Bachelor of Architecture

Admission, Program – Scheme, Structure and Syllabus; and Evaluation System

ICFAI School of Architecture

ICFAI Foundation for Higher Education

(Declared as Deemed-to-be-University under section 3 of the UGC Act, 1956)

REGISTRAR
THE ICFAI FOUNDATION FOR HIGHER EDUCATION
(Deemed-to-be-University Under Section 3 of the UGC ACT,1956)

ICFAI FOUNDATION FOR HIGHER EDUCATION HYDERABAD

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ADMISSION FOR B.ARCH PROGRAM

ELIGIBILITY

The eligibility criteria for B.Arch admission in ICFAI School of Architecture complies with the Minimum requirements for Architecture education, 2020 issued by the Council of Architecture.

A candidate must have passed in 10+2 scheme of examination with 50% marks in Physics, Chemistry and Mathematics and also 50% marks in aggregate, to apply for admission in B.Arch program.

Or

The candidate must have passed in 10+3 diploma examination with mathematics subject, with at least 50% marks in aggregate to apply for admission in B.Arch program.

In addition to the above, the candidate must quality the National Aptitude Test in Architecture (NATA) conducted by Council of Architecture (COA) conducted for admission in the specified academic year. The results of previous year NATA examination or earlier will not be valid for admission in the current year.

ADMISSION PROCESS

Admission into the B.Arch. Program is a multi-stage process based on their:

1. Performance in the qualifying examination,
2. Personal Interaction with the program faculty.
3. Scores of NATA 2021
4. Candidates who are short-listed will be called for Personal Interview.

The selected candidates will be given the Selection Letters on the date of Interview and will be given Provisional Admission. The provisional admission is subject to payment of admission fee.

If an applicant is found ineligible even at a later date, after admission into the program, his/her admission will be cancelled. All admissions will be subject to verification of facts from the original certificates/documents of the applicant. The decision of the Admissions Committee regarding eligibility of any applicant shall be final.

Applicants who have appeared for Class XII (or equivalent) examination and awaiting results are also eligible to apply provided they complete their examinations (including practical examinations) before **registration for first semester.** The admission of applicants will, however remain provisional until they produce mark sheets establishing their eligibility.

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B Arch - PROGRAM SCHEME

Curriculum as Recommended by the Council of Architecture (COA) Under the Choice Based Credit System (CBCS) For the B.Arch Degree Program

1. Professional Core (PC) Course:

   A Course, which should compulsorily be studied by a candidate as a core requirement is termed as a core course.

2. Building Sciences and applied Engineering (BS & AE):

   A Course, which informs professional core and should be compulsorily studied.

3. Elective Course:

   A course which can be chosen from a pool of courses and are of two types:

   Professional Elective (PE): which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope.

   Open Elective (OE): Which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill.

4. Employability Enhancement Courses (EEC):

   Which may be of two kinds:

   Employability Enhancement Compulsory Courses (EECC)

   Skill Enhancement Courses (SEC)

S.No	Course Type	Code	Percentage of Credits	Credits Required	Credits Proposed
1	Professional Core Courses	PC	45%	135	135
2	Building Science & Applied Engineering	BS & AE	20%	60	60
3	Elective Courses				
	i) Professional Electives	PE	10%	30	30
	ii) Open Electives	OE	5%	15	15
4	Employability Enhancement Courses				
	i) Employability Enhancement Compulsory Courses	EECC	15%	45	45
	ii) Skill Enhancement Courses	SEC	5%	15	15
Total Credits				300	300

Credit Distribution: The credit distribution is proposed based on the *Minimum standards for architectural education 2020* by the Council of Architecture.

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1. 1 lecture period or hour per week shall have 1 credit,
2. 1 lab/workshop or studio exercises or seminar periods or hours per week shall have 1 credit
3. 1 design studio or construction studio or project or thesis period or hour per week shall have 1 credit. For Practical training, the total number of credits shall be specified for one semester only.

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B Arch - PROGRAM STRUCTURE

FIRST SEMESTER									
Code	Course Title	Distribution of marks				Periods per week			Credits
		IA	EE	EJ	TM	L	P	U	
AR1.1PC	Basic Design & Visual Arts	175		175	350	1	8	9	9
AR1.2PC	Model-Making Workshop I	25		25	50	0	1	1	1
AR1.3PC	Architectural Drawing & Graphics I	50	50		100	1	2	3	3
AR1.4BS	Building Materials & Construction I	50	50		100	1	5	6	6
AR1.5BS	Surveying & Levelling of Landforms	50	50		100	1	2	3	3
AR1.6BS	Basics of Structural Design & Analysis	50	50		100	2	1	3	3
AR1.7BS	Environmental Sciences	50	50		100	3	0	3	3
AR1.8SE	English Language skills	50	50		100	2	0	2	2
	TOTAL	500	300	200	1000	11	19	30	30

SECOND SEMESTER									
Code	Course Title	Distribution of marks				Periods per week			Credits
		IA	EE	EJ	TM	L	P	U	
AR2.1PC	Architectural Design Studio II	175		175	350	1	8	9	9
AR2.2PC	Model Making Workshop II	25		25	50	0	1	1	1
AR2.3PC	Architectural Drawing & Graphics II	50	50		100	1	2	3	3
AR2.4PC	History & Theory of Human settlements	50	50		100	3	0	3	3
AR2.5BS	Building Materials & Construction II	50	25	25	100	1	5	6	6
AR2.6BS	Structural Mechanics	50	50		100	2	1	3	3
AR2.7BS	Climatology	50	50		100	2	1	3	3
AR2.8SE	Professional Communication	50	50		100	2	0	2	2
	TOTAL	500	275	225	1000	12	18	30	30
Summer Internship of a minimum duration of 30 working days during the Summer Vacation									

IA	Internal Assessment	TM	Total Marks
EE	End Exam	L	Lecture
EJ	End-term Jury	P	Studio or practical
		U	Units / Total Periods

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Third Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR3.1PC	Architectural Design Studio III	200		200	400	1	8	9	9
2	AR3.2PC	History of Architecture I	50	50		100	3	0	3	3
3	AR3.3BS	Building Materials & Construction III	50	25	25	100	1	5	6	6
4	AR3.4BS	Structural Analysis	50	50		100	1	1	2	2
5	AR3.5BS	Landscape Design & Site Planning	50	50		100	1	1	2	2
6	AR3.6PE	Professional Elective I	50	50		100	3	0	3	3
7	AR3.7OE	Open Elective I					3	0	3	3
8	AR3.8SE	Computer Applications I	50		50	100	0	2	2	2
		TOTAL	500	225	275	1000	13	17	30	30

Fourth Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR4.1PC	Architectural Design Studio IV	200		200	400	1	8	9	9
2	AR4.2PC	History of Architecture II	50	50		100	3	0	3	3
3	AR4.3BS	Building Materials & Construction IV	50	25	25	100	2	2	4	4
4	AR4.4BS	RCC Structures	50	50		100	2	1	3	3
5	AR4.5BS	Water Supply & Building Sanitation	50	50		100	2	0	2	2
6	AR4.6PE	Professional Elective II	50	50		100	3	0	3	3
7	AR4.7OE	Open Elective II					3	0	3	3
8	AR4.8SE	Computer Applications II	50		50	100	0	3	3	3
		TOTAL	500	225	275	1000	16	14	30	30
Summer Internship of a minimum duration of 30 working days during the Summer Vacation										

			IA	Internal Assessment	TM	Total Marks
			EE	End Exam	L	Lecture
			EJ	End-term Jury	P	Studio or practical
					U	Units / Total Periods

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Fifth Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR5.1PC	Architectural Design Studio V	200		200	400	1	8	9	9
2	AR5.2PC	History of Architecture III	50	50		100	3	0	3	3
3	AR5.3BS	Building Materials & Construction V	50	25	25	100	1	2	3	3
4	AR5.4BS	Electrification, Lighting & Acoustics	50	50		100	3	0	3	3
5	AR5.5PE	Professional Elective III	50	50		100	3	0	3	3
6	AR5.6PE	Professional Elective IV	50	50		100	3	0	3	3
7	AR5.7OE	Open Elective III					3	0	3	3
8	AR5.8SE	Building Information Modelling	50	50		100	1	2	3	3
		TOTAL	500	275	225	1000	18	12	30	30

Sixth Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR6.1PC	Architectural Design Studio VI	250		250	500	2	10	12	12
2	AR6.2PC	History of Architecture IV	50	50		100	3	0	3	3
3	AR6.3BS	Steel Structures	50	50		100	2	1	3	3
4	AR6.4BS	Ventilation, Air Conditioning, Fire Safety & Building Automation	50	50		100	2	1	3	3
5	AR6.5PE	Professional Elective V	50	50		100	3	0	3	3
6	AR6.6PE	Professional Elective VI	50	50		100	3	0	3	3
7	AR6.7OE	Open Elective IV					3	0	3	3
		TOTAL	500	250	250	1000	18	12	30	30
Summer Internship of a minimum duration of 30 working days during the Summer Vacation										

			IA	Internal Assessment			TM	Total Marks
			EE	End Exam			L	Lecture
			EJ	End-term Jury			P	Studio or practical
							U	Units / Total Periods

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Seventh Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR7.1PC	Architectural Design Studio VII	250		250	500	2	10	12	12
2	AR7.2PC	Estimation, Costing & Specifications	50	50		100	1	2	3	3
3	AR7.3PE	Professional Elective VII	50	50		100	3	0	3	3
4	AR7.4PE	Professional Elective VIII	50	50		100	3	0	3	3
5	AR7.5OE	Open Elective V					3	0	3	3
6	AR7.6EE	Research Methodology in Architecture	50	50		100	3	0	3	3
7	AR7.7EE	Portfolio Making Workshop	50		50	100	1	2	3	3
		TOTAL	500	200	300	1000	16	14	30	30
Eighth Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR8.1EE	Practical Training	500		500	1000	-	-	-	30
		TOTAL	500		500	1000	-	-	-	30

Ninth Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR9.1PC	Architectural Design Studio IX	250		250	500	2	14	16	16
2	AR9.2PC	Urban Design	50	50		100	1	2	3	3
3	AR9.3BS	Green Building Architecture	50	50		100	3	0	3	3
4	AR9.4PE	Professional Elective IX	50	50		100	3	0	3	3
5	AR9.5EE	Pre-Thesis Seminar	50		50	100	2	3	5	5
		TOTAL	450	150	300	900	11	19	30	30
Tenth Semester										
S.No	Code	Course Title	Distribution of marks				Periods per week			Credits
			IA	EE	EJ	TM	L	P	U	
1	AR10.1PC	Architectural Design Thesis	400		400	800	3	18	21	21
2	AR10.2PE	Professional Elective X	50	50		100	3	0	3	3
3	AR10.3EE	Professional Practice	50	50		100	3	0	3	3
4	AR10.4SE	Foreign Language	50	50		100	3	0	3	3
		TOTAL	550	150	400	1100	12	18	30	30

IA	Internal Assessment	TM	Total Marks
EE	End Exam	L	Lecture
EJ	End-term Jury	P	Studio or practical
		U	Units / Total Periods

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ELECTIVE COURSES				
S.No	Code	Course Title	Semester	Courses and Emphasis
1	AR3.6PE	Professional Elective I	III	Art Appreciation, Vernacular Architecture
2	AR4.6PE	Professional Elective II	IV	Applied Ergonomics, Creativity & Problem-solving
3	AR5.5PE	Professional Elective III	V	Documentation of Heritage buildings, Design for Accessibility, Sacred Geometry
4	AR5.6PE	Professional Elective IV	V	Architecture of Telangana, Art in Architecture
5	AR6.5PE	Professional Elective V	VI	Housing, Climate - responsive Architecture, Appropriate technologies for sustainable development.
6	AR6.6PE	Professional Elective VI	VI	Architectural Design with Steel, Architectural Design with Glass, Eco-Friendly materials and construction techniques
7	AR7.3PE	Professional Elective VII	VII	Building Performance & Compliance, Optimization of Construction Waste
8	AR7.4PE	Professional Elective VIII	VII	Architectural Illumination, Human Psychology and Architecture
9	AR9.4PE	Professional Elective IX	IX	Smart City, Disaster Mitigation & Management,
10	AR10.2PE	Professional Elective X	X	Architectural Journalism, Intelligent Buildings
11	AR3.7OE	Open Elective I	III	Courses offered on SWAYAM/NPTEL platforms or elective courses offered by the university which do not have pre-requisites and which are approved by the academic committee and the Board of Studies of ICFAI School of Architecture shall be offered as open-electives.
12	AR4.7OE	Open Elective II	IV	
13	AR5.8OE	Open Elective III	V	
14	AR6.7OE	Open Elective IV	VI	
15	AR7.5OE	Open Elective V	VII	

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B Arch - SYLLABUS

FIRST SEMESTER SYLLABUS

AR1.1PC: BASIC DESIGN & VISUAL ARTS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.1PC	Basic Design & Visual Arts	175		175	350	135	162	9

COURSE OVERVIEW

Understanding the elements and principles of design as the building blocks of the creative process will be facilitated through exercises that will develop originality, expression, skill and creative thinking. The grammar of design and visual composition will be explored through two-dimensional compositions and three-dimensional models using various media for representation. The studio also introduces drawings and models as tools for conceptualization, organization and furthering of design thought process. The studio has a direct interface with the Architectural Design Studio & Model-making Workshop.

COURSE OBJECTIVE

To enable the understanding of the relationship between the Grammar of Design and Architecture.

COURSE CONTENT

Introduction to elements of design like point, line, plane, solid and void. Understanding the importance of design principles like balance, harmony, rhythm, contrast, symmetry, scale, proportions, colors, tones, textures etc. Study of solids & voids to evolve sculptural forms & spaces; explore play of light & shade and application of color. Introduction to external & internal forms, analytical appraisal of forms, their quality; Concept of space, interrelationship between space, volume and order; Variations in forms with planer juxtapositions.

STUDIO PROJECT

Exercises in Point, line and shapes; Exploring color schemes and their application in a visual composition and in architectural forms and spaces; Collage with a given theme; To achieve focus and center of interest in design using different textural elements; Development of geometric pattern by division, subtraction, and addition, and express them with the use of colors; Two & Three dimensional Design Exercises involving real and imaginary objects, drawing compositions and models, to form an appropriate base for subsequent Architectural design and theory. Study models of different materials viz. paper, clay, wax, soap, wires etc. made by themselves.

SUGGESTION: Basic Design Studio may be conducted as a number of modules within the recommended hours of teaching per semester. It is not necessary to conduct this course on a weekly schedule. The modules may be planned parallel to model-making workshop modules.

COURSE OUTCOME

A continued fascination felt through both negative and positive ideations of seeing Principles of Design in everyday objects, by bringing random objects together and by consciously removing the unnecessary noise around them via abstraction is the Studio's primary aim. Celebrating the optimism seen through both self-conscious and self-aware directions, the Studio will be able to produce exercises directional to memory, meanings, and breakaway from the limitations felt by the chosen objects. Exploration on the grammar of design and visual composition through two-dimensional compositions and three-dimensional models using various media for representation; as the Studio introduces drawings and models as tools for abstraction, and furthering of design thought process.

REFERENCES

1. Broadbent, G. (1973). Design in Architecture - Architecture and Human Science. New York: John Wiley and Sons.
2. Chauhan, P. (2005). Learning Basic Design. Mumbai : Rizvi College of Architecture.
3. Ching, F. D. K. (1997). Design Drawing. Hoboken: John Wiley & Sons.
4. Ching, F. D. K. (2012). Architecture: Form, Space and Order. 3rd Ed. Hoboken: John Wiley & Sons.
5. Roger, K. L. (1998). Architect? A Candid Guide to the Profession. Cambridge: The MIT Press.
6. Rasmussen, S. (1962). Experiencing Architecture. 2nd Rev. Ed. Cambridge: MIT Press.

AR1.2PC: MODEL MAKING WORKSHOP I

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.2 PC	Model-Making Workshop I	25		25	50	15	18	1

COURSE OVERVIEW

This course introduces the students to architectural model making and its importance and use in architectural academics and profession. The course is designed to develop basic model making skills with focus on geometry, scale and proportion.

COURSE OBJECTIVE

To equip students with the basic skills necessary to represent their ideas in a simplistic model format using commonly available materials. To make students practice with various tools essential for making architectural models.

The Model-making workshop has a direct interface with Basic Design Studio and Building Materials and Construction studio I.

COURSE CONTENT

Unit I: Introduction to Architectural Modeling

Need for architectural models. Role of scale-models in design. General practices in model making. Types of models: block, detailed, construction & interior models.

Unit II: Introduction to surface and solid geometry (simple objects)

Differences between solid and surface modeling, approximation in modeling, simple shapes in both modeling methods (EPS Molded Foam or *Thermocol* for solid modeling and paper for surface modeling), introduction to surface development for developable surfaces.

Unit III: Composition with concept of additive modeling (in coordination with basic design course)

Development of composition by adding multiple objects of different sizes and shapes (in conjunction with basic design course). The concept of additive modeling and manufacturing has to be explained theoretically.

Unit IV: Developing scaled construction model (in coordination with building construction course)

Scaling and approximating different elements of building construction, spatial organizing of materials to develop building forms (in conjunction with building construction course).

Unit V: Working with alternate materials and techniques

Exploring various other materials, techniques and processes of model making, including molding techniques with clay and POP, working in various labs in campus (like production technologies lab for metal works)

COURSE OUTCOME

This course shall make the student aware of the importance and use of model making in architecture, and shall also equip them with basic model making skills to help them use models as design tools while exploring concepts and massing. By the end of the course the students shall also be capable of making scaled models of simple built forms and building elements.

REFERENCES

1. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. New Jersey: John Wiley & Sons.
2. Criss. B. M. (2011). Designing with models: A Studio guide to Architectural Process Models.3rd Ed. Hoboken: John Wiley & Sons.
3. Kieran, S. and Timberlake, J. (2008). LobollyHouse: Elements of a New Architecture. New York: Princeton Architectural Press.
4. Morgan, C. L. and Nouvel, J. (2002). The Elements of Architecture. London: Thames & Hudson.
5. Werner, M. (2011). Model Making. New York: Princeton Architectural Press.

AR1.3PC: ARCHITECTURAL DRAWING & GRAPHICS I

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.3PC	Architectural Drawing & Graphics I	50	50		100	45	54	3

COURSE OVERVIEW

This course enables students to equip themselves with the techniques of Visual and graphical communications in Architecture, covering basic to intermediate levels of representation, techniques and lays the foundation for the holistic understanding of architecture drawings.

COURSE OBJECTIVE

1. To introduce fundamental techniques of Visual representation and to equip the students with the basic principles of representation.
2. To introduce the skill set of working with a graphical language of architectural representation.
3. To help the students move seamlessly between the manual mode of graphical representation and its digital alternative, and allow them to develop a self-awareness and comprehension of the judgment required in using the appropriate tools for a given task.
4. To sensitize towards an understanding on comprehensive use of skills in architectural representations.

COURSE CONTENT

UNIT I LEARNING SKETCHING & DRAWING

Free-hand drawing appropriate to visual & architectural representation, indoor & outdoor sketching, drawing from observation, terminology & abbreviations used in visual representation, line & shape, tone & texture, figure & ground, Color & value, shade & shadow patterns in mix medium using, pencils, pens, watercolors, paints and Ink.

UNIT II VISUAL THINKING

Drawing techniques to express new ideas and designs. Drawings and examples to understand Visual perception, memory drawings, visual communication and abstraction.

UNIT III INTRODUCTION TO DIGITAL TECHNIQUES OF DRAWING

Basics of CAD, Introduction to the interface of the selected CAD program by the assigned faculty, drafting commands, basic drawing tools to draft basic geometry. Editing objects,

layers and properties. Introduction to Plans, Elevations and Sections. User Interface (Various tabs and options available). Setting up work space (e.g., Model space, Drawing Limits, Units, UCS & WCS, snap, Roth grid, etc. in case of AutoCAD). Basic drawing skills (2D) (selection options, various lines, various curves, polygons, boundary & regions, etc.)

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

2D sections of solid geometry with line properties in CAD. Line thicknesses, hatching, dimensioning, and text. Editing objects (move, copy, array, align, rotate, scale, skew, trim, offset, mirror, etc.). Visibility and Appearance (Layers, Layer Properties, Individual object properties, Hide, Isolate, etc.). Working with 'Blocks' and 'XRef' (in AutoCAD). Presentation of 2D drawings (Layout, Hatching, Annotations, Dimensioning, Printing, Exporting to Photoshop, etc.)

UNIT V MEASURED DRAWING OF SMALL SPACE

Measure drawing of a small unit/ space/ furniture/ element from historic buildings. Documentation process in field notes and final sheets with relevant text using both the media to be introduced. Introduction to Isometric, Axonometric and Oblique views.

COURSE OUTCOME

Understanding the basic of use of stationery, digital platforms, and modes of visual communications, Architectural Representations and Architectural Graphical language which need to be applied in other areas of architectural discourse. Basics of Orthographic and Axonometric projections, both in the Digital and Manual media. Comprehensive understanding to develop measured drawing and draft a small space.

REFERENCES

1. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. John Wiley & Sons.
2. Martin, L. C. (1970). Architectural Graphics. 2nd Ed. Macmillan Pub Co.
3. Morris, I. H. (1902). Geometrical Drawing for Art Students. Longmans.
4. Lockard, W. K. (1992). Drawing as a Means to Architecture. 6th Ed. New York: Van Nostrand Reinhold Company.
5. Zell, Mo. (2008). The Architectural Drawing Course. 1st Ed. Thames and Hudson.
6. AutoCAD 2018 and AutoCAD LT 2018 – Wiley – Sybex – 2017
7. AutoCAD 2018 for Architectural Design – Creative space – independent Publication – 2017

AR1.4BS: BUILDING MATERIALS & CONSTRUCTION I

Code	Course Title	Distribution of marks			No of Sessions		Credits
		IA	EE	TM	Min	Max	
AR1.4BS	Building Materials & Construction I	50	50	100	90	108	6

COURSE OVERVIEW

This course is an introductory course for building materials and construction. It imparts fundamental knowledge of building components through an understanding of the material properties and the respective construction techniques. This course teaches about natural building materials and the working details of the same. Students will be taught relevant theoretical vocabulary along with essential representative skills for the same.

COURSE OBJECTIVE

To introduce basics of building materials and construction and to impart knowledge of properties, manufacturing/ Processing and application of natural materials in building construction.

