Review existing literature, extracting insights and identifying research gaps.
- To create a concise synopsis outlining the aim, objectives, methodology, scope and expected outcomes /conclusion of the thesis project, showcasing academic writing and research skills.
- To Execute to collect, analyse data, using appropriate methods and techniques and interpreting findings.
- To prepare a thesis document with academic standards, clarity, and originality.

Course Outcome:

By the end of the semester, the student should be able to:

- Define a thesis topic in architecture with theoretical and practical understanding.
- Conduct comprehensive literature reviews, identifying gaps for further research and finalization of thesis topic.
- Develop a clear Thesis proposal, demonstrating academic writing and research design proficiency.
- Execute research plans effectively, analysing data to generate new insights for design thesis.
- Communicate findings through synopsis and literature review for thesis with academic standards, clarity, and originality.

Course Curriculum:

Unit-1	Thesis Topic Identification and Articulation	<p>Students must identify and select three potential thesis topics based on individual interests and curiosity and must report to the concerned faculty for approval.</p> <p>Upon approval students will formulate a well-defined research question or hypothesis (for all 3 selected topics) aligned with relevant theoretical frameworks and practical considerations from the knowledge gained through analytical study of building and spaces from social, economic, cultural and environmental aspects.</p> <p>Students must Conduct a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis for each of the three selected thesis topics and evaluate the viability, relevance and potential challenges associated with each topic. A Seminar (not included in contact hrs.) has to be conducted encouraging dialogue exchange and criticism.</p> <p>From the inputs received in the seminar, students will refine their study and Finalize Thesis topic for further exploration.</p>
Unit-2	Literature Review and Synthesis	<p>Students must identify and select minimum 10 comprehensive literature (out of which 3 must be from the articles published in National and International Journals only) to survey and critically evaluate existing research literature related to the selected thesis topic by analysing and comparing findings from a range of architectural sources, including academic journals, books and conference proceedings to inform the research direction.</p> <p>Students will write review on the selected 10 research papers.</p> <p>Students will identify key insights, trends and gaps in knowledge and synthesize findings from the literature review to inform the research direction and refine the research question or hypothesis.</p>

Unit-3	Research Proposal Development	Students will write a clear and concise research proposal or synopsis outlining the research aim, objectives, methodology, scope and expected outcomes of the finalized thesis topic from the research study conducted before. Each student will present their Synopsis through a Seminar demonstrating proficiency in academic writing and research design, adhering to established formatting and citation conventions.
Unit-4	Data Collection and Analysis	Student must select a topic for the preparation of the research paper from the domain of architecture (preferably the selected thesis topic) and execute the research plan effectively for preparation of research paper by collecting and analysing data using appropriate methods and techniques. Students will apply quantitative and/or qualitative research methods, such as surveys, interviews, case studies, or experimental design to investigate architectural phenomena and interpret findings. Students will clear their research paper findings through any plagiarism check like Plagiarism checker X or so and make sure that the similarity index does not exceed 10%.
Unit- 5	Communication of Research Findings	Students will communicate their research findings and insights through the preparation and presentation of a research paper (not less than 4000 words) that adheres to academic standards and conventions. (preferably use IEEE Paper format and Mendeley software for citation). Students will present their Paper presentation in audio visual mode by engaging peers and faculty to solicit feedback and refine the presentation content and delivery.

Submission /Assignments:

- Following final approval from the faculty, each student is required to submit a typed and printed single spiral-bound booklet encompassing all units.
- The cover page must feature the institute's certificate, including the course name, and must be signed by the respective faculty member and the principal.
- All pages within the booklet must be numbered sequentially and an index page covering all units must be included.
- Prior to the inclusion of the research paper, a copy of the plagiarism check report must be attached as part of the submission requirements.