COURSE CONTENT

UNIT-I: Introduction to Building Materials and Construction

Theory: Introduction to building materials, elements, components, site and context; reading and representation of various materials and details through drawings; concepts and vocabulary of (a) structural building components like foundations, columns, beams, slab, lintels, plinth ,piers, buttresses, domes, etc., (b) building envelope components like walls, fenestrations, louvers, brackets, etc., (c) interior components like partitions, staircase, ceilings, etc., (d) others elements can be from landscape, site boundary, Open/ semi-open outdoor spaces etc.

Studio: Graphical representation of building components.

UNIT-II: Soil based Design and construction techniques

Theory: Soil as a construction material; properties of soil; testing of soil (onsite & off site); various methods of tweaking properties (additives, stabilization, etc.,) details of various forms of mud construction (rammed earth, adobe, stabilized soil blocks, wattle & daub, etc.,); design & details of mud construction and its maintenance for foundation, base course, walls, openings, arches vaults, floors, roofs, etc.

Studio: Mud wall construction, compacted earth, stabilized mud blocks.

UNIT-III: Natural Materials

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Theory: Mud and lime, bamboo and casuarinas, Thatch and its varieties, palm trunks and rafters. Types of Bamboo; preservation, processing and maintenance of Bamboo; Joinery with Bamboo.

Studio: Bamboo in architectural construction, bamboo& thatch roofing

UNIT-IV: Terracotta products

Theory: Hollow bricks; jali work; weathering tiles; Mangalore tiles and hollow clay roofing blocks.

Studio: Clay block partition walls; jali wall; screen walls; terracotta flooring; Mangalore tile roof; hollow clay roofing blocks, weathering tiles on roofs.

Note: Site visit and market study for the above-discussed topics.

COURSE OUTCOME

Students shall learn fundamentals of building materials and construction; should get accustomed to relevant terms and representation. They shall become familiar about the mentioned natural building materials, their uses, and application.

REFERENCES

1. Barry, R. The Construction of Buildings Vol. 1-5. New Delhi: East-West Press.
2. Foster, J. and Mitchell, S. Building Construction: Elementary and Advanced, London: B.T. Batsford Ltd.
3. Hailey and Hancork, D. W. Brick Work and Associated Studies Vol. II. London: MacMillan.
4. McKay, W. B. Building Construction Metric Vol. I–IV. Mumbai: Orient Longman.
5. Moxley, R. Mitchell's Elementary Building Construction. London: B. T. Batsford.
6. Rangwala, S. C. Building Construction: Materials and types of Construction. New York: John Wiley and Sons.
7. S.P Arora and S.P. Bindra, Text book of Building Construction, GanpatRai publications (P) Ltd New Delhi
8. S.K.Sharma, "A Text book of Building Construction", S.Chand& Co Ltd., New Delhi
9. KlansDukeeberg, Bambus – Bamboo, Karl Kramer verlag Stuttgart Germany,
10. Francis D.K. Ching Building Construction illustrated John Wiley & Sons
11. Chudley, R. Building Construction Handbook. London: ButterworthHeinemann.
12. Sushil-Kumar, T. B. Building Construction. Delhi: Standard Publishers.

AR1.5BS: SURVEYING & LEVELLING OF LANDFORMS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.5BS	Surveying &Leveling of Landforms	50	50		100	45	54	3

COURSE OVERVIEW

The course focuses on various field surveying techniques available in construction sites. Upon completing the course, the student will be able to analyze the obtained field data by using various advanced pieces of equipment such as Total Station, Auto Level, etc., and rectify the errors to get accurate measurements. Also, he/she will be able to prepare a map with the help of obtained field measurements.

COURSE OBJECTIVE

To equip students with the basic principles and theories which underlie the systematic study of topographic features, basic skills of landform analysis through map and field observation, need and role of Surveying and Leveling related to Architecture, preparation and interpretation of survey drawings, methods, tools and equipment necessary to carryout different survey procedures and recent advancements in the field of landforms survey and measurements.

COURSE CONTENT

UNIT-I : Introduction

Reading of survey maps, understanding of features and undulations of ground. Scales used in Plotting. Study of land forms, topography and contours, graphic representations of landforms. Principles, definitions, units, scales, symbols and instruments used in Surveying, common errors in surveying and their corrections.

UNIT-II: Linear Measurements

Measurements in horizontal plane, linear measurements with chain & tape, setting-out &

survey stations, survey accessories, survey lines, open & closed traverse, chaining &offsetting, direct & indirect ranging, log-books, field boundaries, field area estimation. Compass survey, bearings & angles, local attractions, errors in compass survey.

UNIT-III: Contours in Landforms

Characteristics, contour intervals, direct & indirect methods of contouring, block contour surveys, profile leveling, longitudinal & traverse cross sections, gradients, Contouring methods & equipment, plane-table, plotting contours & profiles, estimating areas & volumes.

UNIT-IV: Sloping Landforms and Leveling

Measurements along sloping landforms, principles, definitions, methods, instruments, & staff required for leveling, simple & differential leveling, dumpy level, adjustments, hand signals, reduced levels, rise & fall methods, errors in leveling, level tube & barometric leveling.

UNIT-V: Precision methods in Landforms Survey & Measurement

Theodolite surveying, temporary adjustments, horizontal & vertical angles, closing errors and balancing traverse, automated & digital surveying, total station, G.P.S, Aerial Photography, digital levels, auto-levels.

PRACTICAL SESSION

Chaining station points, offsets, field-book entry, single- and double-line entry, triangulation, traversing, plotting, calculation of areas. Compass surveying traversing, balancing, closing errors, plotting, and calculating areas. Plane table surveying, two- and three-point problems. Theodolite, measuring angles, theodolite traversing and plotting, balancing closing errors. Demonstration of surveying with total station equipment. Leveling level book entry, preparation of contour map.

COURSE OUTCOME

Upon successful completion of this subject students should be able to:

1. Use all conventional surveying instruments such as Chain, Plane table, Dumpy level, theodolite, etc.
2. Use all advanced surveying instruments such as Total station, Auto level, Digital Planimeter, etc.
3. Carry out linear and angular measurements, levelling, measurements to heights and distances.
4. Develop blue print of the given location.

REFERENCES

1. Miller, V. C. and Westerback, M. E. (1989). Interpretation of Topographic Maps. Columbus :Merrill.
2. Lynch, K. and Hack. G. (1984). Site Planning. 3rd Ed. Cambridge: Maple-Vail Inc.
3. Easterbrook, D.J. (1999). Surface Processes and Landforms. 2nd Ed. New York: McMillan.
4. Duggal, S.K. (2013). Surveying: Vol. I & II. 4th edn. New Delhi: Tata McGraw-Hill Education.
5. Subramanian, R. (2008).Surveying and leveling. 3rd edn. New Delhi: Oxford University Press.
6. Arora, K.R. (2010). Surveying.11th edn. New Delhi: Standard Book House.
7. Anderson, J.M. and Mikhail, E.M. (2001). Introduction to surveying.3rdedn. New York: McGraw-Hill.
8. Kanetkar, T.P. (2007).Surveying and leveling. Pune, India: Pune VidyarthiGrihaPrakashan.

AR1.6BS: BASICS OF STRUCTURAL DESIGN & ANALYSIS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.6BS	Basics of Structural Design & Analysis	50	50		100	45	54	3

COURSE OVERVIEW

This course imparts the importance of the structural aspects of any building. The need for structural analysis and design of the building and its basic concepts are discussed in this course through solving practical problems. It develops analytical thinking skills and enhances the problem-solving capacity of the students.

COURSE OBJECTIVE

The students shall be familiarized with the basic theorems and mechanical properties of engineering materials, elastic constants, different types of stresses and strains, and the deformation of elastic bodies under simple stresses, the use and principles of composite sections, analysis of perfect frames for vertical loads by analytical as well as graphical methods.

COURSE CONTENT

UNIT-I: History of structural design in the pre- and post-industrial revolution era

Definition of a structure – Function –types of loads acting on a structure with introduction to Indian Standards – Introduction to design principles. Development of monolithic, rock-cut structures, vaults, flying buttresses, tents, bridges through ancient & medieval history. Post Industrial modular construction of large span & suspension structures in steel and concrete-examples of iconic projects.

UNIT-II: Introduction to forces and moments

Introduction of forces, composition, resolution, moments and couples, Resultant of forces, Lami's theorem, principle of moments, Vargion's theorem. Principle of equilibrium. Simple problems. Concurrent and non-concurrent co-planar force systems, resultant and equilibrate analytical and graphical solutions.

UNIT-III: Mechanical properties of building materials

Simple stresses and strains, elasticity. Stress, strain, types of stresses, elastic limit, modulus of elasticity, composite sections. Stresses due to change in temperature. Elastic constants, linear strain, lateral strain, Poisson's ratio, volumetric strain, relation between E, N and K.

UNIT-IV: Analysis of trusses

Introduction to trusses, Elements of truss, Assumptions for truss analysis, structural Determinacy, methods of analysis of trusses.

UNIT-V: Introduction to design philosophies

Various design philosophies, need and significance, advantages and disadvantages. Working stress method, Limit State method, Ultimate load method.

Material testing laboratory-I

1. Compression test on Bricks and Solid Blocks.
2. Water absorption test on Bricks.
3. Determination of bulking characteristics of the given sand sample.
4. Study of UTM
5. Study of Torsion testing machine
6. Study of Hardness testing Machine
7. Study of Compression testing Machine etc. understanding operation and application.

COURSE OUTCOME

Upon successful completion of this subject students should be able to

1. Apply the concepts of equilibrium to system of forces on rigid bodies and analyze the same.
2. Simplify the structural systems with loading conditions into free body diagram and analyze the resultant force and its location.
3. Analyze the reactions at support of statically determinate beam members subjected to various loading conditions
4. Appreciate the need of structural Design of buildings

REFERENCES

1. Timoshenko, S., Young, D. H. and Rao, J. V. (2007). Engineering Mechanics. 4th Ed. New Delhi:
Tata McGraw-Hill Education
2.Ferdinand, L. S. (1975). Engineering Mechanics: Statics and Dynamics. 3rd Ed. New York Harper Collins Publishers.
3. Junnarkar, S. B. (1991). Mechanics of Structures. Vol. 1. 21st Ed. Delhi :Charotar.
4. Kumar, K. L. (2003). Engineering Mechanics. Delhi: Tata McGraw-Hill Education.
5. Ramamrutham, S. (2008). Engineering Mechanics: A Textbook of Applied Mechanics. New Delhi: DhanpatRai Publishing Company.

AR1.7BS: ENVIRONMENTAL SCIENCES

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.7BS	Environmental Sciences	50	50		100	45	54	3

COURSE OVERVIEW

The Elements and Principles of Ecology and Environmental Sciences studies are imparted in this Course. The importance of maintaining the Ecological Balance and Sustainability of the Built Environment of mankind is the underlying focus.

COURSE OBJECTIVE

To introduce the basics of environmental science studies and its relevance to the built envelope around mankind. Fundamentals of Climatology are also introduced in view of its integral importance for students of Architecture.

COURSE CONTENT

UNIT-I Introduction to Ecosystems and Environment, environmental resources

Types of ecosystems, characteristics features, structure and functions of Ecosystems – Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries). Land, Forest, Water and Energy as environmental resources.

UNIT-II: Biodiversity and its conservation

Value of biodiversity - consumptive and productive use, social, ethical, aesthetic and option values.Bio-geographical classification of India – India as a mega diversity habitat.Threats to biodiversity-Hotspots, habitat loss, poaching of wildlife, loss of species, seeds etc.Conservation of biodiversity, in-situ and ex-situ conservation.

UNIT-III: Environmental problems in India

Local and Global Issues, Causes, effects and control measures of Air pollution, Indoor air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, composting, vermiculture, Urban and Industrial wastes, recycling and reuse. Nature of thermal pollution and nuclear hazards, Global warming, Acid rain and Ozone layer depletion.

UNIT-IV: Social issues and Environment

Social issues and the environment, from unsustainable to sustainable development, urban problems related to energy; human population and environment- population explosion, resource exploitation and depletion, human-wild conflict, loss of wetlands, mangroves, increasing desert areas, spread of diseases.

UNIT-V: Institutions and Governance

Introduction to Government regulations, Monitoring and enforcement of environmental regulations, Introduction to Environmental Acts, viz., Water (Prevention and Control of Pollution) Act, Air Prevention and Control of pollution act, Environmental Protection Act, Wild life protection Act, Forest Conservation Act, etc.

COURSE OUTCOME

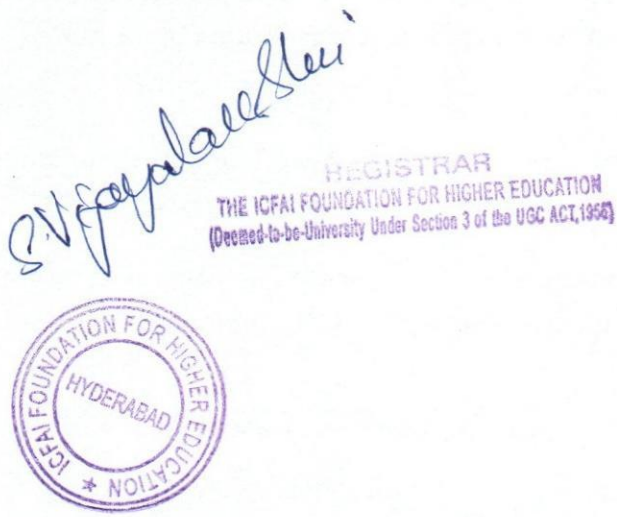
The basic Principles and elements of Environmental Science studies are imparted. The understanding and Sensitization of the importance of maintaining ecological balance and Sustainability is achieved during the learning about the construction of a Built environment by mankind.

REFERENCES

1. Agarwal, K. C. (2001). Environmental Biology. Bikaner :Nidhi Publications Ltd.
2. Benny, J. (2005). Environmental Studies. New Delhi: Tata McGraw Hill.
3. Bharucha, E. (2005). Text book of environmental studies for undergraduates courses. New Delhi:

Universities Press, UGC. .

4. Brunner, R.C. (1989). Hazardous Waste Incineration. New Delhi: McGraw Hill.
5. Kaushik, A. and Kaushik, C. P. (2010). Basics of Environment and Ecology. New Delhi: New Age International Publishers.



AR1.8SE: ENGLISH LANGUAGE SKILLS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR1.8SE	English Language skills	50	50		100	30	36	2

COURSE OVERVIEW

The course envisions making students learn the skills of critical reading, public speaking and writing for different purposes.

COURSE OBJECTIVE

To enhance the Speaking, Reading and Writing skills in the English Language.

COURSE CONTENT

UNIT I: Introduction to English Language Skills

Introduction to skills of Language: speaking, reading and writing, together with their respective sub-skills; Introduction to word study.

UNIT II: Reading

Reading of selected passages for comprehension – Skimming, scanning, summarizing, paraphrasing, Critical appreciation – Understanding text organization, deducing meaning, inferential reading, extrapolation.

Note making skills: Difference between note taking and note making, Different note making and note taking strategies.

Analysis of text materials – reports, technical literature, case studies, advertisements, job notifications, Understanding keywords, Structure and organization of the texts.

UNIT III: Speaking

Presentations: Preparation of content, Body language, PowerPoint presentation techniques.

UNIT IV: Writing

Paragraph writing: Paragraph structure – Topic sentence, supporting sentences and concluding sentence, Coherence and cohesion: Linkers/transition markers, coordination and subordination.

Essay writing: Types of essays: Descriptive, Expository and Persuasive

Academic writing: Hedging, Referencing styles and citations.

UNIT V: Vocabulary

Word Study: Root Words, Word formation, Synonyms, Antonyms.

COURSE OUTCOME

At the end of the course, students are expected to learn the skills of language and their respective sub skills and use them in various academic contexts.

REFERENCES

1. Reading Strategies for College and Beyond (Second Edition) by Deborah J. Kellner
2. College Writing Skills with Readings 10th Edition by John Langan and Zoe Albright
3. Essential Strategies for Word Study: Effective Methods for Improving Decoding, Spelling, and Vocabulary by Timothy Rasinski,JerryZutell.
4. Business Reports in English, Comfort, Jeremy et al Cambridge University Press, 1984
5. Professional Communication, Koneru. A. (2008) Tata McGraw Hill Publishing Company Limited

SECOND SEMESTER SYLLABUS

AR2.1PC: ARCHITECTURAL DESIGN STUDIO II

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.1PC	Architectural Design Studio II	175		175	350	135	162	9

COURSE OVERVIEW

This studio teaches the students to critically analyze spaces and understand the basics of human-space interface and spatial organization. This course is designed to equip students with basic knowledge required for Architectural design.

COURSE OBJECTIVE

The relationship between the human body and architecture has always been a key element in architectural design and practice, the connection between the two wasn't documented or even accepted until the rise of ergonomics some years ago. The question is how is the body perceived in modern times? How does this perception influence the way we design the buildings and spaces that we inhabit? Ergonomics is seen as a discipline that emphasizes the separation between body and object; however, not only is it the connection between them, it is also the pre-established blueprint that maximizes and synchronizes their productivity. At its most basic level, it is a technical discourse on the increasingly mechanized human dwelling. In 1948, the architect Le Corbusier, released one of his most famous publications titled Modular, followed by Modular 2 (1953). In these texts, Le Corbusier expressed his support of the research that Vitruvius, DaVinci, and Leon Battista Alberti started centuries before: to find the mathematical relationship between human dimensions and nature.

The research of the previously mentioned authors also represents the search to explain the Parthenon, the temples, and cathedrals built according to exact measurements that reference a code of essentiality. Knowing what instruments were used in finding the essence of these buildings was the starting point, instruments that at first glance seemed to bypass time and space. It wouldn't be farfetched to say that the measurements came from essence: parts of the body such as the elbow, the finger, thumb, foot, arm, palm, etc. In fact, there are instruments and measurements that carry names alluding to parts of the human body, an indication of architecture's proximity to it. This Semester shall be dedicated to the understanding of "self", "surroundings influencing the self" and the "proximity" that plays a prominent role in deciding the way of the self.

COURSE OUTCOME

The connection between the two- Human body + surrounding the self, shall be documented in the form of applications suitable to the understanding of "self" and "surroundings". Spaces of the predominantly self-oriented leading to further clarity upon "self" shall be taken up. Influences, notions, preferences and the delving nature of self are to be focused upon.

REFERENCES

1. Ching, F. D. K. (2012). Architecture: Form, Space and Order, 3rd Ed. Hoboken: John Wiley & Sons.

2. Roth, L. M. (2013). Understanding Architecture: Its Experience History and Meaning, 3rd Ed. Philadelphia: West-view press.

3. Rudolf, A. (1977). The dynamics of architectural form. Berkeley and Los Angeles: University of California Press.

4. Prak, N. L. (1968). The Language of Architecture: A contribution to architectural theory. Hague: Mouton & Co.

5. Paul, A. J. (1994). The Theory of Architecture–Concepts & themes. New York: Van Nostrand Reinhold. New York.

6. Pandya, Y. (2007). Elements of Space making. Ahmedabad: Mapin.

7. Peter, V. M. (1998). Elements of architecture – from form to place. 1st Ed. New York: Routledge.

8. Unwin, S. (2003). Analyzing Architecture. London :Rouledge

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AR2.2PC: MODEL MAKING WORKSHOP II

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.2PC	Model Making Workshop II	25		25	50	15	18	1

COURSE OVERVIEW

In continuation to AR1.2PC Model Making Workshop I, this course is designed to equip the students with advanced model making skills to help them represent their complex architectural ideas and forms in model format. The course also introduces them to joinery in wood and other advanced model making materials and techniques.

COURSE OBJECTIVE

To equip students with the skills necessary to represent their complex architectural ideas in model format using advanced materials and techniques. To make students practice with the necessary tools capable of aiding in the modeling of complex geometries and forms.

The Model-making workshop has a direct interface with Architectural Design Studio II and Building Materials and Construction II.

COURSE CONTENT

UNIT I: Introduction to Subtractive modeling

Principles of subtractive modeling, the differences with its additive counterpart, and using it for the development of complex 3D objects (free form).

UNIT II: Hybrid complex modeling involving additive and subtractive modeling (in coordination with architectural design course)

Application of various modeling techniques in the architectural design studio with their project. Analyze a design model and decide on how to combine additive and subtractive modeling.

UNIT III: Joinery in Wood (In coordination with building construction course)

Develop various joinery in wood (Tongue and Groove, Mortise and Tenon, Half-lap, dovetail, box wood, butt joint, etc.)

UNIT IV: Advanced materials and modeling techniques

Moulding as a process - Polyurethane as a material for moulding, use of laser - CNC cutting - acrylic and other 2D cutting sheets, theory on other advanced model making techniques like additive printing (3D Printing), stereolithography, etc.

COURSE OUTCOME

This course shall upgrade the students' model making skills that they acquired in the previous semester to the next level. By the end of the course the students shall be capable of making models of complex built forms, site features and components. The students shall be exposed to advanced materials and modelling techniques.

REFERENCES

1. Bhatt, N. D. (2003). Engineering Drawing. Anand: Charotar Publishing House.
2. Ching, F. D. K. (2009). Architectural Graphics. 5th Ed. Hoboken: John Wiley & Sons.
3. Criss. B. M. (2011). Designing with models: A Studio guide to Architectural Process Models.3rd

Ed. Hoboken: John Wiley & Sons.

4. Kieran, S. and Timberlake, J. (2008). Loblolly House: Elements of a New Architecture. New York: Princeton Architectural Press.
5. Morgan, C. L. and Nouvel, J. (1998). The Elements of Architecture. London: Thames and Hudson.
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AR2.3PC: ARCHITECTURAL DRAWING & GRAPHICS II

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.3PC	Architectural Drawing & Graphics II	50	50		100	45	54	3

COURSE OVERVIEW

This course is the advanced level of architecture representations, from manual to digital and vice versa, will not only help students keep-up with latest software trends but also make them understand the demands of ever-changing technologies used as medium of presentation in architecture.

COURSE OBJECTIVES

To introduce fundamental techniques of perception and visualization through perspectives. Inculcating the requisite skills needed to illustrate ideas and designs using manual and/or digital media and techniques.

COURSE CONTENTS

UNIT I: Fundamental of Perspectives

Urban sketching and understanding of perspectives - one point, two point & three-point. Anatomy of Perspectives, picture plane, station point, vanishing point, Eye level, Ground level, ground plane etc., its variation & effects.

UNIT II: Entourage in Architecture

Free hand sketching of building elements, street elements, human postures with trees and plants in a drawing to add life. To establish scale and proportions. Define context, relevance with surroundings and scene setup to establish a stronger composition. Using a mix medium comprising pencils, pens, photographs cuttings, paper cuttings, watercolors, paints and Ink.

UNIT III: Digital Graphic Techniques

Introduction to Photoshop, to create concept illustrations, rendered drawings and compose sheets. Basic literacy in Adobe Photoshop could be addressed through the following modules:

1. Familiarizing with the workspace.
2. Creating Image space (Image size and resolution, Background).
3. Importing various kinds of data from various sources.
4. Working with Layers (Creating and managing layers, Masking, Layer properties).

5. Basic image creation tools (drawing tools, erasing tools, selection tools, exploring brushes, colour filling tools, text)
6. Basic image editing tools (brightness, contrast, curves adjustment, HDR toning, levels adjustment, Hue & Saturation values)
7. Image content editing (Masking, Scaling, Perspective correction, Stamp tool, creating Panorama, liquefy)
8. Vector possibilities within Photoshop.
9. Extra tools unleashed with pressure sensitive stylus and dials (Wacom digital pens, Wacom remote and Surface Dials).
10. Creating Paths and Macros.
11. Exporting and saving.

UNIT-IV: Sciography

Introduction to Sciography, Principles of shade & shadow, Shadows of lines, planes & simple solids due to near & distant sources of light, shadows of architectural elements, Construction of Sciography on building, Application of Sciography on pictorial views.

Unit-V Mix medium Rendering Techniques

Representation technique of plan, elevation & section in architectural drawing. Monochromatic & different themes of rendering, architectural rendering techniques using pen & ink, colour, values, tones, and general approach to rendering. Architectural representation of trees, hedges, foliage, human figures, cars, symbols etc., with the transition between manual graphic techniques to digital interface and vice-versa

COURSE OUTCOME

Students shall be equipped to excel at the graphical techniques in architectural representations, ideas presentations, concept drawings, visual representations, architectural design diagrams, schematic drawings, viewpoints and architectural space representations on digital platforms. These techniques of representing the drawings and architectural ideas graphically, shall add depth, meaning and resonate with the values, philosophies and theories used in design ideations and building a narrative.

REFERENCES

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5. Ching, F. D. K. (2011). A Visual Dictionary of Architecture. 2nd Ed. Hoboken: John Wiley & Sons.

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8. Holmes, J. M. (1954). Applied Perspective. London: Sir Isaac, Piotman and Sons Ltd.
9. Narayana, K. L. and Kannaiah, P. (1988). Engineering Graphics. New Delhi : Tata McGraw-Hill
10. Norling, E. (1969). Perspective drawing. California: Walter Fostor Art Books.
11. Robert, W. G. (2006). Perspective: From Basic to Creative. 1st Ed. London: Thames and Hudson.
12. Adobe Photoshop CC Help (guide from Adobe website – 2018)

AR2.4PC: HISTORY & THEORY OF HUMAN SETTLEMENTS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.4PC	History & Theory of Human settlements	50	50		100	45	54	3

COURSE OVERVIEW

This course lays the foundation of the History and Theory of Architecture module and commences with a discourse on the coalescence of individuals into a commune and eventually that of communes into a civilization. The origins of the Human Society are also, in a way, the origins of institutionalized Architecture.

COURSE OBJECTIVE

To provide an insight into the architecture of prehistoric period and early civilizations. Social, religious and political character, construction methods, building materials and how they influenced their built form and settlement pattern shall be explained with suitable examples. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in a specific context. The study must enable students to do a comparative evaluation of various civilizations, appreciate chronological developments along the timeline and across geographies.

COURSE CONTENT

UNIT-I: Prehistoric / Primitive Architecture

Primitive people, shelters, settlements, burial systems, megaliths and memorials.

UNIT-II: Nile Valley Civilization | Euphrates and Tigris Valley Civilizations'

Study of socio-cultural, religious and political systems, people's beliefs, climate and other factors influencing Architecture, character of human settlements, typology of Shelters and buildings, Religious burial systems and Cult temples of Egypt. Architectural character as a reflection of climate and geology, planning of Palaces of Assyria and Persia, Ziggurats and corbelled drains of Assyria, Staircases of Persepolis, physical planning of Babylonia, Ur-Sumer.

UNIT-III: Indus Valley Civilisation | Aryan / Vedic Civilisation

Timeline, socio-cultural, religious and political systems, settlement planning pattern, typology of Shelters and civic buildings, Citadel-Granary-Great baths, civic utility systems.

UNIT IV: Classical Greek Architecture

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Architecture in the classic Greek period, different orders, optical correction and appreciation of perfection.

UNIT V: Classical Roman Architecture

Architecture in Roman period, Grand Scale, application of Greek orders, Construction of Vaults, Study of different typologies of buildings, development of roads and aqueducts.

COURSE OUTCOME

Through exercises varying from modelling to sketching, textual interpretation to discussion, (the methods which are left to the teaching faculty's discretion), the students would gain an insight into the historicity of concepts such as community, harmony, society, aesthetics and geo-cultural spectrum of architecture and society. The course shall develop within the student an ability to correlate between different scales (macro to micro) of parameters which not only shape a civilization on the whole, but also a community and an individual- that individual being a person or an architectural object.

REFERENCES

1. Brown, P. (2010). Indian Architecture: Buddhist and Hindu period. Mumbai: D.B. Taraporevala Sons and Co.
2. Bubbar, D. K. (2005). The Spirit of Indian Architecture. New Delhi: Rupa& Co.
3. Copplestone, T. and Lloyd, S. (1971). World Architecture: An Illustrated History. London: Verona Printed.
4. Crouch, P. D. (1985). History of Architecture: Stonehenge to Skyscrapers. London: McGraw-Hill.
5. Dutt, B. B. (2009). Town Planning in Ancient India. Delhi: Isha Books.
6. Kimball, F. and Edgell, G. H. (2012). A History of Architecture. Amazon: Ulan Press.
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10. Harris, M. C. (1977). Illustrated Dictionary of Historic Architecture. New York: M. Courier Dover Publications.
11. Ingersoll, R. AndKostof, S. (2013). World architecture: a cross-cultural history. Oxford: Oxford University Press.
12. Pramar, V. S. (2005). A social history of Indian architecture. New Delhi: Oxford University Press India.
13. Roth, M. L. (2006). Understanding Architecture: Its Elements, History, and Meaning. Columbia: West-view Press.

14. SenGupta, B. K. (2006). Reading material on History of Human Settlements. New Delhi: ITPI.
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16. Watkin, D. (2005). A History of Western Architecture. 4th Ed. London: Laurence King Publishing.
17. Copplestone, T. and Lloyd, S. (1971). World Architecture: An Illustrated History. London: Verona Printed.
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20. Hamlin, T. F. 1953. Architecture through the Ages. New York: Putnam Adult.

AR2.5BS: BUILDING MATERIALS & CONSTRUCTION II

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.5BS	Building Materials & Construction II	50	25	25	100	90	108	6

COURSE OVERVIEW

This course is aimed to provide ample insight on the important conventional Building materials like sand, cement, mortar, bricks and stone along with the intricacies involved in brick and stone masonry. Lectures shall be supported by case studies and site visits for easy understanding and practical exposure. Students will be taught relevant theoretical vocabulary along with necessary drafting skills for the same.

COURSE OBJECTIVE

To impart knowledge of properties, manufacturing and application of basic building construction and materials.

COURSE CONTENT

UNIT-I: Sand, Cement & Mortar

Theory:

Sand: Types of Sand, Properties of Sand used for Construction, Tests for silt & organic contents, different grades of sand, alternative materials for sand.

Cement: Overview of cement manufacturing, Raw materials of cement and their functions; properties, types and grades of cement, Setting time, tests of cements, relevant ISI standards, and alternative materials for cement.

Mortar: Types, Proportioning, mixing mortar, cement mortar, lime mortar, methods of preparing, handling uses and maintenance of mortars, plastering and pointing.

Alternative materials: Cinder, Sawdust and Fibrous plaster, Gypsum plaster, Plaster of Paris.

Practical: The session has to be conducted with support of an on-going construction site visit with a direct interaction with a site engineer. Field tests of cement: The students have to go through the process of mixing/preparation of sand, cement, and other mortars for various construction needs.

UNIT-II: Brick as a construction material

Theory: Brick composition, sizes, strength, method of manufacturing, properties, types and their uses. Types of brick bonds, Bricks in different building components like foundations, walls (conventional and cavity walls), arches, staircases, cladding, copings, flooring, brick jail work, decorative brickwork, Madras terrace roofing.

Studio: Types of brick bonds, Walls, Arches, Staircase, Cladding, Decorative Brickwork, creative patterns for Jali work using bricks.

Practical: Practical session involves construction of all the brick bonds taught in the classroom to be laid practically in the construction yard.

UNIT-III: Stone as a construction material Theory:

Types of construction stone and their properties and use in building construction. Types of stone masonry, Nature of stone wall construction in various building components like foundations, walls, buttresses, arches and roofing.

Studio: Stone Construction - Walls, Arch, Flooring, Lintel & cladding.

Site study and Report: The student have to document all the practical work conducted in the construction yard / site throughout the semester and give a brief report with sketches and photographs at the end of the semester.

Note:

a) Lecture classes shall be supplemented with adequate studio hours where students are required to prepare construction drawings.
b) Site visits and Market studies shall be conducted to facilitate understanding of latest materials and construction techniques on-site.
c) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present.
d) Alternative construction techniques for respective topics need to be discussed in detail.

COURSE OUTCOME

On completion of the course, Students would understand the properties, use and application of basic construction materials; would gain understanding of Brick masonry and Stone masonry. The course also imparts skills to prepare construction drawings of the same.

REFERENCES

1. Barry R, The Construction of Buildings Vol 1-5, New Delhi: East-West Press.
2. Bindra S.P. and Arora S.P. Building Construction: Planning Techniques and Methods of Construction, New Delhi: DhanpatRai Publications.
3. Ching, F. D. K. Building Construction Illustrated. New York: Wiley.
4. Edward, A. and Piano, J. Fundamentals of Building Construction: Materials and Methods. Hoboken: John Wiley & Sons.
5. Foster, J. S. Mitchell Building Construction: Elementary and Advanced. London: B.T. Batsford Ltd.
6. Hailey and Hancork, D. W. Brick Work and Associated Studies Vol.II.London: MacMillan.

7. McKay, W. B. Building Construction Metric Vol. 1–IV. Mumbai: Orient Longman.
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10. Rangwala, S. Building Construction. Anand: Charotar Pub. House.
11. Sushil-Kumar, T. B. Building Construction, Delhi: Standard Publishers.

AR2.6BS: STRUCTURAL MECHANICS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.6BS	Structural Mechanics	50	50		100	45	54	3

COURSE OVERVIEW

This course emphasizes the stability analysis of any structural system. The significance of the center of gravity and moment of inertia and its calculations are discussed in this course. Different types of beams, SFD, BMD and various stress analysis procedures and their significance are also discoursed in this course. Upon successful completion of this course, the students will be able to draw the bending moment diagram and shear force diagram and also, he/she will be able to analyze the same and calculate the critical bending and shear stress developing in the structural members.

COURSE OBJECTIVE

To familiarize the student with the effects of transverse forces such as shear force & bending moment in beams; determination of SF & BM in simple beams under different loading systems, geometrical properties such as centroid, moment of inertia etc., for sections of different shapes.

COURSE CONTENT

UNIT-I: Geometric properties of sections -Centre of gravity

First moment of area, its significance, Centre of gravity for various structural shapes such as rectangle, triangle, etc., and composite shapes such as I, L, T sections.

UNIT-II: Geometric properties of sections -moment of inertia

Moment of inertia concept – theorem of parallel axis and perpendicular axis – moment of inertia of composite section - principal axis and principal moment of inertia, section modulus.

UNIT-III: Beams: Types & Properties

Types of beams and their behavior, types of supports and reactions, bending moment and shear forces; simply supported, cantilever and overhanging beams, relation between bending moment and shear force.

UNIT-IV: Theory of Simple Bending, Shear stress

Theory of simple bending and assumptions. $M/I=f/y=E/R$ applications. Flexural formula, Determination of different types of stresses induced in beams and shafts due to bending and twisting moments respectively. Bending stresses and Shearing stresses in beams, distribution of shear stress over different sections like, rectangular, circular, triangular, I and T-sections.

UNIT-V: Columns

Euler's method and its limitations, crippling load under various end support conditions, short and long column concept, failure, phenomena of buckling.

COURSE OUTCOME

Upon successful completion of this subject students should be able to

1. Determine Centre of gravity and moment of inertia of various rigid bodies.
2. Analyze the critical bending and shear stresses at any sections.
3. Analyze simple statically determinate structures such as beams, pin jointed trusses and pin jointed frames subjected to various loading and supporting conditions.

REFERENCES

1. Basavarajaiah, B S, Mahadevappa R (2010). Strength of Materials. , 3rd edition, Taylor & Francis
2. Hibbeler, R.C. (2016). Mechanics of Materials. 10th ed. Singapore: Pearson Eduction.
3. Gere, J.M. and Timoshenko (2007). Mechanics of Materials, 4th Ed. New Delhi: PWS Pub Co.
4. Subramanian, R. (2010). Strength of Materials, 2nded , London: Oxford University Press,
5. Ramamrutham, S & Narayanan, R. (2014). Strength of Materials, 8th Ed. New Delhi: DhanpatRai Publishing Company Private Limited.

AR2.7BS: CLIMATOLOGY

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.7BS	Climatology*	50	50		100	45	54	3

COURSE OVERVIEW

This course gives an introduction to various concepts in environmental physics that help in aiding the comprehension of how a building interacts with its environment. It emphasizes the fundamentals of heat, light and sound aspects in a built environment and balancing these aspects to make the built environment suitable for Human comfort. It also introduces some basic standards and voluntary rating systems towards climate responsive built environments.

COURSE OBJECTIVE

Equip the students with the scientific background required to design climate responsive buildings, by offering a clear understanding of the various climatic zones and its climate responsive considerations in architectural design of building and built-up areas.

COURSE CONTENT

UNIT-I

Global climate factors, elements of climate, classification of climatic zones, desirable conditions, principles of thermal conditions and STI, body heat exchange, thermal balance, psychrometric chart, sun path, sun angles, SAP, sunshine hours, solar noon, declination, extra-terrestrial radiation, solar constant, radiation on different of different directions with different inclination of walls. Effect of climate on habitat, shelter and environment. Human comfort conditions – comfort chart, comfort zone, effective temperature, humidity, radiation, wind, precipitation and its impact on the Macro and Micro-climate. Effect of landscape elements on Climate and Architecture. Impact of climate and building on Ecological balance.

UNIT-II

Radiation spectrum, spectral sensitivity of eye, visual cone and comfort, daylight assessment, types of reflection, glare and quality and spread of light in buildings. Sound waves, audible range of sounds, equal loudness controls, noise reduction systems, sound transmission path. Thermal conductivity, emissivity, radiation, Reflectivity and convection. Density, specific heat, latent heat, thermal bridging, diffusivity, thermal insulation. Heat loss through common building elements due to transmission, R-values and U-values - imperial and SI units.

UNIT-III: Fundamentals of Thermo-dynamics

Basic concepts of thermo-dynamics, state and path functions, thermodynamic equilibrium, concept of perfect gas, specific heat, energy, temperature, pressure, Laws of thermodynamics.

UNIT-IV

Reduction Heat Transfer or Enhancement, insulation properties of materials and built forms. Radiation versus other Heat Transfer Methods, Evaluating various built forms and its components / or materials for comfort conditions with respect to thermal, visual and air movement.

UNIT-V

Brief introduction of rating systems for climate responsive buildings such as LEED, GRIHA and others. Broad understanding of models, strategies and codes related to energy efficient and climate responsive considerations in buildings and built-up areas.

COURSE OUTCOME

Basic knowledge on building physics that impacts human comfort in a building as a response to the climatic factors of its context. The course equips the learners to be able to design elements of building in response to the climatic conditions of the place. This course also introduces the basic ideas of sustainability and various built environment rating systems.

REFERENCES

1. Chand, I. and Bhargava, P. K. (1999). The Climatic Hand Book. New Delhi: Tata McGraw-Hill.
2. Duffie, J. A. and Beckman, W. A. (1980). Solar Engineering of thermal process. New York: John Wiley & Sons.
3. Kaushik, S. C. (1989). Solar Refrigeration and Space Conditioning, Jodhpur: Divya-jyotiPrakashan.
4. Koenigsberger, O. H., Ingersoll, T. G., Mayhew, A. and Szokolay, S. V. (1980). Manual of Tropical Housing and Building: Climatic design. Hyderabad: Orient Longman.
5. Kukreja, C. P. (1982). Tropical Architecture. New Delhi: McGraw–Hill.
6. Lam, W. M. C. (1986). Sun-lighting as Form-giver for Architecture. New York: Van Nostrand Reinhold.
7. Olgyay, A. and Olgyay, V. (1976). Solar Control and Shading Devices. New Jersey: Princeton University Press.
8. Sodha, M. S., Bansal, N. K., Kumar, A. and Bansal, P. K. (1986). Solar passive buildings, science and design. London: Pergamon Press.
9. USGBC. (1996). Sustainable Building Technical Manual. Public Technology Inc.
10. Wright, D. (1984). Natural Solar Architecture. New York: Van Nostrand Reinhold Company.

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AR2.8SE: PROFESSIONAL COMMUNICATION

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 2.8SE	Professional Communication	50	50		100	30	36	2

COURSE OVERVIEW

The course aims at expanding a student's communication skills in the English language within the academic and professional contexts.

COURSE OBJECTIVE

To develop the language skills required in professional and academic contexts.

COURSE CONTENT

UNIT I: Speaking

Group Discussion: Differentiating facts and opinions, Expressing opinions and feelings, Critical thinking and Reasoning.

Debate: Persuasion, Assertion and Team work.

Interview: Self – Introduction and Body language.

UNIT II: Writing

Resume/ CV, Job application/ cover letter, Business proposals, Business communication: Emails to fellow architects, Letters/ Emails to clients, Letters/ Emails to public authorities, Letters/ Emails to contractors and Enquiry letters/ Emails to industries and dealers

UNIT III: Research Aptitude

Understanding research, types of research, Types of reports: Formal, informal, Interpretative and Informative.

Report writing: Report Layout, Report structure, Front Matter Abstract writing, Body, Literature Review and Data collection methods, Back Matter, Research proposal, Executive summary

UNIT IV: Word Study

Denotation, Connotation, Contextual words, Collocation, Phrasal verbs.

COURSE OUTCOME

The course imparts skills to be able to write and understand written English to facilitate reading of Architectural texts and references, and aid in the composition of texts to convey ideas.

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REFERENCES

Cambridge Academic English: Intermediate Student's Book by Martin Hewings, Craig Thaine, Michael McCarthy, 2012

1. Study reading - A course in reading Skills for academic purposes, Cambridge University Press,1992 by Eric H. Glendinning & Beverly Holmstrom
2. Good style - writing for science and technology, E&FN Spon, an Imprint of Chapman & Hall, 1992 by John Kirkman
3. Essential Strategies for Word Study: Effective Methods for Improving Decoding, Spelling, and Vocabulary by Timothy Rasinski, JerryZutell.
4. Business Reports in English, Comfort, Jeremy et al Cambridge University Press, 1984
5. Professional Communication, Koneru. A. (2008) Tata McGraw Hill Publishing Company Limited

THIRD SEMESTER SYLLABUS

AR3.1PC ARCHITECTURAL DESIGN STUDIO III

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.1PC	Architectural Design Studio III	200		200	400	135	162	9

COURSE OVERVIEW

This Course intends on the growth, understanding and banks on the capacities that deal with *space* as an identity of architecture. The factor that separates art from architecture is the spatial implications and conditions to accommodate human needs, hence, the course shall address possibilities through experimentation of dealing with *space, spatiality, spatial quality, & spatial characters* of architecture.

COURSE OBJECTIVE

The Spatial Relationship in Architecture specifies how a certain space is positioned in relation to another given space. Spaces that are interlinked, interlocked, adjacent, sometimes within/ without connections, overlapping, and so on, shall become the criterion for the search of spatiality toward an architecture of relational studies. Structure plays a part in organizing space into places. The relationship between space and structure is not always simple and straightforward; it is subject to different approaches. In terms of attitudes, one can either choose and allow a structural strategy to define the places one wishes to create, or one can decide on the places and, in a way, force structure to cope with them. There are thus three broad categories of the relationship between space and structure: the dominant structural order; the dominant spatial order; and the harmonic relationship between the two, in which spatial and structural order seem in agreement. Such as, if one superimposes an interpretation of the grid of the roof structure, one can see that the columns were arranged with a particular spatial structure; the places within the building are identified by the structure; the sacred place itself is identified from the outside by the incorporation of a prominent formal element- intent, one that responds to the lines of sight which radiate from a point of focus under the four columns which do make a square on plan. Throughout history, many works of architecture have been created under the power of a conviction that structure is the fundamental form-giving force in architecture, and that the geometric order inherent in resolved structure is the most appropriate order for space too. This Semester shall delve into the understanding of "space", "spatiality", and in relation to "structure" & geometries that dictate a correlation between spaces to co-exist, merge, transform, metamorphose into an architecture defining it.

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COURSE OUTCOME

The Studio Project shall focus upon imparting an understanding towards creating relations, demarcations, progressive definitions of spaces that shall help in furthering the notion of architecture. As frames, grids, non-grids, traces, overlays etc., are imposed upon an architectural ideation, the seemingly distinct processes of thought within the mind of a student, which would visualize structure and architecture as separate entities would be aided by the faculty in-charge to be encapsulated within a single comprehensive process of thought. Depending upon the selected typology of the Studio Project, Site and other parameters, the Studio outcome shall focus upon delivering an architectural project, whose concept and/or representation display (to a fair degree) the synchronous relationship between Architecture and Structure, with the word 'Structure' itself being applied to both- the broader Spatial Orders as well as the Tectonic.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), A mix of bibliographical and videographical references is desirable, to ensure better engagement from the students and catering to different modes of learning.]

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AR3.2PC: HISTORY OF ARCHITECTURE I: MEDIEVAL PERIOD to ADVENT OF MACHINE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.2PC	History of Architecture I	50	50		100	45	54	3

COURSE OVERVIEW

The Course provides an insight into the architecture of Classical antiquity & early Medieval period of the world with an emphasis on the Social, religious, political and architectural character, construction methods, building materials and settlement planning. The influence of geology, geography, climate, beliefs, religion, culture, art on architecture shall be highlighted so as to appreciate how architecture is embedded in place-specific context.