References Books:

1. Babbie, E. 1983. The Practice of Social Research. Third edition. Belmont: Wadsworth Publishing Co.
2. Creswell, J.W. 1994. Research Design: Qualitative and Quantitative Approaches. Thousand Oaks: Sage.
3. De Vaus, D.A. 2003. Surveys in Social Research. Jaipur: Rawat Publications.
4. Dey, I. 1993. Qualitative Data Analysis: A User-Friendly Guide for Social Scientists. London: Routledge.
5. Groat, L. & Wang, D. 2002. Architectural Research Methods. New York: John Wiley and Sons Inc.
6. Kothari, C.R. 2005. Research Methodology: Methods and Techniques. New Delhi: Wishwa Prakashan.
7. Michelson, William. 1982. Behavioural Methods in Environmental Design. Stroudsburg, Pennsylvania: Dowden, Hutchinson and Ross, Inc.
8. Nachmias, C.F. & Nachmias, D. 1996. Research Methods in Social Sciences. Great Britain: St. Martin's Press Inc.
9. Patton, M.Q. 1980. Qualitative Evaluation Methods. Newbury Park: Sage Publications.
10. Sanoff, H. 1977. Methods of Architectural Programming, Vol. 29. Dowden Huthinson0 and Ross, Inc.
11. Research papers published in journals from UGC-CARE list may be referred for understanding the overall structure and style of technical writing.

21 AR7 – 06: Estimation Specification and Costing -II

Teaching Scheme per week		Credits	Examination scheme				
Lecture (L)	03	03	Theory exam		Practical/Oral Exam		Total
Practical/Studio(P/S)	-	-	ISE	ESE	ICA	ESE	
Total	03	03	30	70	--	----	100

Course Objective:

- Master detailed estimation methods for RCC buildings.
- Learn to create abstracts using D.S.R. and analyze building rates.
- Understand writing good specifications, types, and their use.
- Grasp the components and details of tender documents.
- Recognize the importance of market surveys.
- Understand cost, value, and valuation purposes.

Course Outcome: By the end of the term, the student shall be able to –

- Prepare accurate estimation of RCC building quantities.
- Proficient abstracting of RCC projects.
- Draft clear and concise specification
- Interpret tender notices.
- Conducting thorough market surveys.
- Grasp valuation principles and factors

Course Curriculum:

Unit-1	Detailed estimate of RCC Building	Taking out quantities of RCC buildings including steel reinforcement.
Unit -2	Abstract Sheet	Preparing abstract of RCC building using current D.S.R., analysis of Rates for building items.
Unit-3	Specifications	Introduction, definition, purpose, importance, use of specifications to engineers, architects, contractors Types of specifications, General specifications, Detailed specifications on building materials Specifications writing on complete building items and also Indian standard specification number referred to red book. I.S. qualities of writing good specifications Details of Tender documents, Tender Notice
Unit-4	Market Survey	Significance and importance of market Survey
Unit -5	Introduction to Valuation	Cost, Value and price, Purpose of valuation, Different forms of Value, Factors affecting the market Value Classification of Valuers and Role Valuer

Submission/ Assignment:

Prepare estimate, calculating detailed quantities of a building items of building plan using current D.S.R.

Reference Books:

1. "Estimating and Costing" by SK Dutta
2. "Estimating, costing and Valuation" by S C Rangawala.
3. Estimating and Costing in Civil Engineering: Theory and Practice Including Specifications and Valuations

21 AR7-07: Professional practice - I

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	03	03	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	03	03	30	70	--	--	100

Course Objective:

- To understand Architecture as a profession, Architects' duties, responsibilities and liabilities and the various roles to be played throughout the project lifecycle.
- To equip students with practical knowledge related to office management, tendering procedures, contracts.

Course Outcome:

At the end of semester students should be able to

- Understand architecture as a profession, understanding the Architects Act of 1972, the code of professional conduct, and roles of the Council of Architecture (COA) and Indian Institute of Architects (IIA).
- To establish proficiency in office management practices, client relations in architectural projects, offered services, fee scales.
- To demonstrate knowledge of the tendering process,
- To understand the components and implications of architectural contracts
- Apply knowledge to navigate professional challenges and foster growth in architectural practice.