COURSE OBJECTIVE

To provide an understanding of the evolution of Classical architecture in the west in its various stylistic modes characterized by technology, ornamentation and planning practices.

COURSE CONTENTS

UNIT I: Early Christian Architecture

Study of Architectural character, evolution of Church form, building typologies, and building elements, polymath architecture, Baptisteries, early Basilica churches; settlement planning, and fortification systems. Byzantine, Romanesque, Gothic periods.

UNIT II: Re-birth of everything. Renaissance. 1300s-1600s|1750s-1900s

The Renaissance Background. Renaissance Rome. Renaissance Venice and Palladio. Changing relationship between Church and State- Public Squares, Plazas and ornamentation.

The Enlightenment. Cultural transformations: Neo-Classical architecture 1750-1900.

Rationalism. Structural Rationalism and the influence of Viollet-le-Duc: Gaudi, Horta, Guimard and Berlage, 1880-1910. Giuseppe Terragni and the architecture of Italian Rationalism 1926-43.Antonio Sant'Elia and Futurist architecture 1909-14.

UNIT III: The Advent of Industrial Revolution. 1880s-1910

The advent of industrial revolution in Europe with specific reference to Mannerist architecture, Jacobean Architecture, Elizabeth Architectural style, Victorian architecture and Moorish Architecture. This module has to be handled with specific reference to new inventions in building industry and art and their influence on architecture.

UNIT IV: Machine & mark of it. 1775-1939|1800-1909|1836-1924|1896-1916

The Industrial Revolution. Territorial transformations: urban development's 1800-1909. Technical transformations: structural engineering 1775-1939. News from Nowhere: England

1836-1924. Building of factory towns. Urbanization- Birth of modern town planning; Garden City, City Beautiful; New building technologies and their implications on architecture.

Arts and Crafts Response. Charles Rennie Mackintosh and the Glasgow School 1896-1916. Fluidity and plasticity, organic influences; works of Antonio Gaudi, Victor Horta, C.R.Mackintosh.

Chicago school, Eclecticism, Louis Sullivan's contribution to American architecture.

COURSE OUTCOME

The study shall enable skills to develop the design vocabulary to analyze a space for its design integrity with specific reference to the aspects of scale and proportions of classical architecture.

The course shall impart skills to do a comparative evaluation of developments in a chronological manner along the timeline and across different geographies. Also, students shall be enabled to appreciate tangible and intangible aspects of the heritage associated with history.

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18. Kostoff, Spiro. The Architect, Chapters in the History of the Profession, Oxford University Press, NY, 1977.
19. Koyre, Alexander. Metaphysics and Measurement: Essays in Scientific Revolution, Chapman and Hall, London, 1968.
20. Osler, Margaret J. ed. Rethinking the Scientific Revolution, Cambridge University Press, N.Y. 2000.
21. Rykwert, Joseph. The First Moderns: The Architects of the 18th Century, MIT Press, And Cambridge, MA: 1980.
22. Steele, James. Charles Rennie Mackintosh, Synthesis in Form, Academy Editions, London, 1993.

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AR3.3BS: BUILDING MATERIALS & CONSTRUCTION III

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.3BS	Building Materials & Construction III	50	25	25	100	90	108	6

COURSE OVERVIEW

The course will expose students to the technical knowledge of using building materials like timber, cement concrete and reinforced cement concrete (RCC). Construction of the various elements of a building shall be covered as theory, practical and lab/Construction yard sessions as applicable for the topic of study. A special emphasis shall be laid on wooden doors, windows, RCC slabs, beams, columns & staircases.

COURSE OBJECTIVE

To acquaint the students with contemporary construction practices pertaining to the usage of Timber, cement concrete and RCC in various core building components.

COURSE CONTENTS

UNIT-I: Timber

Quality of timber used in buildings, defects, causes of timber deterioration, seasoning and preservation, popular timber varieties used in India, properties, strengths. Typical usages of timber in building components. Timber joinery, lightweight roofing structures, truss, partition walls, flooring, wooden staircases, Components and types of windows, doors and ventilators, sky lights and atrium, timber repairs.

Studio: types of doors, windows and ventilators. Wooden flooring, wood composites, fiber boards, pre-laminated.

UNIT II: Cement Concrete

Theory: plain cement concrete, ingredients, properties of cement concrete, its uses and different concrete additives and their effects. Types of concrete, proportioning concrete, water cement ratio, workability and slump, concrete mixing, transportation, placement, consolidation, vibration, curing.

Practical: Field Trip to a construction site to study the process of preparing and laying of cement concrete.

UNIT III: Reinforced Cement Concrete

Theory: Concept of RCC, Form work, bar bending, Rebars cast in situ and precast concrete, RCC framed structure and its components, ready mix concrete, batching plants, Ferro cements; Introduction to prefabrication and systems building; Jointing, tolerances and

modular coordination Modern fixing devices: industrial fasteners, expandable bolts, chemical fasteners etc., causes of deterioration in RCC structures, typical building failures and repairs, shoring, scaffolding and underpinning.

Practical: Industry specialist lectures to be organized to convey the latest/emerging trends in the field.

Lab/Construction Yard: Formwork, Study of principles and methods of construction of RCC elements in building foundations and columns, Raft foundations, Isolated footings, piles, beams and slabs, porticos, sun-shades, post tensioned slabs, pre-stressed beams in RCC construction. RCC in staircases-spiral, helical, waist slab, folded plate, and built-in furniture, Retaining walls.

Note: a) Site visits and Market studies shall be conducted to facilitate understanding of the latest building materials and construction techniques on-site. b) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present. Value Addition: Interaction with construction and industry experts.

COURSE OUTCOME

A thorough knowledge about the building materials and construction techniques stated in the course details with a strong emphasis on practical applicability.

REFERENCES

1. A Text Book of Building Construction by B.C.Punmia, Laxmi Publications Pvt.Ltd. New Delhi .
2. Construction of Buildings by Barry, Vol.1 -5, Blackwell Publishing House, Oxford.
3. Engineering Materials-Material Science by S.C.Rangwala, Charotar Publishing House Pvt. Ltd.
4. Building Materials-P.C.Varghese, Prentice Hall of India Pvt.Ltd. New Delhi .

AR3.4BS: STRUCTURAL ANALYSIS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.4BS	Structural Analysis	50	50		100	30	36	2

COURSE OVERVIEW

The course shall impart theory and practical knowledge about structural analysis of building elements like beams, foundations, etc. Work shall emphasize on practically testing and analyzing various components of the building in terms of capacity and strength.

COURSE OBJECTIVE

To impart knowledge about the structural analysis of various elements of the building and to expose the candidate to practical application of the same through lab sessions.

COURSE CONTENTS

UNIT-I: Compound Stresses.

Introduction, Principal stresses and strain, determination of stresses on oblique section, Mohr's circle, theories of failure: maximum principal stress theory, maximum principal strain theory, maximum shear stress theory, maximum strain energy theory, maximum shear strain energy theory.

UNIT-II: Deflections of determinate beams

Deflections of determinate beams, cantilever and simply supported with different loading, relation between slope, deflection and curvature, double integration method, moment area methods, conjugate beam method-application to simple cases including overhanging beams.

UNIT-III: Analysis of indeterminate beams

Analyze Continuous beams by Theorem of Three moments and draw SFD, BMD. Analyze continuous beams, Portal frames and Substitute frames by Moment Distribution method and draw SFD, BMD.

UNIT-IV: Soil mechanics

Introduction to soil mechanics- definition of soil and soil mechanics; formation of soil, types of soil Index properties- classification of soil Stress distribution- introduction: stresses in soil; concept of effective and neutral stresses; stress distribution in soil media; shear and compressive strength of soil.

UNIT-V: Bearing Capacity of Soils, and Settlements of Foundations

Types of foundations, Introduction, terminology, factors affecting bearing capacity of soils, methods of determining bearing capacity; Types of failures in soil, General, Local and

Punching shear failure. Methods of improving bearing capacity of soil, settlement of foundations, Causes and Effect of settlement - Plate load test - Simple problems.

Concrete technology laboratory-I

1. Determination of bulk density and specific gravity of Fine aggregates.
2. Sieve analysis.
3. Determination of bulk density and specific gravity of Coarse aggregates.
4. Field Density of Soil.
5. Liquid limit and plastic limit classification of soils.
6. Moisture content in coarse aggregate (or) Water absorption test on coarse aggregate.
7. Los Angeles abrasion test.
8. Direct shear test.
9. Compressive strength of brick.
10. Compressive strength of Concrete cubes.

COURSE OUTCOME

The Course shall enable the knowledge about understanding the nuances of a good structural analysis through theory and practical sessions focusing on the various components of the building.

REFERENCES

1. Reddy, C.S. (2001). Basic structural analysis. New Delhi, India: McGraw Hill Higher Education.
2. Negi, L. S. (2003). Structural analysis. Columbus, USA: McGraw-Hill.
3. Vazirani, V.N. (2003). Analysis structure: Theory & design Vol 2. India: Khanna publishers.
4. Arora, K.R. (2015), "Soil mechanics and foundation engineering". India: Standard Publishers, New Delhi.
5. GopalRanjan, A.S.R. Rao, (2001) "Basic and Applied Soil Mechanics" New Age International Pvt. Ltd., New Delhi.

AR3.5BS: LANDSCAPE DESIGN & SITE PLANNING

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.5BS	Landscape Design & Site Planning	50	50		100	30	36	2

COURSE OVERVIEW

The Course imparts knowledge about Landscape designing as an integral part of the Architectural design process. The course shall operate in synchrony with the third semester design studio to assist in the development of a site study, prepare a substantive site analysis and landscape design for the Studio project.

COURSE OBJECTIVE

To introduce the students to the specific discipline of Landscape architecture &establish its relevance with in the broader profession of Architecture and Environment Planning. To gain an insight into the changing relationship of humans with nature, to develop the understanding of site and site planning. To develop the skill of integrated design of open and built spaces.

COURSE CONTENTS

UNIT I: Introduction to Landscape Architecture

Introduction to landscape - its meaning, Experience of a landscape, Aesthetics & Imagery of a landscape, Relationship of humans and nature; how landscapes relate to land, nature, environment and place; How the scales & conception of landscapes evolve over time, Sense of place in the landscape.

UNIT II: Site Planning

Site survey and appraisal, Site Inventory checklist – Topography, vegetation, soil, hydrology, climate etc. Principles of site planning, Design issues in site planning and placement of buildings. Integrating the built and open spaces.

UNIT III: Elements of Designed Landscapes

Brief overview of the use of landforms, water, plants, built elements, application of materials, street furniture in a designed landscape.

UNIT IV: Sustainable Landscape Design

Exploration of sustainable landscape solutions at the site, brief overview of Xeriscaping, green roofs & walls, rain water harvesting etc. Studio component of the semester may be integrated with Architectural Design of the current semester.

COURSE OUTCOME

Upon completion of the course, the students will be able to design landscapes using hard and softscape elements. They will be able to perform site analysis and planning for the buildings and open spaces.

REFERENCES

1. Appleton. (1996). *the Experience of Landscape*. Wiley.
2. Geoffrey, and Jellico, S. (1987). *The Landscape of Man*. Thames and Hudson.
3. Holl, G. P. (2006). Questions of Perception Phenomenon logy of Architecture. Richmond: William Stout Publishers.
4. Laurie. (1986). *An Introduction to Landscape Architecture*. Elsevier.
5. Lynch, K. (1962). *Site Planning*. Cambridge: The MIT Press.
6. Reid, G. (2002). *Landscape Graphics*. New York: Watson-Guptill.
7. Simonds, J. O. (2006). *Landscape Architecture: A Manual of Land Planning and Design*.
8. Hopkins. C. (2008). Sound Insulation: Theory into Practice. 1st Ed. Butterworth Heinemann.
9. Randall, W. (2008). Residential Lighting: A Practical Guide to Beautiful and Sustainable Design. 2nd Ed. Wiley.
10. Rea, M. (2000). The Lighting Handbook. 9th Ed. Illuminating Engineering Society of North America.
11. Reinhart, C. (2014). Day lighting Handbook.
12. Smith, B. J., Peters, R. J. and Owen, S. (1982). Acoustics and Noise Control. New York: Longman.
13. Steffy, G. (2000). Time-Saver Standards for Architectural Lighting. McGraw-Hill.
14. Szokolay, S. V. (2008). Introduction to architectural science. Taylor & Francis.
15. Vigran, T. E. (2008). Building Acoustics. 1st Ed. Taylor & Francis.

AR3.6.1PE: PROFESSIONAL ELECTIVE I – ART APPRECIATION

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.6PE	Professional Elective I	50	50		100	45	54	3

COURSE OVERVIEW

This course is an exploration of art forms and their cultural connections. It includes study of art history and the elements, and methods used in creative thinking. The course introduces art vocabulary and various methods of art communication skills.

COURSE OBJECTIVE

To expose students to the broad spectrum of sensory arts, architecture being one of them. To explore visual art forms and their cultural connections by learning about the history of art and its principles through an in-depth study of the elements, media, and methods used in creative thought and the creative process.

COURSE CONTENTS

The course proposes a five-step system for understanding arts in all forms.

1. Description: Explaining a work of art from an objective point of view, its physical attributes, and formal construction.
2. Analysis: A detailed look at a work of art that combines physical attributes with subjective statements based on the viewer's reaction to the work.
3. Context: Any historical, religious, or environmental information that surrounds a particular work of art and which helps to understand the work's meaning.
4. Meaning: A statement of the work's content. A message or narrative expressed by the subject matter.
5. Judgment: A critical point of view about a work of art concerning its aesthetic or cultural value.

UNIT I: Introduction to the five-step system of art-appreciation:

Interpreting examples of visual art, architecture, sculpture, painting or decorative art using a five-step critical process: description, analysis, context, meaning and judgment.

UNIT II: Influence of social, cultural, historical events on art:

The role and influence of cultural, social, historical events of various types of art movements and the effect of visual arts in societies, history, and other world cultures.

UNIT III: Art Vocabulary

Identifying and describing the elements and principles of art. Analytical skills to connect formal attributes of art with their meaning and expression.

UNIT IV: Art Communication

Articulation in writing the themes and issues that artists explore in their work. Effective communication to understand and appreciate the variety of responses art provokes. Utilize information to locate, evaluate, effectively use and communicate information about visual art, architecture, sculpture, painting or decorative art in its various forms.

COURSE OUTCOME

After completing this course, students will be able to interpret works of art based on this five-step system of analysis; explain the processes involved in artistic production, themes, and the political, social, cultural, and aesthetic issues that artists explore in their work and explain the role and effect of the visual arts in societies, history, and other world cultures.

REFERENCES

1. Cantanese, A. J. and Snyder, J. C. (1988). Introduction to Architecture. New York: McGraw hill Books Co.
2. Ching, F. D. K., Jarzombek, M. and Prakash, V. (2010). A Global History of Architecture. 2nd Ed. John Wiley & Sons.
3. Fred, S. K. (2009). Art through the ages a Global History. 3rd Ed. Clark Baxter.
4. Heidegger, M. (1993). The origin of the work of Art-Basic writings. Harper Collins.
5. Heskett, J. (2002). Design-A very short introduction. Oxford University Press.
6. Rapoport, A. (1969). House Form and Culture. New Jersey: Prentice Hall.
7. Salingaros, N. (2009). A Theory of Architecture. Umbau-Verlag.
8. Vitruvius, Translation: Morris, H. M. (1960). The Ten Books on Architecture.

AR3.6.2PE: PROFESSIONAL ELECTIVE I: VERNACULAR ARCHITECTURE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.6PE	Professional Elective I	50	50		100	45	54	3

COURSE OVERVIEW

This course involves study of a particular region chosen by the instructors with a strong vernacular architectural style. The course covers study of everyday buildings, landscapes and sites which are not designed by professional architects but by indigenous people. It explores vernacular architecture as an expression of local identity, indigenous traditions, and assimilation of different cultures.

COURSE OBJECTIVE

To study the vernacular architecture of a particular region (to be chosen by the instructors) and to understand the principles of their planning and construction. To draw lessons and principles for contemporary times.

COURSE CONTENTS

UNIT I: Introduction to Vernacular Architecture:

Introduction to Vernacular settlements. Definitions and classifications, typologies and way of life. Socio-cultural and anthropological context and construction practices. Global and national perspectives and the state of current research in the field.

UNIT II: Examples of Vernacular Architectural styles:

Analysis of the evolution of building styles in diverse locales, such as the leather yurts in Mongolia, timber houses in Japan, brick, mud and straw houses in India, reinforced concrete fortified towers and gray brick courtyard houses in Southern China including Macau and Hong Kong.

UNIT III: Adaptations in Contemporary Architecture

Sustainable building materials and construction techniques, Works of Laurie Baker, Has an Fatty, Anil Laul, Gerard Da Cunha, Building Centres- Auroville, Anangpur, Nizamuddin Building Centre.

UNIT IV: Case Study Documentation & Analysis

Study of a region with a strong vernacular architectural identity with respect to historical precedence, climatic conditions, geographical significance, cultural, social interactions & economic conditions of the people. Study of a basic shelter in the region in terms of spatial organization, planning principles, elements and passive sustainability.

COURSE OUTCOME

Candidates shall be equipped with the knowledge of various influences involved in the evolution of a particular vernacular style. Case study of a region with strong vernacular architectural style shall enable the candidate to study, analyze and draw conclusions from a live case and understand its relevance to contemporary situations.

REFERENCES

1. Oliver, Paul, "Encyclopedia of vernacular Architecture of the world (3 Vol. Set)", Cambridge University Press, U.K., 1997.
2. Spiro Kostoff, City assembled, City shaped, Phaidon, 1995.
3. Charles Correa, A Place in the Shade. Penguin Books, 2010.
4. Aranya, Vastu-Shilpa Foundation, Ahmedabad, 2015 (reprint)
5. SirishBeri, "Spaces Inspired by Nature", 2013.

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AR3.7OE: OPEN ELECTIVE I

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR3.7OE	Open Elective I							3

COURSE OVERVIEW

The course provides the students to select any subject which they feel would help them to fully realize their potential. The student can opt for any Open course approved by the University.

COURSE OBJECTIVE

To enable the candidate to choose a course of his/her interest and to develop skills in multi-disciplinary subjects in order to broaden exposure and scope for employability.

GUIDELINES FOR SELECTION OF THE COURSE

(i) Courses offered on SWAYAM/NPTEL platforms or elective courses offered by the university which do not have pre-requisites and which are approved by the academic committee and the Board of Studies of ICFAI School of Architecture shall be offered as open-electives.

(ii) The Approved courses shall be sent to the SWAYAM Coordinator of the University, with details of the course and the university/platform offering the course.

(iii) An Internal Faculty member shall coordinate with the course coordinator of a particular course being offered.

(iv) The Courses being offered can be across other disciplines but the intent of an open elective shall focus on employability and skill enhancement.

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AR3.8SE: COMPUTER APPLICATIONS I

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 3.8SE	Computer Applications I	50		50	100	30	36	2

COURSE OVERVIEW

This course addresses the representation of architectural ideas in computer graphics Vector methods.

COURSE OBJECTIVES

This course is aimed at introducing students to the software that helps in visualizing space and representing architectural ideas and drawings.

COURSE CONTENT

UNIT I: CorelDraw

1. Familiarizing workspace
2. Understanding Advantages and limitations of Vector software compared to pixel-based workspace
3. Creating layers
4. Creating basic shapes and geometry / shapes
5. Importing various formats into CorelDraw environment
6. Changing object properties
7. Morphing possibilities (Including Shape deformations, shape addition and subtraction, 3D manipulation, morphing one object to other)
8. Customizing layered clipart and textures
9. Text in CorelDraw (aligning with various geometry, customizing fonts, text art)
10. Converting raster images to vector graphics
11. Working with raster images within CorelDraw and externalizing to Corel paint
12. Composing and exporting graphics to various formats.

UNIT II: Adobe InDesign

1. Familiarizing workspace – create documents, properties panel, import PDF
2. Layout and Design – Layout adjustment, Add page numbering, table of contents, book files.
3. Text- threading text, wrap text, endnotes, text frames, bullets and numbering, glyphs and special characters.
4. Styles- paragraph and character styles, object styles, drop caps and nested styles.
5. Typography- tabs and indents, text composition, format paragraphs, align text
6. Tables- create and format tables, table and cell styles, stokes and fills.

7. Drawing and Painting – Draw lines and shapes, line stroke settings, understand paths and shapes, edit paths, pen tool, pencil tool.
8. Color- Apply color, work with swatches, tints, mix inks, spot and process colors
9. Export and Publish.

UNIT III: Introduction to Adobe Illustrator

1. Workspace Basics
2. Create and Edit shapes
3. Transform and edit art works
4. Change color and strokes
5. Add Text
6. Drawing tools

COURSE OUTCOME

Skills required being able to create concept illustrations, rendered drawings and compose sheets; And to be able to generate scalable vector graphics and to be able to work in conjunction with raster images for maximum productivity.

REFERENCES

1. CorelDraw User Guide X7 (CorelDraw website)
2. Tutorials on https://www.coreldraw.com/en/pages/tutorials/coreldraw/
3. Tutorials on https://helpx.adobe.com/in/indesign/tutorials.html
4. Tutorials on https://helpx.adobe.com/in/illustrator/tutorials.html

FOURTH SEMESTER SYLLABUS

AR4.1PC: ARCHITECTURAL DESIGN STUDIO IV

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.1PC	Architectural Design Studio IV:	200		200	400	135	162	9

COURSE OVERVIEW

This Course is aimed at helping the student develop a sense of empathy in planning and Design, by raising the scale of the studio project to highlight the relationship between an individual and a community. The Studio's primary focus lies upon the introduction to such typologies in architecture which serve a community through the provision of a service to a select demography, age group or a particular need. The project shall also emphasize upon the necessity of studying sociological and/or socio-economic data of the community being served in the development of the building program.

COURSE OBJECTIVES

Architectural works could be classified based upon the spaces which need to be serviced and those which serve them. This service and served relationship across, a] different scales (e.g., between a Room and a building or between a building and the community), and b] typologies (e.g., educational typology serving the residential one) is a mutualistic one. Depending upon which perspective one adopts to understand these relationships, the service-served roles could be seen as a dynamic coupling of two or more typologies than a static condition which defines set roles. For example, a School may serve a community, and the community in turn also serves the School, through participation, without which it could not effectively function. In this Studio, these relationships would potentiate an exploration into the programme building and/or design of spaces which serve the immediate community of a selected site in its vicinity. The possibilities of the service which needs to be provided shall allow the students to see a community, locale or a small settlement (Urban or Rural) as a source of needs- complex and connected, and seek solutions to address them through Architectural intervention. This Studio, therefore, shall focus primarily upon investigating the programmatic interdependencies of the needs, potential and future of a community and propose Design interventions which may highlight the challenges, solve some of the underlying or overarching problems or provide a vision towards the Zukünfte (Futurity) of the community in focus.

COURSE OUTCOME

The Studio shall engage the students in a participatory exercise towards understanding the community in focus, deliberate upon the challenges faced by its members, and develop a

building programme which could potentially address one or more of these issues. Rather than defining a set typology, the students could in-turn develop new ones, amalgamating the possibly contradictory or complex functions into a workable spatial configuration. This exercise shall then culminate in the development of a design proposal addressing the inquiries potentiated by the programmatic exercise. Architectural Design Exercises are by definition those that address the future. However, how near or far the focus upon future lies, depends entirely upon the Students or the Guides.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), Texts which could enhance focus upon the Cultural and socio-economic aspects of design and communities. A mix of bibliographical and videographical references is desirable, to ensure better engagement from the students and catering to different modes of learning.]

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AR4.2PC HISTORY OF ARCHITECTURE II: INDIAN-SUBCONTINENT CONTEXT

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.2PC	History Of Architecture II	50	50		100	45	54	3

COURSE OVERVIEW

The history of architecture in India is a material narrative of aspirations, politics, and societies in the region.

COURSE OBJECTIVES

To expose the students to a wide spectrum of Architectural Styles ranging from prehistoric to pre-independence period in India.

To equip the students with the knowledge of the evolution of architecture in relation to time with special emphasis to social, religious and environmental factors.

To impart the knowledge of the development in construction technology in different periods specific to India.

COURSE CONTENTS

UNIT I: Vedic Architecture

Introduction to Vedic History: Social, cultural, political and economic influences on architecture. The concept of Vastu Purusha. Influence of Vastu Shastra on Vedic Architecture.

UNIT II: Buddhist Architecture

Introduction to history of Buddhism and beliefs. The Stupas, Chaitya halls, Viharas, Toranas, Pagodas and other elements of buildings during this era. Influence of Buddhist principles on the form and ornamentation of buildings. Influence of Tibetian Architecture.

UNIT III: Evolution of Hindu Temple form:

The essence of Hindu Architecture in India. A brief introduction to different styles of Hindu temples: Nagara and Dravidian Styles. Comparison between both the styles. Vesara style temple style with specific examples. The evolution of the temple form with examples of early rock cut temples to late Chalukyan temple architecture with specific reference to form. Nagara Temple Style-Basic components of the Nagara style temples.Site, Layout, design, sculptures, iconography and ornamentation of Nagara Temples. Study of prominent temples of Nagara style in Orissa, Rajasthan, Gujarat, Khajuraho, etc. in chronological order. Dravidian Temple Style- the Basic components of the Dravidian Style temples. The Pallava and Chola temple styles and comparisons between both architectural styles. Pandya style of Architecture.

UNIT IV: Jain Temple Architecture

Development of Jain temple Architecture and significance of Jain Architecture in India. Elements of Jain Temples and the structure. Study of the interior layout with specific examples like Dilwara temples and Adinath temple.

UNIT V: Islamic Architecture

Arabs, Afghans into the Indian Subcontinent. Their early invasions and borrowing of buildings. Religious impact and frequent wars.Khaljis &Tughlaqs in the north. Mughals and extensive architectural work of grandeur by Akbar - Mughal Architecture in India. Bahmanis in the Deccan. Early Saracenic School in India, Imperial School in Delhi. Influence of Hindu style. Provincial Style at Gujarat, Deccan and Bengal.

COURSE OUTCOME

Knowledge to identify the common characteristics among the monuments of a particular style. Graphic skills to present a building analyze its elements and explain the composition. Knowledge about good practices of architecture in the past.

REFERENCES

1. Brown, P. (1983). Indian Architecture (Islamic Period). Bombay: Taraporevala and Sons.
2. Catherine, A. (2001). Architecture of Mughal India. Cambridge University Press.
3. Grover, S. (2002). Islamic Architecture in India. New Delhi: CBS Publications.
4. Harris, M. C. (1977). Illustrated Dictionary of Historic Architecture. New York : M. Courier Dover Publications
5. Hillenbrand, R. (1994). Islamic architecture - form, function and meaning. Edinburgh: Edinburgh University Press.
6. Ingersoll, R. AndKostof, S. (2013). World architecture: a cross-cultural history. Oxford: Oxford University Press.
7. Mitchell, G. (1978). Architecture of the Islamic world - its history and social meaning. London: Thames and Hudson.
8. Nath, R. (1985). History of Mughal Architecture Volumes I-III. New Delhi: Abhinav Publications.
9. Tadgell, C. (1990). The History of Architecture in India. New Delhi: Penguin Books.

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AR4.3BS: BUILDING MATERIALS & CONSTRUCTION IV

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.3BS	Building Materials & Construction IV	50	25	25	100	60	72	4

COURSE OVERVIEW

The course will expose students to the technical knowledge of using Building materials like Glass, Surface Finishes, Ferrous metals and their types. Construction of the various elements of a Building shall be covered as theory, practical and lab/Construction yard sessions as applicable for the topic of study.

COURSE OBJECTIVE

To familiarize students about the Properties, Types and Applications of Glass, Surface finishes and Ferrous metals in building construction.

COURSE CONTENTS

Unit I:Glass

Theory: Brief review of glass manufacturing, composition, properties and uses of glass. Types of glass, their properties and usage (Wired glass, fiberglass, rock wool, laminated glass, Glass-Crete blocks, structural glass, etc.) treatment of glass.

Lab/Construction Yard: Construction details of glass application in windows, doors, partitions, etc.

Unit II: Floor & Wall treatments

Theory: Finishing materials for walls and floors-wall putties, textures, floor finishes: tiles and natural stones, specialty floors, grouts, timber floors, etc. Curtain wall systems, sheet metal cladding, composite panels, structural glazing, marble, granite and other cladding materials on walls exteriors. Acoustic and thermal insulation materials, plastics, fiberglass, etc.

Lab/Construction Yard: Construction details of various wall cladding materials, curtain walls and floor laying.

Unit III: Paints & Varnishes

Theory: Need for painting and treating surfaces. Constituents of paints, types and their application process in building construction. Types of varnishes, their application scenarios and processes. Specialty chemicals, sealants, adhesives and their applications. VOC.

Unit IV: Ferrous Metals

Theory: Ferrous metals- brief review of pig iron, cast iron, wrought iron. Brief review of steel manufacturing process, its properties and uses, various forms of architectural steel, Standard

steel sections, Connections, Steel welding and forging. Glossary of technical terms in steel structures, Mezzanine floors.

Lab/Construction Yard: Structural steel in construction – grillage foundations, steel columns, trusses, staircases, sheet metal cladding and roofing in the industry.

Note:

a) Site visits and Market studies shall be conducted to facilitate understanding of the latest building materials and construction techniques on-site.

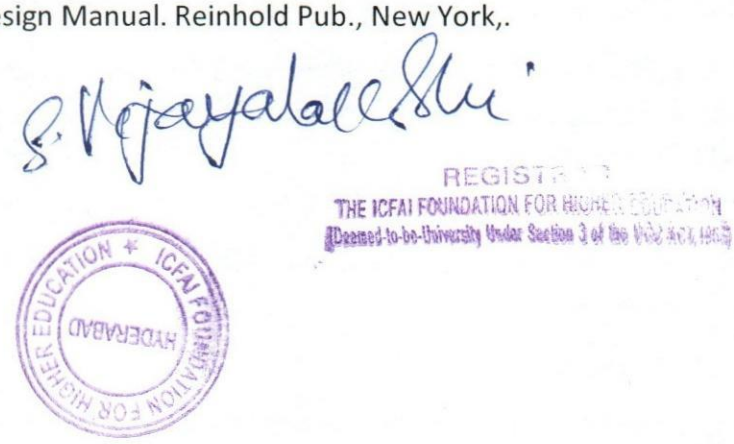
b) Pedagogy should establish the linkage of the relevant material and construction techniques from past to present. Value Addition: Interaction with construction and industry experts.

COURSE OUTCOME

A thorough knowledge about the building materials and construction techniques stated in the course details with a strong emphasis on practical applications.

REFERENCES

1. Engineering Materials-Material Science by S.C.Rangwala, Charotar Publishing House Pvt. Ltd.
2. Building Materials by Duggal S.K., New Age international, New Delhi
3. Materials and Construction by Reshpande B, Oriental Watchman Publishing House, Poona-2.
4. A Text Book of Building Construction by B.C.Punmia, Laxmi Publications Pvt.Ltd. New Delhi .
5. S.P Arora and S.P. Bindra, Text book of Building Construction, GanpatRai publications (P) Ltd New Delhi
6. Schall, Rolf. Curtain Walls: Design Manual. Reinhold Pub., New York,.



AR4.4BS: RCC STRUCTURES

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.4BS	RCC Structures	50	50		100	45	54	3

COURSE OVERVIEW

This course covers the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method. The design of basic structural elements such as slab, beam, and column which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included.

COURSE OBJECTIVE

To strengthen student's knowledge about reinforced cement concrete and its applications in buildings. To equip students about the methods of designing various structural members using reinforced cement concrete.

COURSE CONTENTS

UNIT-I: Introduction to Reinforced Concrete design

Introduction to RCC design, characteristics of RCC, assumptions, nominal mix, Design mix. Neutral axis; Introduction to IS-456, LSD Principles, procedure, characteristic load and characteristic strength, partial safety factors for loads and material strength.

UNIT-II: Design of Beams for flexure and shear

Design and analysis of singly reinforced beams for flexure, shear & bond. The concept of doubly reinforced Beams and design.

UNIT-III: Design of different types of slab

Concepts and design of different types of slabs spanning in one direction, two directions, Continuous slab, cantilevered slab, circular slab and flat slab.

UNIT-IV: Design of RCC Columns and Staircases

Design of RCC columns, axially and eccentrically loaded Columns. Concepts and Design of different types of staircases.

UNIT-V: Foundations

Types of foundations, Design of foundation for R.C.C structure: - Shallow foundation, Piles, Pile Cap and pile load test.

Material testing and site visits I

1. Site visit for reinforcement detailing and casting of a) Beams b) slabs. Preparation of the drawings for the same.
2. Determination of Fineness Modulus of cement.
3. Soundness test of cement
4. Determination of workability of concrete by slump cone, compaction factor test.
5. Casting of cement concrete cubes with different grades of concrete.
6. Consistency and setting time of cement
7. Compression strength of cement mortar
8. Compressive strength test of cement concrete cubes.

COURSE OUTCOME

At the end of the course the student shall be in a position to design the basic structural elements such as beam, column, slab, staircase, foundation of reinforced concrete structures.

REFERENCES

1. Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2004
2. Sinha, S.N., "Reinforced Concrete Design, Second Revised Edition", Tata McGraw-Hill Education, 2002
3. Pillai, S.U. and Menon, D., "Reinforced Concrete Design", TaTa McGraw-Hill,2003
4. Raju N. Krishna, "Reinforced Concrete Design: Principles And Practice" New Age International- 2007
5. Arun Kumar Jain, B. C. Punmia, Arun Kr. Jain, Ashok Kr. Jain, "Limit State Design of Reinforced Concrete", Firewall Media- 2007
6. IS 456: 2000 Plain and Reinforced Concrete - Code of Practice
7. SP 24 (S and T): 1983 Explanatory Handbook on Indian Standard Code of Practice for Plain and Reinforced Concrete
8. SP 16 : 1980 Design Aids for Reinforced Concrete to IS 456 : 1978
9. IS 875 Part 1, 2, 3, 4, Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures.
10. SP 34 :1987 Handbook on Concrete Reinforcement and Detailing

AR4.5BS WATER SUPPLY AND BUILDING SANITATION

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.5BS	Water Supply & Building Sanitation	50	50		100	30	36	2

COURSE OVERVIEW

The course shall educate the students towards a basic approach to plumbing system design for water supply and building sanitation. The course shall be imparted through theoretical inputs supported by exercises of market survey and site visits.

COURSE OBJECTIVE

To equip the students with the knowledge about the building services related to water supply and building sanitation, so as to enable them to comprehend the subject thoroughly and integrate the learning into architectural design.

COURSE CONTENTS

UNIT I: Water Supply

Introduction, types of sources, yield & spacing of wells, intakes, pumping and transportation of water. Treatment of water, qualities of potable water. Domestic water distribution system, reservoirs, supply system layouts, Pipe appurtenances, pumps, pumping plants, overhead tanks, water demand calculations. Building service connection, Ferrules, Water meters. Layout of domestic water piping systems, joints, fittings and valves. Cold & hot water lines in buildings, Water supply to high rise buildings: problems encountered & systems adopted.

UNIT II: Building Sanitation

Principles of sanitation, collection and disposal of various kinds of refuse from buildings. Methods of carrying refuse, systems of refuse disposal and their principles. Plumbing definitions and related terms, plumbing systems (one pipe, two pipes etc.), House drainage system, Drainage of sub-soil water. Inspection chambers, Manholes, Sub-drains, culverts, ditches and gutters, drop inlets and catch basins, roads and pavements, storm overflow/regulators.

UNIT III: Plumbing and Sanitary Appliances

Basic principles of Plumbing- needs, scopes and terminologies. Specifications and installation of sanitary fittings like wash basins, water closets, urinals, bidets, sinks, etc., in buildings. Uses of gate valve, float valve, flap valve, ball valve, flush valve, etc., different types of taps, faucets, stop cocks, bib cocks, 'P', 'Q', 'S', floor/bottle traps used in buildings.

UNIT IV: Design of Plumbing Systems

Design considerations on drainage schemes. Planning of bathrooms, lavatory blocks and kitchen in domestic and multi-storied buildings. Preparation of plumbing drawings, symbols commonly used in these drawings.

UNIT IV: Sewerage

Indian standards and byelaws for sanitary conveyance. Disposal of sewage from isolated buildings, Gradients used in laying of drains and sewers for various sizes. Septic tank details & capacity calculation. Sewage treatment. Use of pumps in sanitation, biogas, soil disposal without water carriage, rural sanitation.

COURSE OUTCOME

Upon completion of the course, students will have knowledge about the basics of plumbing systems in buildings. Site visits and market surveys shall equip the students about the current plumbing trends in the building industry. The students shall be equipped to prepare design schemes of water supply and sanitation for a basic shelter.

REFERENCES

1. Birdie, B. S. (1996). *Water supply and Sanitary Engineering.* DhanpatRai and Sons. &'_ National Building Code of India. (2005)._
2. Punmia, B. C., Jain, A. K. and Jain, A. K. (1995). *Water Supply Engineering*. New Delhi: Laxmi Publications.
3. Punmia, B. C., Jain, A. K. and Jain, A.K. (1998). *Waste Water Engineering*. New Delhi: Laxmi Publications.
4. Rangwala, S. C. (2005). *Water Supply and Sanitary Engineering*. Charoter Publishing.

AR4.6.1PE: PROFESSIONAL ELECTIVE II: APPLIED ERGONOMICS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.6.1 PE	Professional Elective II	50	50		100	45	54	3

COURSE OVERVIEW

The course will expose the students to various scenarios of human factors- both physical and psychological requirements to design for human comfort.

COURSE OBJECTIVE

To expose the students to the requirements of designing for human comfort in accordance with anthropometry. Sensitizing the importance of inclusive design for the elderly & disabled.

COURSE CONTENTS

UNIT I: Introduction to Human Factors & Ergonomics

Human beings in the man-made world and importance of ergonomics, Gross human anatomy, Ergonomics for the workplace, Children and the Elderly.

UNIT II: Ergonomics and Design

Introduction to Anthropometrics, static and dynamic anthropometrics, Muscles and work physiology, Static and Dynamic work including maximum capacity.

UNIT III: Disability, Ageing and Inclusive Design

Built environment for the physically handicapped, Ramp, toilets and corridor design, Spatial Requirements for wheelchair movement- Issues (Architectural, functional) in the design of old age homes, Criteria to be considered when designing for the visually impaired.

UNIT IV: Environmental Ergonomics

Biomechanics, Environmental Condition including, thermal, illumination, noise and vibration, Bio transducers and nervous system including their limitations.

UNIT V: Health Effects of Environmental Stressors

Controls and Displays, psycho-physiological aspects of Design, Occupational hazards in work environment, Visual stress, Postural Stress, Stress due to commuting.

COURSE OUTCOME

The students will have knowledge of ergonomics and its applications including designing for the physically challenged and the elderly.

REFERENCES

1. Don Norman, (2013). The Design of Everyday Things. Basic Books, New York.

2. Sally Augustin, Neil Frankel, Cindy Coleman, (2009). Place Advantage: Applied Psychology for Interior Architecture. John Wiley & Sons. Inc.
3. Karl H E Kroemer, (2017). Fitting the human: Introduction to Ergonomics and Human Factors Engineering. CRC Press, Taylor & Francis Group.
4. Chaira, J. D. and Callender, J. H. (1987). Time Savers Standards for Building Types. Singapore: McGraw-Hill.
5. Crosbie, M. J. and Watson, D. (2005). Time Savers Standards for Architectural Design: Technical data for Professional Practice. 8th Ed. The McGraw-Hill Company.

AR4.6.2PE: PROFESSIONAL ELECTIVE II: CREATIVITY AND PROBLEM SOLVING

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.6.2 PE	Professional Elective II	50	50		100	45	54	3

COURSE OVERVIEW

The course introduces the different tools and techniques of creativity as applicable to problem solving in design.

COURSE OBJECTIVE

To introduce lateral thinking and facilitate innovative design solutions.

COURSE CONTENTS

UNIT I: Introduction

Definitions of creativity, understanding the components of creativity, definitions of problem solving, theories of creativity, goals and objectives, value judgments, defining problems, information gathering, creative incubation, creative thinking and creative process.

UNIT II: Thinking techniques

Principles in generative, convergent, lateral, interactive and graphical thinking, working with check lists as a means of tracking thought processes, analysis and synthesis, simulation, action ability and implementations of intentions. Blocks in creative thinking.

UNIT III: Tools and techniques of creativity

Mind mapping, brainstorming with related stimuli and free association, positive techniques for creativity, creative pause, Focus, Challenge, alternatives, concepts, sensitizing techniques, group or individual techniques.

UNIT IV: Problem statements

Brain writing with unrelated stimuli, idea mapping, random input, storyboarding exercises, problem solving techniques –brainstorming, lateral thinking of De Bono.

UNIT V: Creative solutions applicable to designs

Design, Invention, opportunity, problems, improvement, planning, projects, conflicts. Simple Design exercises. Creative Design process – conceptual design, embodiment design, detail design, Iterations.

Suggested Assignments: Design of basic products of day to day use and conceptual sketches along with the design methodology followed.

COURSE OUTCOME

Skills required for exploring creativity and challenging assumptions of design and generating alternatives by using tools and techniques of creativity.

REFERENCES

1. Geoffrey Broadbent. Design in Architecture, London:D.Fulton
2. Christopher Alexander. Pattern Language. New York: Oxford University Press
3. Thomas Mitchell. Redefining Designing: Form to Experience
4. Edward De Bono, Lateral Thinking
5. James Snyder and Anthony Y Catanse, Introduction to Architecture, McGraw-Hill Book Company, New York, 1979.
6. Design Basics for Creative Results by Bryan L.Peterson, F&W Publications, Inc.
7. Noone, Donald.J, Creative Problem solving, Hauppauge, 1993.
8. De Bono, Edward, and Serious Creativity: Using the power of lateral thinking to create new ideas, HarperCollins publishers, and 1992.

S. Vijayalakshmi

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AR4.7OE: OPEN ELECTIVE II

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.7OE	Open Elective II							3

COURSE OVERVIEW

The course provides the students to select any subject which they feel would help them to fully realize their potential. The student can opt for any Open course approved by the University.

COURSE OBJECTIVE

To enable the candidate to choose a course of his/her interest and to develop skills in multi-disciplinary subjects in order to broaden exposure and scope for employability.

GUIDELINES FOR SELECTION OF THE COURSE

(i) Courses offered on SWAYAM/NPTEL platforms or elective courses offered by the university which do not have prerequisites and which are approved by the academic committee and the Board of Studies of ICFAI School of Architecture shall be offered as open-electives.

(ii) Subject to approval of the academic committee of ISArch, a student may opt any professional elective course of lower semesters as open elective in a semester, given he/she hasn't pursued that course earlier.

(iii) The Approved courses shall be sent to the SWAYAM Coordinator of the University, with details of the course and the university/platform offering the course.

(iv) An Internal Faculty member shall coordinate with the course coordinator of a particular course being offered.

(v) The Courses being offered can be across other disciplines but the intent of an open elective shall focus on employability and skill enhancement.

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AR4.8SE: COMPUTER APPLICATIONS II

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 4.8SE	Computer Applications II	50		50	100	45	54	3

COURSE OVERVIEW

This course aims to equip students with 3d modeling, rendering and post production in computers with latest software used in architectural practices.

COURSE OBJECTIVE

This course is aimed at introducing students to the software that helps in visualizing space and representing architectural ideas and drawings. This course consists of 3D (solid and surface) modeling with real time representation of materials and environment.

COURSE CONTENTS

UNIT I: RHINO 3D

1. Rhino is used to create, edit, analyze, document, render, animate, and translate Non-uniform rational basis spline (NURBS) curves, surfaces, and solids, point clouds, and polygon meshes.
2. Introducing 3D (concept of UCS, Extrusion, Visual styles, navigating, viewports, etc.)
3. Modeling in 3D (Creating and Editing Surface Models, Creating and Editing Solid Models)
4. Model Creation Tool: Points, curves, curves from other objects, surfaces, solids, meshes.
5. Editing :general tools, transform tools, points and curves, surfaces, solids, meshes
6. Interface: User interface, construction aids.
7. Display, Rendering, drafting and printing
8. Digital fabrication and 3d printing
9. Mesh tools: robust mesh import, export, creation and editing tools.
10. 3D capture, analysis.
11. Introduction to plugins - Grasshopper, RhinoScript, RhinoPhyton, Renderer Development kit, openNURBS.