Course Curriculum:

Unit 1	Architecture as a professional practice	Idea of profession; differences between profession, trade and business.
		Types and extent of services offered by architects, scale of fees, stages of payment, and contract between client and architect.
		Types of Architectural firms, proprietorship, partnership, associate ship and private limited firms; advantages and disadvantages of each type of firm; building clientele and projects.
		Administration of Architectural firms; basic accounting procedures, financial literacy related to personal and office matters.
Unit 2	Code of Professional Conduct	Architects Act of 1972 Role of Council of Architecture, Indian Institute of Architects in functioning of the Profession.
Unit 3	Tender	Procedure of invitation of tender, tender document and its content.
		Types of tenders, advantages and disadvantages of each type; suitability to various projects. Tender notices, opening, scrutiny, process of selection and award.
		Earnest Money Deposit, Security Deposit, Retention Amount, Mobilization Amount and Bonus & Penalty Clauses.
		Issues arising out of tendering process and the role of an architect.

Detailed Syllabus – CBCS 2021 Pattern – B. Architecture

Unit 4	Contract	General Principles of contract, types of contracts; Contract document.
		Contract Management: Architect's role in Contract Management.
		Conditions and Scope of Contract; role of an architect in ensuring completion of contract.
Unit 5	Issues arising in Contract	Termination of contract, Certificates of value and quality, Virtual completion and final completion
		Defects liability period, Latent and patent defects, Liquidated and un-liquidated damages,
		Extension of time, delays and penalty, non-tendered items, extras, extra work, additional works, variations, rate analysis and architect's role in certification of variations, Prime cost, provisional sum.

Submission/ Assignment: Files and Notes

Reference Books:

- 1) "Professional Practice for Architects & Engineers" by Roshan Nanavati
- 2) "Legal and Contractual Procedures for Architects" by Bob Greenstreet
- 3) AJ Legal Handbook
- 4) "Professional Practice" by KG Krishnamurthy and SV Ravindra.

21 AR7-08 – Elective - IX

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	----	----	50	--	50

The student will opt for any one of the following courses

A. Building Bye Laws

Course Objective:

- Understand Maharashtra's Development Control Rules (DCR) under UDCPR.
- Learn general land development principles.
- Study land use classifications.
- Understand general building requirements.
- Explore building part and parking necessities.

Course Outcome:

- Interpret and apply DCR within UDCPR.
- Analyze land for development.
- Categorize land use.
- Comply with building regulations.
- Design buildings and parking areas per guidelines.

Course Curriculum:

Unit-1	Implications of Development control rules as per UDCPR. (Unified Development Control and Promotion Regulations) for Maharashtra state.
Unit-2	General Land Development
Unit-3	Land use Classifications
Unit-3	General building requirements
Unit-4	Requirements of parts of buildings and Parking

Submission /Assignment: PPTS, Files and Notes

Reference Books:

1. UDCPR

B. Building Information Modelling

Course Objective:

- Upon the successful completion of this course, students should have achieved the following objectives:
- Produce 3D computer models of structures using established standards.
- Understand the transition from 2D to 3D representations.
- Be able to analyze and extract building information data for a Revit model.

Course Outcome:

At the end of semester students shall be able to:

- The course has the following learning outcomes:
- Extract and analyse data from site topography.
- Create basic building models using structural grids and support systems.
- Design basic building components including levels, floors, roofs, etc.
- Employ parametric modelling in 3D design.
- Incorporate the mechanical, electrical, and plumbing systems into the 3D building model.
- Produce the building details and documentation.

Course Curriculum:

Unit-1	BIM Introduction: Definition of BIM, history of BIM. BIM on the architecture and engineering disciplines
Unit-2	BIM Basics: Introduction & modelling, Interface and navigation. 3D drafting: basic model building, Structural grids, support
Unit-3	Bim Basics: Introduction & Modelling (cont.) Levels, Floors, Roofs, Ceiling, Windows, Doors. Navigation: Ribbon, Sketch Mode, General Interface. Basic dimensions, Building sections, plans and elevations.
Unit-4	Parametric Families: Instance vs. Type Parameters, Massing: In-place mass, Conceptual mass. Families: Loading and using basic families, creating basic families
Unit-5	Details And Documentation: Construction details, Detail views, Sheet Organization, and Title block.
Unit-6	Documentation And Renderings: Scheduling, Tags, Table, Legends, Advanced Annotations. 3D Renderings, Materials, Materials Library, Lighting.

Submission /Assignment: G+ 1 Residential / Commercial building model worked in BIM

Reference Books:

1. Revit Architecture reference guide
2. Building information Modelling – by Karen M. Kensek

C. Health Care design

Course Objective:

- To Study of comprehensive and specialized services, amenities and infrastructure provisions in Hospital Systems and Services.
- To understand various issues related to design of Hospital Systems and healthcare buildings.