UNIT II: RENDERING

1. Material Settings – Physical Materials, Procedural Textures, Native Material Support, Material Library, Material manipulation.
2. Rendering Settings- Interactive Rendering, Rendering Elements, V-Ray Warm, Scene Intelligence, Viewport Rendering, Animation and Walkthrough.
3. Lighting – Adaptive Lighting, Light Instances, Global Illumination, Accurate Lights, Image Based Lighting, Sun & Sky, Adaptive Dome Light, Lighting Analysis Tool.

4. Camera – Real World Cameras, Virtual Reality, Interactive Lens Effect, Exposure and White Balance.
5. Atmospheric Volumetric Effects – OFG, Aerial Perspective, Volumetric Materials.

UNIT III: POST PRODUCTION

1. Architecture image from the ground up after the model is ready.
2. Final PSD file + Base Renders.
3. Textures/images- glass and reflections
4. PNG plants,
5. Cutouts of trees, humans, automobiles.
6. Layer organization, workspace setup, importing files
7. Background, sky and foreground.
8. Lighting and light effects.
9. Level, adjustment and contrast settings.
10. Layers/channels – Alpha, Denoiser, Ambient occlusion etc.

COURSE OUTCOME

The students shall be offered basic proficiency in 2D drafting and 3D modelling in Rhinoceros. This basic skill set shall include working with the NURBS modelling capacity of Rhino, like mesh/ surface manipulation. The students shall also be exposed to the parametric design possibilities offered by Grasshopper. The Students shall also learn the workflow between modelling (of a model made in a software of their choice or of the faculty's choosing), rendering in V-ray and post-production of the image in Photoshop. The students must be exposed to (if not proficient in) different aesthetic styles of presentation of a graphic. The expected skill set of the student must enable them to apply this workflow in their Studio projects thereafter.

REFERENCES

1. https://www.rhino3d.com/6/features#overview
2. https://www.chaosgroup.com/vray/rhino#overview
3. Adobe Photoshop CC Help (guide from Adobe website – 2018)

FIFTH SEMESTER SYLLABUS

AR5.1PC ARCHITECTURAL DESIGN STUDIO V

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.1PC	Architectural Design Studio V	200		200	400	135	162	9

COURSE OVERVIEW

This Studio shall progress a student's vision of Society and Architecture from the previous project aimed at designing for a community towards an exercise of designing a community. The Studio shall also upgrade the student's skills in Architectural representation, technical skills in the composition of Architecture and its allied services and raise the student's perception of scales (micro-macro), networks(service-served) and nodes(centers) in design thinking.

COURSE OBJECTIVE

Being a trans-disciplinary and participatory activity, Architecture must be studied accordingly- by understanding the various layers of the art of designing and construction and equip the student with the vision to see their work as an amalgam of superimposed disciplines. In other words, one could see Architecture as a cross-section of these disciplines- Structural systems, Technology, Services, Sociology, Economy, Culture, Art and Law. In this Studio, the students shall work within these layers on two fronts, Technique and Topology. The Technique refers to the ability to conceptualize one's Architectural vision through a simultaneous reflection and effort over its construction and operation. The Students would hence learn to think about "how to build" together with "what or why to build." Topology refers to the understanding of the several parts of a system, how they work individually and as a group. This network of systems could refer to the building program consisting of several independent or interdependent units forming a project, as well as to the network of services within the project which allow it to function.

The Studio shall follow along the lines of the previous one, and understand the complex network of Service and Served Spaces, in programme and Design. The project selected for this purpose could explore the problem of building a community, designing the hierarchy or heterarchy of its various parts, to create a comprehensive whole.

COURSE OUTCOME

The Studio shall consider the design of a project/ typology where different disciplines within Architecture and the Humanities could be dealt with in some detail. The Studio's focus shall be on Designing a community and/or Designing for a community, where the students shall be encouraged to develop the building programme based on their understanding of the network

of relationships shared between an individual and the neighborhood, the neighborhood and the City, the City and the Environment; all the while understanding the complexities of these inter-dependencies. The idea of the studio starting with this thought exercise, is to understand and acknowledge their existence and seek sensitive solutions with due attention to their impact on an individual, the community and the environment. The Studio Project shall also focus upon understanding the reciprocal relationships between these various nodes, the impact of changing scales (Macro to micro and vice versa) in Design thinking and developing a critical attitude towards understanding contextuality, territoriality, environmental psychology, culture and Laws governing construction activity on the selected site.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), Texts which could enhance focus upon the Cultural and socio-economic aspects of designing a community. Works on Urbanism, Planning and varying scales in designing a project could be included depending upon the ease of readability of the texts (up to the faculty's discretion). A mix of bibliographical and videographical references is desirable, to ensure better engagement from the students and catering to different modes of learning.]

AR5.2PC HISTORY OF ARCHITECTURE III

History of World Architecture. Mind-Craft-Machine-Meaning (14th century to 20th century)

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.2PC	History of Architecture III	50	50		100	45	54	3

COURSE OVERVIEW

The Course progresses towards the advent of the industrial age, new materials, technologies in Architecture, the impact of such drastic changes within the society and culture and the subsequent repercussions on Architecture.

COURSE OBJECTIVE

To impart an understanding of the evolution in architecture and urbanism from the medieval to industrial times; Understanding about European Renaissance and its contemporary Mughal architecture in India; Understanding about Industrial Revolution and its influence on the built form and settlement patterns; Colonial mercantile capitalism and spread of Western influences in India; Synthesis of architectural styles as modes of political accommodation. Also, students must be enabled to appreciate tangible and intangible aspects of heritage associated with history.

COURSE CONTENT

UNIT-I

Modernism. 1886-1963 Vienna-Germany-France-United States

Vienna. The Sacred Spring: Wagner, Olbrich and Hoffmann 1886-1912. Adolf Loos and the crisis of culture 1896-1931.

UNIT-II

Germany. Henry van de Velde and the abstraction of empathy 1895-1914.The Deutsche Werkbund 1898-1927. The Glass Chain: European architectural Expressionism 1910-25. The Bauhaus: the evolution of an idea 1919-32. **The New Objectivity**: Germany, Holland and Switzerland 1923-33. **De Stijl**: the evolution and dissolution of **Neo-Plasticism** 1917-31. Mies van der Rohe and the significance of fact 1921-33. Mies van der Rohe and the monumentalisation of technique 1933-67.

UNIT-III

France. Tony Garnier and the Industrial City 1899-1918. AugustePerret: the evolution of **Classical Rationalism** 1899-1925. Le Corbusier and the Esprit Nouveau 1907-31. Le Corbusier and the Ville Radieuse 1928-46. Le Corbusier and the **monumentalisation of the vernacular** 1930-60.

UNIT-IV

The United States. Adler and Sullivan: The Auditorium and the high rise 1886-95. Frank Lloyd Wright and the myth of the Prairie 1890-1916. Frank Lloyd Wright and the Disappearing City 1929-63.

COURSE OUTCOME

Understanding the Social + Economic + Political Hierarchy of civilisations at an advanced stage of human beings. A stage of world architecture history when questions relevant to understanding the lack of progress and sudden realization for its necessity- seeking creativity, existential meaning. Questions ranging from *humanism to the undeniable* presence of *machines,* the course brings about the discourse on architecture transforming and reflecting the nature of humans.

REFERENCES

1. Bartlett, Kenneth: The Renaissance Notes transcribed by James Steele from: The Great Courses. Audiotape. Cohen, H. Floris. The Scientific Revolution: A Historiographical Inquiry, University of Chicago Press, 1994.
2. Colquhoun, Alan. Essays in Architectural Criticism: Modern Architecture and Historical Change, MIT Press, Cambridge, MA, 1981. Curtis, William. Modern Architecture since 1900, Phaidon, London, 1996.
3. Davey, Peter. Arts and Crafts Architecture, Phaidon Press, London, 1997.
4. Giedion, Siegfried: Space, Time & Architecture: The Growth of a New Tradition, Harvard University Press, 2008.
5. Kenneth Frampton: Modern Architecture: A Critical History: Thames and Hudson, Fourth Edition, World of Art Series, 2007.
6. Jencks, Charles and George Baird, eds. Meaning in Architecture, Barrie and Jenkins, London, 1969.
7. Jones, Denna, Ed. Architecture: The Whole Story, Thames and Hudson, London, 2014.
8. Kostoff, Spiro. The Architect, Chapters in the History of the Profession, Oxford University Press, NY, 1977.
9. Koyre, Alexander. Metaphysics and Measurement: Essays in Scientific Revolution, Chapman and Hall, London, 1968.
10. Osler, Margaret J. ed. Rethinking the Scientific Revolution, Cambridge University Press, N.Y. 2000.
11. Rykwert, Joseph. The First Moderns: The Architects of the 18th Century, MIT Press, And Cambridge, MA: 1980.
12. Eisenman, P. (1999). Diagram Diaries. New York: Universe.
13. Heidegger, M. (1993). Building Dwelling Thinking. Basic Writings. HarperCollins.
14. Merleau-Ponty, M., and InEdie, J.M. (1964). The primacy of perception. North Western University Press.

15. Hillier, B. (1996). Space is the machine: A configurational theory of architecture. Cambridge: Cambridge University Press.
16. Lakoff, G. (1993). The contemporary theory of metaphor. In: Ortony, A. (Ed.) Metaphor and Thought. 2nd Ed. (pp. 202-251) Cambridge: Cambridge University Press.
17. Schulz, N. C. (2007). The Phenomenon of Place. In: Larice, M. and Macdonald, E. (Ed.). The Urban Design Reader (pp. 125–137). Routledge.
18. Smith, K. H. (2012). Introducing architectural theory: Debating a discipline. New York: Routledge.
19. Kenneth Frampton: Modern Architecture: A Critical History: Thames and Hudson, Fourth Edition, World of Art Series, 2007.

AR5.3BS BUILDING MATERIALS & CONSTRUCTION V

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.3BS	Building Materials & Construction V	50	25	25	100	45	54	3

COURSE OVERVIEW

This course supplements the BMC courses of earlier semesters. It also introduces fundamentals of advanced developments in Building Construction, structures and sustainable construction practices. The students are expected to understand the basic vocabulary and systems (not numerical calculations) of the same for adopting these in architectural forms.

COURSE OBJECTIVE

To expose students to the fundamental aspects of advanced building construction materials and methods

COURSE CONTENT

Unit I: Aluminum & other non-ferrous metals

Theory: The use of non-ferrous metals like aluminum, copper, lead, zinc, tin, nickel in building construction. Alloys of aluminum, copper and steel, galvanized iron.

Lab/Construction Yard: Application in Staircases, doors, windows, roof, skylights, partitions, space dividers etc.

Unit II: Structural elements

Flat slab, flat slab with drop panel, flat slab with column capital, post tensioned slabs, pre-stressed beams Advanced construction methods in RCC, lift slab construction, multi-storied building frames, Mivan construction technology, diaphragm wall, catenaries; vaults, domes and curved membranes; Portal frames.

Unit III: Advanced Building Materials

Plastic, Polymer types, thermosetting and thermoplastics, resins, common types of moldings, fabrication of plastics, polymerization and condensation, plastic coatings. Linoleum, plastic coated paper, polythene sheets, reinforced plastics, plastic laminates PVC, metals, synthetic boards, fireproof/ resistant boards/tiles, non- load bearing gypsum blocks

Unit IV: Sustainable materials and practices

Self-healing and bionic buildings, GRIHA-rated practices, Building Materials And Technology Promotion Council (BMPTC), roof gardens, vertical green walls and any passive solar design features.

COURSE OUTCOME

By the end of the course students should be aware of latest materials and building technologies, structural systems and Sustainable construction practices available and in use in the construction industry.

REFERENCES

1. James Ambrose, Building Construction Enclosure System
2. Andrea deplazes (ED), Constructing Architecture: Materials processes structures-A handBook Second Extended edition
3. Robert E Fischer, Engineering for Architecture
4. R Barry, The construction of Buildings Volume 4 4th Edition
5. Sandela, Felix. Architecture and Structuralism.
6. Lane, Allen. Developments in Structural Form. Penguin Books ltd, London.
7. Macdonald, J. Angus. Structure and Architecture, 2nd ed. Architectural Press, Oxford.
8. Michaels, Leonard. Contemporary Structures in Architecture..
9. Siegel, Curt. Structure and Form in Modern Architecture. Crosby Lockwood and Son Ltd., London
10. Subramanian, N. Principles of Space structures. Wheeler and Co., Allahabad,.

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AR5.4BS ELECTRIFICATION, LIGHTING & ACOUSTICS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.4BS	Electrification, Lighting & Acoustics	50	50		100	45	54	3

COURSE OVERVIEW

The course shall explore the basic approaches to electrical, lighting, acoustic systems of a building including the design aspects associated with their performance. The course shall be imparted through theoretical inputs supported by market surveys, site visits and exercises integrated with Architectural Design Studio.

COURSE OBJECTIVES

To equip the students with the knowledge about the building services related to electricity and wiring systems within building; and to expose them to the fundamentals of lighting design and acoustics so as to enable them to comprehend the subject thoroughly and integrate the learning into architectural design.

COURSE CONTENT

UNIT I: Fundamentals of Electricity

Voltage, Amperage, Wattage, Sources of Electricity, Electricity generation, Basic Electrical Distribution System, Single and three phase connections, Indian Electricity rules.

Exercise: Study of electrical distribution in campus.

UNIT II: Building Wiring System

Service wires, metering, light and power circuits, Safety aspects and devices, MCB, ELCB, distribution boards, wiring methods, ISI Codes and standard materials, Conductors, switch boards, electrical points in general building, earthling, short circuit and overloading, NBC recommendations, Symbols and representation in architectural layout drawings.

Exercise: Preparation of layouts for residences, offices, Preliminary Estimation of Electrical & illumination works.

UNIT III: Fundamentals of Light

General definition of terms related to optical sensitivity, visual performance & vision, Application of lighting (natural and artificial) and illumination in Architecture.

Artificial sources of light. Method of lighting- direct, semi direct, indirect, concealed lighting, spot lighting, task lighting, decorative lighting, landscape lighting, flood lighting, underwater lighting. Types of Lamps and their characteristics: Incandescent lamp, Fluorescent lamp, Gas filled lamp, HID lamp, Neon lamp and LED lamp.

Exercise: Market survey on various types of lighting fixtures

UNIT IV: Illumination

Definition of Light power, light flux, Light intensity, Laws of Illumination: inverse square law and Lambert's Cosine law. Application of law of illumination. General formula for illumination. Standard level of illuminations for various tasks, Basic lighting design, General and local lighting, glare and glare control.

Exercise: Lighting design of Residential units, Shops & Restaurants, general office, conference hall, Art – gallery and Museum Parks & playgrounds Road/area lighting and Landscape Lighting.

UNIT V: Fundamentals of Acoustics

Characteristic and measurement of sound, frequency, intensity, and decibel scale, auditory range, effects of sound on humans, loudness. Acoustics and acoustical environment, Behavior of sound in an enclosed space. Principle of geometrical acoustics, Different acoustical defects in auditorium and its solution, reverberation and reverberation time calculations – Sabine's formula and its interpretation, dead and live room.

UNIT VI: Noise Control and Acoustic Materials

Noise sources, sound transmission through wall and partition, Vibration isolation – control of mechanical noise, floor, wall, ceiling treatment. Design Principles- reduction of noise at the source, Reduction of noise near the source. Application of sound absorption material, Reduction of noise by Structural Defense. Planning and analysis of problems. Reduction of noise by Town Planning and Regional Planning consideration.

Acoustical materials - acoustical tiles, fiberboard, resonator absorption unit absorber, carpets, acoustical plaster, resilient packing composite materials, etc. – Their use, selection criteria and construction.

COURSE OUTCOME

Upon completion of the course, students will have the knowledge and skill to workout electrical networks for a simple building; determine general lighting and acoustic requirements and performance for a space.

REFERENCES

1. National Building Code, 2015, Bureau of Indian Standards
2. Sylvan, George S., Architectural Utilities 3: Lighting & Acoustics
3. Derek Philips; Lighting in Architectural Design.
4. G.K.Lal, Elements of Lighting, 3-D Publishers.
5. R.G. Hopkinson and J.D.Kay, The lighting of buildings, Faber and Faber, London, 1969.
6. Sage, Russell. The Architecture of Light: Architectural Lighting Design Concepts & Techniques.

7. I.E.S. Handbook.
8. Barron, M., Auditorium Acoustics and Architectural Design; Taylor & Francis.
9. Harold, B.M. & Lewis G.F, Acoustics for Architects; Reinhold

AR5.5.1PE PROFESSIONAL ELECTIVE III – DOCUMENTATION OF HERITAGE BUILDING

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.5PE	Professional Elective III	50	50		100	45	54	3

COURSE OVERVIEW

The "Introduction to Architectural Documentation for Cultural Heritage" Module aims at sharing applied knowledge in architectural records for conservation in the region, providing the basic understanding of how to make and manage documentation, as well as the hands-on experience that will help students make informed decisions that ensure the protection of cultural heritage sites.

COURSE OBJECTIVE

The module consists of interactive, participatory sessions, both theoretical and practical. Study visits and applied work on sites will complement the work carried out in the classroom. The module aims at introducing the following topics:

- Concepts of documentation and information gathering, recording and heritage information management;
- Activities, methodologies and tools for recording, documentation, inventories and information management;
- Addressing recording practice based on specific case studies;
- Topography, photogrammetric, and 3D scanning techniques.

COURSE CONTENT

DOCUMENTATION, RESEARCH & RECORDING

This course introduces the survey and recording of historic buildings and their sites. Techniques of recording include photography and traditional as well as digitally-based quantitative methods including measured drawings and rectified photography. Emphasis is on the use of appropriate recording tools in the context of a thorough understanding of the historical significance and function of the site.

1. ARCHITECTURAL PHOTOGRAPHY

   Introduction to photographic information gathering

2. WRITTEN DOCUMENTATION

   Writing architectural descriptions

3. FIELD INVESTIGATION

   Understanding significance Identifying later alterations and additions Assessment of conditions Secretary of the Interior's Standards.

4. HISTORIC RESOURCES SURVEYS

   Identifying historic contexts Definition of boundary, period of significance Integrity analysis: Contributing and Non-Contributing elements.

5. MEASURED DRAWINGS

   Types and purposes of drawings, taking measurements in the field Site visit.

6. PHOTOGRAPHY

   This seminar explores the intersecting social and cultural histories of photography and the urban and suburban built environment.

COURSE OUTCOME

By the completion of the course, students should be able to understand the use of different tools for recording in specific to context, should gain knowledge about different techniques and the step by step sequential process followed for Architectural Documentation of Cultural Heritage buildings.

REFERENCES

1. Burns, John, et al., eds. Recording Historic Structures: Historic American Buildings Survey/Historic American Engineering Record, 2nd edition. Hoboken, NJ: John Wiley & Sons, 2004.*
2. Carter, Thomas and Elizabeth Collins Cromley, Invitation to Vernacular Architecture: A Guide to the Study of Ordinary Buildings and Landscapes. Knoxville: University of Tennessee Press, 2005.*
3. Gottfried, Herbert and Jan Jennings, American Vernacular: Buildings and Interiors. New York: W. W. Norton and Co., 2009.*
4. Maliszewski-Pickart, Margaret, Architecture and Ornament: An Illustrated Dictionary. Jefferson, North Carolina: McFarland, 2009.*
5. Chukwunyere C. Ugochukwu, Urban Neighborhood Revitalization and Heritage Conservation: The Architecture of Urban Redesign,) Edwin Mellen Press Ltd. 2006
6. James Strike, Architecture in Conservation: Managing Development at Historic Sites, Routledge, 2012
7. Kenneth Williamson, Development and Design of Heritage Sensitive Sites: Strategies for Listed Buildings and Conservation Areas 1st Edition, Routledge, 2010
8. AylinOrbasli, Philip Grover, Architectural Conservation: Principles and PracticeJohn Wiley & Sons, 2007

AR5.5.2PE PROFESSIONAL ELECTIVE III – DESIGN FOR ACCESSIBILITY

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.5PE	Professional Elective III	50	50		100	45	54	3

COURSE OVERVIEW

The course is designed to impart fundamental theories of accessibility design. The course provides exposure to current research trends and case studies related to accessibility design. The course is integrated with the Architectural design studio project for practical application of the learning's imparted in the course.

COURSE OBJECTIVE

The course aims to impart basic knowledge about designing for accessibility and application of the theory imparted in Architectural Design.

COURSE CONTENTS

UNIT I

Disability and Assistance: An introduction to the types of disabilities and assistive technologies. Society and the concept of inclusiveness. A brief history about the origins of Universal design for inclusion. An introduction to the principles of Barrier-free design, Universal design and Inclusive design.

UNIT II

Introduction to User-Centered Design: The role of Ergonomics and human factors in designing for accessibility. Anthropometrics and design for extreme users. Challenges for Universal design and adaptive strategies.

UNIT III

Theory of Inclusive design: "Designing for all", is an Introduction to the theory of inclusive design. Comparative analysis of the theories of user-centered design and inclusive design.An overview of current research trends in the field like the 'person-environment-fit' theory and 'Person-Environment-occupation' theory.

UNIT IV

Building regulations for accessibility: Introduction to building regulations related to design of vertical and horizontal circulations spaces, assistive technologies and spatial design for accessibility. The latest versions of national and international building codes for accessibility in built-environments to be reviewed and discussed with reference to multiple case studies.

UNIT V

Case Studies: Case studies of various types of built-environments with regard to accessibility design to be performed. Indoor and outdoor environments to be assessed for barriers and the various accessibility design techniques adapted and inclusive design strategies to be discussed. Suggestive building types for the study could be health care centers, malls, theatres, institutions, housing, etc.

UNIT VI

Application in Architectural Design: This unit has to be integrated with the design studio project approved in the AR1.5PC Architectural Design V course. The student is expected to apply the strategies of accessibility design in the project under the guidance of the instructor.

COURSE OUTCOME

Upon completion of the course, the student will be equipped with the knowledge of basic application of accessibility design principles in Architecture studio projects. The student will have an overview of the current research trends in the field and shall be exposed to case studies of various building types and the nuances of accessibility design.

REFERENCES

1. Ann Alderson, 'Stairs, Ramps and Escalators: Inclusive Design Guidance', Center for accessible environments, 2010.
2. Edward Steinfeld, JordanaMaisel, 'Universal Design, Designing inclusive environments', John Wiley and Sons, 2012.
3. 'Guidelines and space standards for barrier-free built-environment for disabled and elderly persons', Central public works department, Ministry of Urban affairs and employment, India, 1998.
4. 'National Building code of India-2016' Bureau of Indian Standards-the national body of Indian standards, 2016.
5. Americans with Disabilities Act, 2010 ADA design guidelines, United states department of justice and civil rights division. https://www.ada.gov/2010ADAstandards_index.htm
6. Goldsmith, S. 'Designing for the disabled', 2nd edition, Royal Institute of British Architects, 1967.
7. Code of practice for 'Access for the Disabled to buildings', British Standards Institution BS 5619:1978.
8. Code of practice for 'Designing of housing for the convenience of the disabled people', British Standards Institution BS 5810:1979
9. Deb Kumar Chakrabarti, 'Indian anthropometric dimensions for ergonomic design practice', National Institute of Design, Paldi, Ahmedabad, Gujarat, 1997.
10. Panero, J. and Zelnik, M. 'Human Dimension and Interior Space: A Sourcebook of design referencestandards. 1st edition, Watson-Guptil, 1979.

AR5.5.3PE: SACRED GEOMETRY AND IMPLICATIONS TO DESIGN

Code	Course Title	Distribution of marks				No. of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR5.5PE	Sacred Geometry and Implications to Design	50	50	-	100	45	54	3

COURSE OVERVIEW

The Course is an introduction to the theory and application of sacred geometry in design. Theory sessions aim to impart the philosophy of sacred geometry. Principal drawings of sacred geometry and practical application in design are imparted in the studio sessions. The course shall expose the students to the importance of geometry in design with reference to applied sacred geometry in various timelines and cultures of art and architecture.

COURSE OBJECTIVE

The course aims to introduce the fundamental theory and practical application of sacred geometry in various facets of design in art and architecture.

COURSE CONTENTS

Unit I: Introduction to Sacred Geometry

Fundamentals of sacred geometry and its existence in nature. Metaphor of Universal order and examples of basic geometry in man-made world. Reference to Hindu, Buddhist, Islamic and western culture, art and architecture with respect to geometry.

Unit II: Principal drawings in sacred geometry

Principles governing the progressions related to the sacred roots of 2, 3 and 5. The square cut by its diagonal and archetypal model for geometric proportions and progressions. The square root of three and the VesicaPiscis. The square root of five and the golden proportion.

Unit III: Sacred numbers and Shapes

Diaphantine triangle and its implications in design. Phi ratio and the golden section. Golden mean based on the roots of 2, 3, and, 5. The Fibonacci series and relation to golden mean.

Unit IV: Solids

Cosmic volumes and metaphors for form. Platonic solids – Tetrahedron, Octahedron, Cube, Icosahedron, and Dodecahedron.

Unit V:Theory and Practical observations

The Gnomonic Expansion and the creation of spirals. Flower of life and star tetrahedron. Theory and application of tessellations and fractal formations. Metaphors of sacred geometry in Christian philosophy, the Hindupurusha and prakrtiti, mineral formations in nature, and other metaphors that demonstrate sacred geometry.

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COURSE OUTCOME

On completion of the course, the students will be aware about the sacred geometry in cosmic proportions, numbers, patterns and other elements of nature. The course would enhance observation and evaluation of the aesthetic aspects of nature and its implications for designing the man-made world.

REFERENCES

1. Tons Brunes, 'The secrets of ancient geometry'
2. Karen Ralls. Gothic Cathedrals: A guide to the history, places, art and symbolism, IBIS press (2015).
3. HilmaPettway and Allan Wicks. Architectural Theory and Styles, The English Press, New York (2016).
4. Christopher Powell. The shapes of sacred space: A proposed system of geometry used to layout and design Maya art and architecture and some implications concerning Maya cosmology, University of Texas at Austin (2010).
5. Robert Lawlor. Sacred Geometry philosophy and practice, Thames and Hudson (2002).

AR 5.6.1PE PROFESSIONAL ELECTIVE IV – ARCHITECTURE OF TELANGANA

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.6 PE	Professional Elective IV	50	50		100	45	54	3

COURSE OVERVIEW

Introduction to the Sociological, Political and Economic systems seen through the history of the state of Telangana establishing its several Sociological and Hierarchical layers.

COURSE OBJECTIVES

1. Rulers of Telanganaestablished its Early history (230BC to 220AD) - period of Satavahana Dynasty.
2. Advent of Kakatiya Dynasty (1083AD to 1323 AD)
3. QutbShahis of the Bahmani Sultanate- taken over by the QutbShahi Dynasty (1518AD)
4. AsifJahi Dynasty appointed by the Delhi Sultanate- Subsequent Nizams of Hyderabad rule.
5. Social Hierarchy in the Nizam dominion of *Nizams, Paigahs, Samasthans, Doras*, peasants.
6. Architectural typologies through the times- additions and influencing styles on each period.

COURSE CONTENTS

UNIT I: Early History

The unit exposes students to the early settlements and the impact it held on the socio-religious structure of the time- to draw a parallel with the happenings around the sub-continent during the time.

UNIT II: Kakatiya Dynasty

A historical background. Architecture in and around Warangal District. Gateways, Early Temple forms, Forts etc.

UNIT III: QutbShahi Dynasty

Historical Background. Under the founder Sultan QuliQutb-ul-Mulk. Reign of Muhammad QuliQutb Shah and architectural innovation under him. Religious mingling and acceptance. Construction of Fort at Golconda, the tombs, Char Minar, and baghs, so on.

UNIT IV: AsifJahi Dynasty (or The Nizams of Hyderabad)

Etymology and descent. Development of institutions, infrastructure in the dominion. Influence of the architecture of Europe, especially Italian Renaissance and the architecture of

Nobility. Palaces, Havelis, and the institutions built in Indo-saracenic style. Architecture of Paigahs under the Nizams- Style of Art Deco in Mansions and select few places.

UNIT V

Categorical mass of the Hierarchy- Samasthans & Doras: The Hindu Socio-economic strata, caste systems, culture mingling from the Northern parts of the Sub-continent. Houses, *Gadis*. The traditional stronghold of the *Doras* replicated onto the architecture typologies, fortifications and simple courtyard dwellings.

COURSE OUTCOME

A continued discourse on the state of progressiveness of a place- the course brings out the Social, Religious and Political hierarchy of Telangana region with its varying characteristics toward functioning, symbolizing and amalgamating of styles specific to this region.

REFERENCES

1. Vottery, Madhu, a Guide to the Heritage of Hyderabad. New Delhi: Rupa Publications India, 2010.
2. Imam, Syeda, the Untold Charminar: Writings on Hyderabad. New Delhi: Penguin India, 2008.
3. Sarma, Rani, The Deodis of Hyderabad- a lost heritage. New Delhi: Rupa Publications, 2008.
4. Sardar, Marika, Hyderabad, Golconda. Jaico Publishing House, 2015.
5. Alikhan, Raza, Hyderabad 400 years 1591-1991. New Delhi: Zenith Services, 1990.
6. Medieval History of the Deccan (Vol.1 & 2). Department of Archaeology & Museums, Government of Telangana, Hyderabad. 1964.
7. Indian Archaeology- A Review (IAR), Annual Journals Published by the Director General Archaeological Survey of India, New Delhi.

AR 5.6.2PE PROFESSIONAL ELECTIVE IV – ART IN ARCHITECTURE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.6PE	Professional Elective IV	50	50		100	45	54	3

COURSE OVERVIEW

The modernist movement generally rejected everything that did not meet the demands of structural necessity or material functionalism. The idea that the building itself, through its shapes, relationship between solids and voids, became the art work, necessitating the elimination of any artistic expression applied to or incorporated into the building. Buildings became real estate that often trades hands for money, as are paintings and sculptures. The rules of standardization began to apply, leaving little room for expressionism. The relationship between art and architecture is one that has fascinated designers and artists for centuries. The course aims at finding the balance, and the process to achieve it.

COURSE OBJECTIVES

1. These artworks enhance the civic meaning of public architecture and showcase the vibrancy of visual arts. Together, the art and architecture of public buildings create a lasting cultural legacy.
2. Opportunities for artists to participate in the building project. A panel composed of art professionals, civic and community representatives, the project's lead design architect, meets to discuss.
3. Ensure that the artworks are meaningfully integrated into the overall project.
4. Finding public buildings and spaces to engage visual artists working on community projects.
5. Today, it is rare to find architecture, art, and sculpture united in any but the most tentative way.

COURSE CONTENTS

UNIT I: Failure of Art along Architecture

The unit lists upon the contributors that lead to the demise of artistic expressions in and around architecture of public nature. Economics- Modernist- Abstraction- Period of Postmodernism.

UNIT II: Context of Urban

Uses of Art in Public spaces. Engaging the public and initiatives to make art possible in and around architecture. Street Art forms, Building art forms, Sculptural Art around buildings.

Unit III: Art at Building scale

Installation art to engage the building with its surrounding, and the building to its users or passers-by. Works of Louise Bourgeois, Richard Sierra, Alexander Calder, Olafur Eliasson, Ai Weiwei, Carsten Holler etc. Cities of Boston, New York, Chicago, London to seek examples of engagement with the public.

Unit IV: Building as art

Site-specific artworks. Using the building form itself as an installation art. The works of Gordon Matta-Clark, Fujiko Nakaya.

COURSE OUTCOME

The students must be able to not only distinguish between an architectural work of art and a sculptural/ other works of art, but they must also be able to observe opportunities between the collaboration of the two. The students shall reflect upon Architecture's place as an aesthetic object in reality or as an aesthetically shaped reality. To do this, they shall contrast between the perception of Architectural work of art- its manifestation in reality and bestowing of symbolism or meaning over it and the perception of other art forms. The main goal, however, in terms of outcome of this course is to move from the superficial application of artistic detail/ motifs/ objects in/on architecture versus architecture in itself being a collaborative effort between art and technology.

REFERENCES

1. Kramer, Sibylle, Exhibition Design (Architecture in Focus). New York: Braun Publishing, 2014.
2. Masheck, Joseph, Building-Art: Modern Architecture under Cultural Construction (Contemporary Artists and their Critics). Cambridge: Cambridge University Press, 1993.
3. Gurney, Kim, the Art of Public Space: Curating and Reimagining the Ephemeral City. Palgrave Macmillan, 2015.
4. Lossau, J., Stevens, Quentin, S., the Uses of Art in Public Space. Routledge Advances in Art and Visual Studies. Routledge Publications, 2018.

AR 5.7OE OPEN ELECTIVE III

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.7OE	Open Elective III							3

COURSE OVERVIEW

The course provides the students to select any subject which they feel would help them to fully realize their potential. The student can opt for any Open course approved by the University.

COURSE OBJECTIVE

To enable the candidate to choose a course of his/her interest and to develop skills in multi-disciplinary subjects in order to broaden exposure and scope for employability.

GUIDELINES FOR SELECTION OF THE COURSE

I. Courses offered on SWAYAM/NPTEL platforms or elective courses offered by the university which do not have prerequisites and which are approved by the academic committee and the Board of Studies of ICFAI School of Architecture shall be offered as open-electives.

II. Subject to approval of the academic committee of ISArch, a student may opt any professional elective course of lower semesters as open elective in a semester, given he/she hasn't pursued that course earlier.

III. The Approved courses shall be sent to the SWAYAM Coordinator of the University, with details of the course and the university/platform offering the course.

IV. An Internal Faculty member shall coordinate with the course coordinator of a particular course being offered.

V. The Courses being offered can be across other disciplines but the intent of an open elective shall focus on employability and skill enhancement.

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AR 5.8 SE BUILDING INFORMATION MODELING (BIM)

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 5.8SE	Building Information Modelling	50	50		100	45	54	3

COURSE OVERVIEW

This course covers modeling, representation and quantity estimation in detail. This knowledge unlocks the potential of further usages with building data.

COURSE OBJECTIVE

To learn basics of Building Information Modeling on the platform of Autodesk Revit.

COURSE CONTENTS

UNIT 1: Introduction to BIM

What is BIM, BIM process, advantages of BIM, BIM workflow, construction industry with BIM, levels of BIM, Global governmental acceptance of BIM

UNIT 2: Modeling and representation in BIM

Using Templates, Massing and site modeling, working with architectural elements, insertion of blocks and components, customization of materials etc. Defining levels, sectional planes, views; Setting the sheets and representation

UNIT 3: Scheduling and Estimation in BIM

Developing Schedules of elements used, estimation of quantities, working with object ID

UNIT 4: Rendering and illustrations through BIM

Setting Views, setting of environments, render options

UNIT 5: Future potential

Introduction to Analysis through BIM which includes Energy analysis, Structural analysis, and so on. Introduction to Advanced modeling through Dynamo (Visual Programming Plugin).Introduction to Autodesk naviswork for final design coordination. Exporting data into IFC data models like GBXML etc., for other purposes like operations and Management teams etc.

COURSE OUTCOME

At the end of course students are expected to learn the basics of BIM software hands on and understand the potential of using BIM software towards its application in industry.

REFERENCES

1. Garber, R. (2014). BIM Design: Realizing the creative potential of building information modeling.
2. Race, S. (2013). BIM demystified.
3. Eynon, J. (2016). Construction Manager's BIM Handbook.
4. Deutsch, R. (2012). Data-Driven Design and Construction.
5. Sacks, R., Eastman, C., Lee, G., Teicholz, P. (2018). BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers

SIXTH SEMESTER SYLLABUS

AR6.1PC: ARCHITECTURAL DESIGN STUDIO VI

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.1PC	Architectural Design Studio VI	250		250	500	135	162	12

COURSE OVERVIEW

This Studio focuses primarily upon Architectural Detailing and learning how to prepare construction/ Working Drawings for a Project. The Studio shall help a student understand the complexities of services within a building and their due coordination within a drawing for the purposes of construction. The goal of this exercise is to understand Architectural Design as a complex composite of Conceptualization, Design Development, Services, Materiality, and specifications and Building Construction parameters. These individual foci, which were thus far taught as separate lectures shall be put into practice together in this Studio, for a well-rounded understanding of Architectural Design.

COURSE OBJECTIVE

The phase of an Architect's task involving the production of technical detailing and drawings towards the construction of a project are an integral part of the Design Process. Moving beyond the conceptualization and design development stages, the production of technical details, working drawings or service and structural layouts involve subjecting the project to multiple perspectives, analyzing areas of conflict and resolving them through a holistic approach.

The design of Working details in a project are aimed at exposing a student to the qualities and limitations of materials and technologies, structural and other technical systems, all the while imbibing a semblance of practical thinking in terms of the construction and operations of a Project. The inclusion of these technical aspects as a part of the Design Studio are central to the notion of not only bringing an exchange between the industry and the students but also to allow the students to find innovative solutions vide the development of new details and discover the gap between concept and practice in order to address it through Architectural Design.

COURSE OUTCOME

The Studio shall utilize a previous semester's project of a suitable size and typology as a starting point for developing a set of construction drawings and working details. The set of Working Drawings to be produced shall focus upon the inclusion of the essential and/or relevant building services (Electrical, HVAC, Plumbing, Landscape and Structural Systems)

within the Architectural Layouts and suitably modify, develop or re-design the project/ part of the project in order to ensure its buildability, operability and efficiency. Other than the aforementioned aspects, the students shall also focus upon the use of appropriate materials for their chosen form, function or aesthetic necessities and explore the details involved in using them within their projects. The students must develop the necessary skills to understand the design and drawing of Working Details, Building Sections for Construction, Wall cross-sections, Centre-line drawings, Service Layout(s) and Master Plans. The use of new materials, technologies and innovation in Detailing within the project must be encouraged.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), Texts which could enhance focus upon the Cultural and socio-economic aspects of designing a community. Works on Urbanism, Planning and varying scales in designing a project could be included depending upon the ease of readability of the texts (up to the faculty's discretion). A mix of bibliographical and videographical references is desirable, to ensure better engagement from the students and catering to different modes of learning.]

1. Working Drawings Handbook (4th Ed) by Keith Styles and Andrew Bichard (Architectural Press)
2. Architectural Detailing (3rd Ed) by Edward Allen and Patrick Rand (Wiley)
3. E. Allen and P. Rand, "Architectural Detailing: Function, Constructability, Aesthetics", 2016
4. Stephen Emmitt and John Olie, "Principles of Architectural Detailing", 2004
5. Caleb Hornbostel, "Architectural Detailing Simplified", 1985
6. Robert C. McHugh, "Working Drawing Handbook", 1977
7. M. Shah, "Principles of Building Drawing", 2007
8. M. Shah, "Building Drawing with an integrated approach to Built Environment", 2011
9. M. Shah and C. Kale and Patki, "Building Drawing", 1978 9. K. Gatz, "Modern Architectural Detailing" 2000

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AR6.2PC: HISTORY OF ARCHITECTURE IV

Theory of Architecture: The age of -Isms (19th century to 21st century)

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.2PC	History of Architecture IV	50	50		100	45		3

COURSE OVERVIEW

The question of 'Styles' in architecture is a multifaceted inquiry, involving understanding of materiality, philosophy, traditions, changing trends and value systems. This final lecture series in the History and Theory thread shall broaden the classroom discourse from 'Style' to 'Isms', i.e., From an event/object to a movement/causative philosophy.

COURSE OBJECTIVE

This lecture series will introduce students to the idea of Architectural Language/Style as a medium to realize and recognize the several aspects of design. Students will study the Architectural Languages/Styles of selected architects through a series of analytical exercises elaborating architects' distinct approaches and attitudes.

COURSE CONTENT

UNIT-I: The Search for Meaning-Critical Regionalism

Read: Frampton: The International Style: theme and variations 1925-65. Critical Regionalism: modern architecture and cultural identity. The vicissitudes of ideology: CIAM and Team X critique and counter-critique 1928-68. Alvar Aalto and the Nordic tradition: National Romanticism and the Doricist sensibility 1895-1957. Louis Kahn. Read: Frampton: The Eclipse of the New Deal: Buckminster Fuller, Philip Johnson and Louis Kahn 1934-64.

UNIT-II: Post-Modernism

The principles and philosophy of Postmodernism- in art, design and architecture, worldview, theories & perceptions of time and space, mode of reasoning. Later works of Le Corbusier, Robert Venturi, Charles Moore, Mario Botta, Renzo Piano, Frank O Gehry, Jane Jacobs, and Fredric Jameson.

Constructivism and Deconstructivism. The New Collectivity: art and architecture in the Soviet Union 1918-32.

Unit-III:New Architecture of 21st Century. Parametric Revolution

The principles and philosophy of Post-Structuralism, of art, design and architecture, worldview & mode of reasoning. Philosophies of Jacques Derrida, Peter Eisenman, Bernard

Tschumi, LeFebvre, Merleau-Ponty, JuhaniPallasmaa, Jürgen Habermas, Daniel Libeskind, Rem Koolhaas, ZahaHadid. The Environmental Imperative. Sustainability.

Unit-IV:The Eastern Traditions

Contemporary Islamic Architecture. Contemporary Chinese Architecture. Contemporary Japanese Architecture. Contemporary Indian Architecture.

COURSE OUTCOME

Realizing and applying the present state of architecture- its approach, understanding, influences, and parameters that cause for its change or it's wantonness to change upon the architecture around and in their Studio. To bring to notice the presence of various perspectives and take on architecture, leading to a possibility of applying them to their design understanding by creating exercises to improve upon their sensibilities toward architecture of the not so past "past".

REFERENCES

1. Johnson, P. and Wigley, M. (1988). Deconstructivist Architecture. New York: Museum of Modern Art.
2. Lefebvre, H. (1991). The production of space. Oxford: Cambridge.
3. Pallasmaa, J. (2005). The eyes of the skin: Architecture and the senses. Chichester: WileyAcademy.
4. Pawlyn, M. (2011). Bio-mimicry in Architecture. London: RIBA Publishing.
5. Tschumi, B. (1994). Architecture and disjunction. Cambridge, Massachusetts: MIT.
6. Venturi, R. (1966). Complexity and Contradiction in Architecture. New York: The Museum of Modern Art.
7. Jameson, Fredric. Postmodernism or the Cultural Logic of Late Capitalism, Duke University Press, Durham, NC. 1991.
8. Jencks, Charles and George Baird, eds. Meaning in Architecture, Barrie and Jenkins, London, 1969.
9. Jones, Denna, Ed. Architecture: The Whole Story, Thames and Hudson, London, 2014.
10. Kostoff, Spiro. The Architect, Chapters in the History of the Profession, Oxford University Press, NY, 1977.
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14. Papadakis, Andreas. Deconstructivism, Academy Editions, London, 1998.
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17. Rykwert, Joseph. The First Moderns: The Architects of the 18th Century, MIT Press, And Cambridge, MA: 1980.
18. Schumaker, E. F. Small is Beautiful: Economics as if People Mattered, Blond and Briggs, London, 1973.
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23. Steele, James. Hassan Fathy, Architecture for People, Thames and Hudson, London, 2003.
24. Steele, James. Sustainable Architecture: Principles, Paradigms, and Case Studies, McGraw-Hill, N.Y.1997.
25. Tzonis, Alexander and LianeLefaivre, Critical Regionalism, Architecture and Identity in a Globalized World, Prestel, Munich, 2003.

AR6.3BS: STEEL STRUCTURES

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.3BS	Steel Structures	50	50		100	45	54	3

COURSE OVERVIEW

The course intends to impart skills for structural design of various steel structures as per BIS codal provision IS 800: 2007. The objective of this course is to provide a basic understanding of the mechanical properties and types of structural steel, and to develop technical competence in the design of tension members, compression members, beams, and connections.

COURSE OBJECTIVE

1. To understand the Architectural aspect in steel structures.
2. To learn IS 800-2007 code of practice for the design of compression, tension and flexural members using various cross-sections.
3. To understand the behavior and design procedure of welded and bolted connections.
4. To understand the behavior and design procedure of compression, tension and flexural members.

COURSE CONTENT

UNIT I

Architectural aspects of Grid structures and skeletal structures, space frames, domes etc. in steel, various types, constructional aspects, merits and demerits, etc. Structural behavior of various types of Large Span Steel Structures like: Arches, Open Web Sections, Bow String Girders, Suspension Structures, Geodesic Dome, and Space Structures. Outlines of steel construction procurement process, Factors influencing design decisions, Opportunities for architectural expression in steel, Design process in steel construction, design consideration and steps involved in construction, codes and specifications, design philosophies, limit state design, introduction to various sections of IS 800:2007

UNIT II

Joints- introduction to riveted connection, behavior of bolted connections, types, design strength of ordinary black bolts, simple connections, lap connection design, efficiency of connection. Welded connection introduction, welding process, types of welded joints, design of welds.