Course Outcome:

At the end of semester, the student shall be able to,

- Resolve the complexities in hospital planning.
- Be able to design a solution for any health care facility.

Course Curriculum:

Unit-1	Study of comprehensive and specialized services, amenities and infrastructure provisions in hospital; design of hospitals integrating systems and services such as water, sanitation, solid waste, bio-medical waste management, electricity / energy, telecommunication, parking; site planning; study of building byelaws, rules and code provisions for various types of hospitals, smart hospitals.
Unit-2	Identification of various levels and its types, understand norms and standards, technical services for the various health facilities.
Unit-3	Case studies of hospitals with its services. Conceptual design for health facilities with focus on movement pattern, parking, functional requirements and understanding of services required. Design emphasis on detailing of areas like OT Complex, wards, diagnostic facilities, emergency services, trauma centre etc.

Submission /Assignment: Files /Notes/PPT etc.

Reference Books:

1. Manual of Hospital Planning and design
2. Planning and designing of Speciality health care facilities by Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
3. Step by step Hospital Design and planning, Malhotra Publications

21 AR7-09 – Elective - X

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	----	----	50	--	50

The student will opt for any one of the following courses -

A. Green Building and Rating System

Course Objective:

To focus and enlighten students with different Green Rating System in Practices in world and in India like, GRIHA LEED ETC.

Course Outcome:

At the end of the semester students:

- Will be able to read building codes for green buildings.
- Will be able to understand application of rating system in building design

Course Curriculum:

Unit-1	Introduction of and time line of green rating system all over world.
Unit 2	Introduction to Indian rating system like GRIHA IGBC ETC.
Unit-3	Introduction to codes and standards for green rating system.

Submission /Assignment: File and PPT.

Reference Books:

- 1.Relevant code books for ASHREE ISHREE AND ECBC
- 2.IGBC, GRIHA etc. rating system manual.
- 3.NBC India
- 4.Andrew Watts, "Modern Construction Handbook", : 4th Edition
- 5.Andrew Watts, "Modern Construction Case Studies: Emerging Innovation in Building Techniques", Birkhauser Basel.

B. Design with Climate

Course Objective:

To respond to the climatic parameters and the problems confronting architectural design.

To use various methods & techniques for controlling solar radiation and achieve human comfort

Course Outcome:

At the end of the semester, students should be able:

To analyze climate parameters as site context and microclimate.

To select, design, do calculations of bioclimatic strategy.

To incorporate climate responsive design in their design.

Course Curriculum:

Select Any Design assignment from 2nd year and do retrofitting/re-designing/calculate bioclimatic design strategy to achieve human comfort

Unit-1	Study and analysing of existing selected design assignment
Unit-2	Giving solutions at Site Scale
Unit-3	Design solutions at Building Scale
Unit-4	Design solutions at Component Scale
Unit-5	Strategy Calculations and Design modification

Submission /Assignment: Portfolio

Reference Books:

1. Climate Responsive Architecture – Arvind Krishnan
2. Climate Design By – S. V. Szokolay
3. Sun Wind and Light- G Z Brown.

C. Industrial Design

Course Objective:

- Explore the feasibility of industrial building systems and their use in various building types, emphasizing component manufacturing and technology. Assess their potential for disaster mitigation.
- Understand Modular Dimensional Discipline (MDD), its advantages, limitations, and its application in residential buildings and precast elements.
- Learn about off-site and on-site prefabrication elements, construction joints, associated equipment, manufacturing processes, transportation, assembly, and finishing. Discuss structural, social, and economic considerations of industrial building systems.

Course Outcome:

- Evaluate the feasibility of industrial building systems and their disaster mitigation potential.
- Comprehend MDD and its application in residential construction and precast elements.
- Demonstrate knowledge of prefabrication elements, construction joints, equipment, manufacturing, transportation, assembly, finishing, and associated considerations.

Unit-1	Introduction to Feasibility of using industrial building system in different types of buildings, manufacturing of building components. Technology requirements for industrial building system and use of industrial building system as an alternative for disaster mitigation.
Unit-2	Understand concept and definition of Modular dimensional discipline. Understand advantages and limitations of modular principle; components of residential buildings and precast elements.
Unit-3	Understand purpose and need for off-site, on-site prefabrication elements and construction joints with architectural and technical limitations. Introduction to the equipment used, manufacturing processes, transportation of components assembly and finishing Structural, social and economic issues related to industrial building system.

Submission /Assignment: Portfolio

Reference Books:

1. Industrial Building – Planning and Design by Julian Weyer and Sergio Baragano
2. Factory Design by Chris Van Uffelen
3. Buildings for Industrial Storage and Distribution – by Jolyon Drury and Peter Faiconer
4. Buildings for Industry an Architectural Record Book, Published by F.W. Dodge Corporation

B. ARCH – SEM.VIII
21 AR8-01: Professional Training

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	--		Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	--	18	--	--	100	100	200

Course Objective:

- To provide exposure to the various aspects of architectural practice
- To undertake practical training under the guidance of experts / professionals.
- To Learn about architect's office management and learn about the process of design, execution, and management of a project.

Course Outcome:

At the end of semester students will be able to -

- The students get exposed to the professional work and field work.
- The students will relate the academic work with professional work.
- The students will appreciate the pace of the work in profession and learn to work as a team member.

Course Curriculum:

- The student is expected to be exposed to preparation of working drawing, detailing, preparation of architectural models, computer applications in design and drafting, filing system in respect of documents, drawing and preparation of tender documents.
- Students should also acquaint themselves with local building byelaw
- Site experience may be given in respect of supervision of the construction activity, observing the layout on site, study of the stacking methods of various building materials, study of taking measurement and recording.

Monitoring of Training:

A. Submission of Joining report: To be submitted within one week from the date of joining. Students must report for the training from the day of commencement of 8th semester.

B. Submission of periodical reports: Students shall maintain a day-to-day record of their engagement for the period of training.

This will be recorded in an authorized diary /format to be counter signed by the architect at the end of each week and the same diary /format shall be sent through email to the training co-ordinator once in a month.

C. Completion certificate: At the end of the training period, a student shall produce a certificate of satisfactory completion of training in duplicate.

Submission of Portfolio:

Students shall present a portfolio containing the following works before the examiners for Viva-Voce Examination:

1) Training Report: This shall contain copies of only such drawings which have been dealt, drafted or designed by student. It shall also contain a brief description of works handled during the training along with photographs, pencil sketches etc.

2) Building Material Study – This shall be a detailed study of new or relatively new building materials available in the market. A study of its properties, uses, cost, maintenance etc., is expected to be done. Samples of materials shall also be obtained and presented.

Note:

1. Students shall work only in architectural firms functioning over 5 years and headed by an architect registered with Council of Architecture, New Delhi. duly approved by the institution.
2. In case of an architectural firm abroad, the Principal Architect of the firm should hold the title of architect under the law of that country duly approved by the institution.

21 AR8 – 02: ARCHITECTURAL DOCUMENTATION

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	--		--	Theory Exam		Practical oral exam	
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	--	02	--	--	50	--	50

Course Objective:

- To explore and appreciate unique architectural designs in the core city area. Study buildings by master architects or local innovators and heritage structures.
- To Learn to identify and document architectural features and elements.

Course Outcome:

- Appreciate Architectural Diversity.
- Understand Architectural Planning and Construction.
- Preserve Cultural Heritage.
- Develop Photographic Documentation Skills.
- Enhance Critical Analysis and Interpretation Abilities.

Course Curriculum:

Unit 1	Measure Drawing	Select building as per following criteria: Any building designed by Mater Architect or local architect with unique architectural planning, elements, features, construction details. Any building with unique architectural features, construction technology or heritage building with architectural or cultural values.
Unit 2	Photographical Documentation	Photographic documentation of Unique Architectural features, elements
Unit -3	Report Format	Documentation report indicating Period, Pattern, influences, material and technological advancement and Stylistic description. (A4 Size Word Document of 800-1200 words)

Submission/Assignment: Portfolio- Measure drawings to be submitted in portfolio format.

Reference Books-

- 1.RSP Program Monographs –CEPT University
- 2.Building Craft Lab- DICRC, CEPT University