UNIT III

Introduction to types of tension members, behavior of tension members, modes of failures, factors affecting the strength of tension members, design of angle sections under tension, design of tension splices, plastic theory, plastic hinge concept, plastic collapse load, methods of plastic analysis

UNIT IV

Introduction to compression members, possible modes of failure, classification of cross section, behavior of compression members, elastic buckling of slender compression members, buckling class, design of compression members

UNIT V

Introduction to beam types, section classifications, lateral stability of beams, lateral torsional buckling of symmetric sections, buckling of real beams, behavior of beam in bending, design strength of laterally unsupported beams, shear strength of steel beams, maximum deflection, Discussion on steel-concrete composite construction using steel beams, metal decking and concrete, including the role of shear connectors attachment to the beam for composite action. Case study on unique steel structures in the world.

COURSE OUTCOME

Upon successful completion of the course student will be able to:

1. Apply the IS code of practice for the design of steel structural elements
2. Analyze the behavior of bolted connections
3. Design welded connections for both axial and eccentric loads
4. Design compression and tension members
5. Design simple beam, built up beam and plate girders, composite members

REFERENCES

1. Subramanian, N. (2008). *Design of steel structures*. New Delhi: Oxford University Press.
2. Salmon, C.G., Johnson, J.E. and Malhas, F.A. (2008). *Steel structures: Design and behavior*. 5th edn. Indianapolis, USA: Prentice Hall.
3. Ramchandra, V.G. and Gehlot, V. (2011). *Design of steel structures I*. 13th edn. Jodhpur: Scientific Publishers Journals Department.
4. Bhavikatti, S.S. (2009). *Design of steel structures*. New Delhi, India: I K International Publishing House.
5. IS 800: 2007 Code of practice for general construction in steel?
6. IS 808: 1989 Dimensions for hot rolled steel beam, column, channel and angle sections?

AR6.4BS: VENTILATION, AIR CONDITIONING, FIRE SAFETY AND BUILDING AUTOMATION

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.4BS	Ventilation, Air Conditioning, Fire Safety and Building Automation	50	50		100	45	54	3

COURSE OVERVIEW

The course shall explorethe basic approaches to ventilation, air conditioning, fire safety and building automation systems of a building including the design aspects associated with their performance. The course shall be imparted through theoretical inputs supported by site visits and application-based exercises.

COURSE OBJECTIVES

To familiarize the students to the various ways by which ventilation and fire safety can be achieved in buildings through passive design and then informing them of various air-conditioning systems, fire-fighting equipment and their installation. The course shall also introduce the students to the technology of mobility systems and building automation.

COURSE CONTENT

UNIT I: Ventilation

Basic concept of ventilation, Indoor Air Quality (IAQ), comfort conditions, Air movement around and through buildings, Orientation for wind, stack effect, induced ventilation, artificial/mechanical ventilation.

Learning from this unit is to be integrated into the Architectural Design Studio

UNIT II: Air Conditioning

Principles and components of mechanical ventilation and air-conditioning systems; calculation based on design conditions and system sizing, design considerations for chiller rooms, cooling plants, AHUs; integration with natural ventilation, and other energy conserving technologies-Chilled Water System – Air Cooled and Water-Cooled condensers – Air Distribution system – VAV & VRV Systems – Low temperature applications

Design criteria for selecting the Air conditioning system for small and large building and energy conservation measures.

REGISTRAR

Site visits to be conducted to appropriate buildings to understand various air-conditioning systems and their applications. Exercises to be done on HVAC load calculations and ducting layouts.

UNIT III: Fire Safety

Fire sources, principles of fire behavior, spreading, and growth decay curve; NBC fire safety design considerations, material fire response and fire-retardant materials; fire hydrants, fire escape and egress systems, refuge areas, fire tender access; smoke detector, fire alarm system, and sprinkler systems, fire-fighting pump and water requirements, storage – wet risers, dry rises; fire extinguishers & cabinets; fire protection system – CO2 & Halon system.

Exercises based on configuring, sizing and space requirements for fire-fighting equipment; representation of fire considerations in drawings.

UNIT IV: Mobility Systems

Lifts, escalators, conveyors, and travelators; sizing of space for lifts and other mobility systems; construction and installation; design and operation of automated parking systems.

UNIT V: Introduction to Building Automation

Concept and application of Building Automation, requirements, design considerations and functional efficiency. Access Control System, Lighting Control System, HVAC System, and Energy Management System, Fire alarm system, Security system and other engineering systems.

COURSE OUTCOME

Upon completion of the course, students will have the knowledge and skill to workout HVAC loads and space requirements for equipment; interpret and depict fire safety requirements in design & drawings, estimate lift numbers and lobby sizes.

REFERENCES

1. Roger W.Haines: HVAC system design handbook.
2. Ananthanarayanan PN: Refrigeration and Air Conditioning.
3. ASHRAE Fundamentals Handbook, 2013
4. V.P.Lang," Principles of air conditioning"
5. William H.Severns and Julian R Fellows, "Air conditioning and Refrigeration", John Wileyand Sons, London, 1988
6. National Building Code, 2016, Bureau of Indian Standards
7. Andrew H Buchanan, "Design for fire safety", First edition John Wiley & Sons Ltd., NewYork., 2001
8. Bangash, M.Y.H. &Bangash, T., 2007. Lifts, Elevators, Escalators and Moving Walkways/Travelators.
9. Rodney R.Alder;"Vertical Transportation for Building".

AR 6.5.1PE: PROFESSIONAL ELECTIVE V – HOUSING

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.5PE	Professional Elective V	50	50		100	45	54	3

COURSE OVERVIEW

The course provides the ability and skill in the growing demand of the housing market. Housing is an area of special emphasis in India. To gain understanding of housing requirements for people from different socio-economic backgrounds, housing forms, housing typologies, in the Indian context.

COURSE OBJECTIVES:

1. To draw from the relevant literature, an understanding of the fundamentals in housing practice.
2. To highlight the existing housing conditions and related issues and study the various types of housing.
3. To create awareness about the causes and consequences of housing problems and to discuss/debate about the possible solutions.
4. Understanding of the various issues involved in urban and rural housing and knowledge about the planning and design solutions for low-income groups.

COURSE CONTENTS

UNIT I: Introduction and Terminology

Housing Need and Demand in India -Present and Future. House, Housing and Settlement. Detached and Attached House Types. Net & Gross Residential Density, Perceived Density, Zoning.

UNIT II: Issues Affecting Housing

Issues Affecting Housing- Climate Change, Social factors, Affordability, Health, Safety & Security, Noise Control, Utilities and Services

UNIT III: Objectives of Housing Agencies

Objectives and role of government, urban local bodies and other agencies in housing development: Census, NSSO, HUDCO, State Housing Board, NBO, National Housing Bank (NHB).

UNIT IV: Housing Schemes

Understanding of various housing schemes- Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Rajiv Awas Yojana (RAY), and Basic Services for the Urban Poor (BSUP), Integrated Housing & Slum Development Programme (IHSDP), and Site & Services Scheme.

UNIT V: Housing Development and Design

Understanding of various Housing categories through case studies e.g., Condominiums, Co-operative Housing, Rental Housing, Affordable Housing, Rural Housing, – their Advantages and Disadvantages. Understanding of Neighborhood. Exercises of moderate magnitude on Neighborhood Planning.

COURSE OUTCOME

Students will learn the supporting theories related to the Housing which are implementable in the design studio. The course imparts knowledge regarding the larger picture of the housing scenario in the country along with roles of government and semi government agencies in improving the scenario.

REFERENCES

1. J. Rosie Tighe and Elizabeth J. Mueller „The Affordable Housing Reader" Routledge; 2012
2. Graham Towers, „ Introduction to Urban Housing Design" Routledge; 2005
3. Annual Report 2010-2011, Ministry of Housing & Urban Poverty Alleviation, Government of India.
4. Charles Correa, „Housing and Urbanization: Building Solutions for People and Cities", Thames & Hudson May 2003
5. Correa, C. (2010). A Place in the Shade: The New Landscape and Other Essays. New Delhi: Penguin Books.
6. Ferre, A. and Tihamer, S. H. (2010). Total Housing: Alternatives to Urban Sprawl. New York: ACTAR Publishers.
7. Babur Mumtaz and Patweikly, Urban Housing Strategies, Pitman Publishing, London, 1976.
8. Geoffrey K.Payne, Low Income Housing in the Development World, John Wiley and Sons, Chichester, 1984.
9. John F.C.Turner, Housing by people, Marison Boyars, London, 1976.
10. Martin Evans, Housing, Climate and Ocmfort, Architectural Press, London, 1980.
11. Forbes Davidson and Geoff Payne, Urban Projects Manual, Liverpool University Press, Liverpool, 1983.
12. PatrikSchumacher: 2004, Digital Hadid.
13. Miglani O.P., Urban Housing in Developing Economy.
14. Jain A.K., Urban Housing and Slums.

AR6.5.2PE: PROFESSIONAL ELECTIVE V – CLIMATE RESPONSIVE ARCHITECTURE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.5PE	PROFESSIONAL ELECTIVE V – CLIMATE RESPONSIVE ARCHITECTURE	50	50		100	45	54	3

COURSE OVERVIEW

The course emphasizes on two sections understanding climate and its impact on humans and ii] designing as a response to the climate. Part one will be a deeper insight of what they learnt in first year climatology and part two emphasizes on effectiveness of design strategies. Students are expected to use basic energy modelling in this course.

COURSE OBJECTIVE

To impart knowledge regarding climate responsive built environment fundamentally at design level.

COURSE CONTENT

UNIT 1: Overview of Human Comfort Conditions

Psychrometric chart, Parameters of Human Comfort

UNIT 2: Climatic zones and its implications

Various climatic zones, Local factors that influence microclimate, vernacular and traditional architecture - response to climate, modern responses to climate factors, impact of variations in climate on various architectural design goals.

UNIT 3: Design strategies for climate responsive architecture

Active strategies, passive strategies, standardized strategies for design - varied scales, evaluation of impact of various strategies in overall performance of the design through computational quantification of parameters.

UNIT 4: Case studies of design configurations as response to climate.

COURSE OUTCOME

Students should be able to evaluate a design if it is responsive to local climatic conditions. Understand the effectiveness of various strategies.

REFERENCES

1. Manual of tropical housing and building: climate design – Koenigsberger
2. Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings – Arvind Krishna et al

3. Introduction to Architectural Science: The Basis of Sustainable Design - S. V. Szokolay
4. Smith, P. (2005). *Architecture in a Climate of Change - A guide to sustainable design (2nd ed).* Oxford: Elsevier - Architectural Press.
5. Abraham, M. (2017). *Encyclopedia of Sustainable Technologies.* Elsevier.

AR6.5.3PE PROFESSIONAL ELECTIVE V – APPROPRIATE TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.5.3PE	Professional Elective V – Appropriate Technologies For Sustainable Development	50	50		100	45	54	3

COURSE OVERVIEW

The course covers topics towards understanding of sustainable development goals and technologies that contribute towards it. The course also covers theoretical evaluation of these goals and introspects on the institutionalization of the technologies by various governmental and non-governmental agencies.

COURSE OBJECTIVE

To understand goals of sustainable development and evaluate green technologies appropriateness towards the goal specifically in Indian Scenario.

COURSE CONTENT

UNIT I: Advances in Technologies: Technologies for assessment of performance, internationally available standards, Contemporary research projects in development.

UNIT II: Evaluation of various Active and Passive Technologies for their appropriateness,

Passive Techniques, Active Techniques, standardized strategies for design - varied scales, evaluation of impact of various strategies in overall performance of the design.

UNIT III: Approval/Promotion of Green Technologies. Governmental Norms in adaptation of Technology, Minimum Standards in NBC, ECBC, BEE and other Govt Standards in India.

UNIT IV: Case studies: a] Indian – (works of TERI, works of IISc Bangalore - BVV Reddy, others like Development Alternatives, BMTPC, NIRD, and CBRI) and b] examples across the world.

UNIT V: Redundancies and Paradoxes of these technologies in current context. Paradox - India vs. world Scenarios of building design, authenticity of the databases in the changing climatic conditions, Green washing - marketing strategies.

COURSE OUTCOME

Students should be able to understand goals of sustainable development and learn the basics of various technologies towards sustainable development.

REFERENCES

1. Abraham, M. (2017). Encyclopedia of Sustainable Technologies. Elsevier.
2. Bureau of Energy Efficiency. (2017). Energy Conservation Building Code. Delhi: Bureau of Energy Efficiency.
3. Bureau of Indian Standards. (1987). SP 41 - Handbook on Functional Requirements of Buildings. Delhi: Bureau of Indian Standards.
4. Bureau of Indian Standards. (2016). SP 7: National Building Code. Delhi: Bureau of Indian Standards.
5. Indian Green Building Council. (2016). IGBC Green New Buildings Rating System version 3. Hyderabad: Indian Green Building Council.
6. Koenigsberger, O., Ingersoll, T., Mayhew, A., &Szokolay, S. (1975). Manual of Tropical Housing and Building Climatic Design. Orient Blackswan.
7. Krishan, A., Yannas, S., Baker, N., &Szokolay, S. (2001). Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings. McGraw Hill.
8. Smith, P. (2005). Architecture in a Climate of Change - A guide to sustainable design (2nd ed). Oxford: Elsevier - Architectural Press.
9. Szokolay, S. (2008 (2nd edition)). Introduction to Architectural Science: The Basis of Sustainable Design . Oxford: Elsevier - Architectural Press.
10. The Energy and Resources Institute. (2019). GRIHA v.2019 user manual. Delhi: Teri Press.

AR6.6.1PE: PROFESSIONAL ELECTIVE VI – ARCHITECTURAL DESIGN WITH STEEL

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.6PE	Professional Elective VI- Architectural Design with Steel	50	50		100	45	54	3

COURSE OVERVIEW

The course oversees the possibilities of steel as an element of the architectural design process. Lays the foothold toward experimentation- both material and formal, of using steel as a primary structural, formal and spatial material of architecture.

COURSE OBJECTIVE

To introduce the concepts of designing with steel structures and its components. To elucidate the role of steel ropes/strands in pre-stressing in concrete members. To enable students to understand and design components such as staircases with steel structural members.

COURSE CONTENTS

UNIT-I

Introduction to Steel Structures Introduction to Steel structures: Steel structural shapes, Introduction to IS 800; Rivets, Design of steel structural members, tension, compression and bending Members.

UNIT-II

Steel Connections Concepts of connections, design of riveted and welded connections like beam end connections. Design of Steel Beams and Columns, Concepts of plate girders.

UNIT-III

Design of Steel Beams Design of laterally supported and unsupported beams. Beams subjected to bi-axial bending, built-up beams - design concepts with flanged plates.

UNIT-IV

Design of Steel Columns Theory of columns, slenderness ratio, design of axially loaded steel columns, design of built-up lacing and battened columns.

UNIT-V

Pre-stressed Concrete Structures Principles, Materials, Classification, General information about devices, Equipment, Analysis for stress, Simple calculations in design of cross-section details (P, e, Safe stresses).

Concrete Technology Laboratory – II

1. Site visit on steel structures and skyscrapers.

2. Concrete mix Designs (Innovative laboratory experiment on individual interest)

3. Non-Destructive Test on concrete - Rebound Hammer Test.

4. Flexural strength of RCC beams

5. Study of other Non-Destructive Tests on hardened concrete (Not for exams) a. Ultrasonic pulse velocity test b. Concrete core Extraction.

COURSE OUTCOME

By the completion of the course, Students should understand the properties, use and application of Steel as a Building material; should become well versed with Vocabulary and Concepts in relation to design of steel structures. students should be exposed to a few latest emerging technologies to make them understand the versatility of Steel in Architecture.

REFRENCES

1. Bhavikatti, S. S. (2010). Design of Steel Structures. I.K. International Publishing House.
2. Duggal, S. K. (2000). Design of Steel Structures. Tata McGraw Hill Education.
3. Ram, K. S .S. (2010). Design of Steel Structures. Pearson Education India.
4. Shiyekar, M. R. (2011). Limit State Design in Structural Steel. PHI Learning Pvt Ltd.
5. Subramanian, N. (2008). Design of Steel Structures. Oxford University Press.

AR6.6.2PE: PROFESSIONAL ELECTIVE VI – ARCHITECTURAL DESIGN WITH GLASS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.6PE.2	Professional Elective VI- Architectural Design with Glass	50	50		100	45	54	3

COURSE OVERVIEW

The course is intending to introduce the students to the field of structural applications of glass and to give them some specific skills for calculation and detailing of basic glass structures: panes beams and fins, columns and walls, point-supported glass, as well as for glazing systems such as glass facades, canopies and roofs, stairs and floors. On this purpose the properties of glass as structural material will be presented in comparison with other basic building materials, together with selected examples of glass/glazing applications. Design details and connecting technology, relevant technical regulations, specification and current methods applied in design will be described. Worked examples will accompany the lectures for better understanding, and design projects will help to fix specific knowledge.

COURSE OBJECTIVE

To make Students understand the use of glass as structural material in specific application in buildings, the basic philosophy glass behavior, use of technical regulations and design specification for glass structure design and calculations. Application of FE analysis in structural glass design and interpretation of results.

COURSE CONTENTS

UNIT I: Glass as a structural material

Basis of design of structural glass, strength and load bearing behavior of glass members, Glazing: Structural glass systems; connecting and supporting technology, Robustness of glass structures. Structural and non-structural properties. Annealed glass; toughened glass; heat-strengthened glass; laminated glass. Insulated glass. Fire resistant glass. Photovoltaic Glass.

Unit II:Structural glass applications in building

Design of structural glass members: Panes, beams and fins, columns, walls, point-supported glass. Glazing systems: Glass facades, canopies and roofs, floors, stairs, bridges, glass balustrades. Glass in large deflection structures. Robustness of glass structures Blast resistant glass; shock and bullet resistant glass; seismic action.

UNIT III: How to design a Sustainable Building

Understanding of Building Physics and Segment Based Design, behavior of glass under various climatic conditions. Role of glass in Green Buildings Rating system. Codal Recommendations – ECBC/IS, requirements as per Standards – NBC – Fire & Structural

UNIT IV: Manufacturing of glass

Types of Glass and their applications in the building industry, Coating Technology for High Performance Glass, Innovative Applications – Electro chromic & Digital Printing. Manufacturing and installation of Tempering/ Double glazing/ Lamination, Printing on Glass etc.

UNIT V: Glass as Building Envelope Material

Using Glass as a building envelope, Fundamentals of Facade Design using glass, Facade Design & Testing. How to Design Facade for Day lighting & Energy efficiency – Modelling

Design Tools & Simulation Software's used for Design, understanding of high performance glass and its advantages in saving of energy consumptions. Glass for Acoustics, Fire & Interior applications along with Safety & Security.

COURSE OUTCOME

To make Students understand how glass has become one of the dominant materials in the advanced construction and widely used building material in contemporary architecture, along with it's technical specifications applications and codes across the globe.

REFERENCES

1. J. Wurm: Glass Structures- Design and Construction of self-supporting skins, Birkhauser, Basel, Berlin, Boston, 2007.
2. ISTRUCTE: Structural use of Glass in building, The Inst. 0f Structural Engineers, London, 1999.
3. R. Nijsee: Glass in Structures, Birkhauser, Basel, Berlin, Boston, 2003.
4. C. Schittich et al. Glass construction manual, Bikhauser. Basel, Boston, Berlin, 1999.
5. Rice P., Dutton H., Structural glass , E&FN Spon m London, 1990
6. pr EN 13474-1: Glass in building-Design of panes-Part 1:General basis of design
7. pr EN 1374-2: Glass in building-Design of panes-Part 2: design for uniformly distributed loads
8. ASTM-E-1300-02: Standard Practice for determining Load Resistance of Glass in Buildings
9. Mic Patterson; Structural Glass Facades and Enclosures , Wiley 21 march 2011.
10. Michael Wigginton& Jude Harris; Intelligent Skins, Taylor & Francis, 17June 2013
11. GuediCapeluto, Carlos Ernesto Ochoa; Intelligent Envelopes for High Performance Buildings - Design and Strategy, 2015.
12. Michael Wigginton: Glass Architecture; Phaidon Press, 1972
13. Christian Schittich, Gerald Staib, Dieter Balkow, Matthias Schuler, Werner Sobek; Glass COnstruction Manual; De Gruyter, 2012.

AR6.6.3PE: PROFESSIONAL ELECTIVE VI – ECO-FRIENDLY MATERIALS AND CONSTRUCTION TECHNIQUES

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.6PE	Professional Elective VI- Eco-Friendly Materials and Construction Techniques	50	50		100	45	54	3

COURSE OVERVIEW

The course firstly deals with the impact of construction with various materials on the environment. In evaluating impact of construction emphasis is on both embodied energy as well as operational costs leading towards life cycle assessment. The course also covers topics related to material application and construction techniques with the eco-friendly materials.

COURSE OBJECTIVE

To understand about various eco-friendly materials and their construction techniques

COURSE CONTENT

UNIT 1: Concept of Embodied Energy & LCA

Embodied Energy, Life Cycle Analysis, Materials decomposition in nature.

UNIT 2: Eco Friendly Materials

Various factors that influence embodied energy, locally available materials and its impact on Embodied Energy, Locally available materials like Mud, Bamboo, and etc. in various regions and its applications in Architecture.

UNIT 3: Materials' Thermal Performances

U Values, hybrid material configurations,

UNIT 4: Construction with Eco-friendly materials

Quantity of materials per unit of construction and associated materials, material associations in construction (like brick along with cement and sand for wall)

UNIT 5: Case Studies

Vernacular architecture examples, new developments by organizations like BMTPC, IISc, CBRI, etc. (other Indian origin) and examples in the world scenario

COURSE OUTCOME

To be able to understand various factors that make a material eco-friendly. To comprehend the applicability of eco-friendly materials in building construction.

REFERENCES

1. Abraham, M. (2017). Encyclopedia of Sustainable Technologies. Elsevier.
2. Bhatia, G. (2000). Laurie Baker. Penguin India.
3. Bureau of Indian Standards. (1987). SP 41 - Handbook on Functional Requirements of Buildings. Delhi: Bureau of Indian Standards.
4. Deulgaonkar, A. (2015). Laurie Baker - Truth in Architecture.JyotsnaPrakashan.
5. Koenigsberger, O., Ingersoll, T., Mayhew, A., &Szokolay, S. (1975). Manual of Tropical Housing and Building Climatic Design. Orient Blackswan.
6. Krishan, A., Yannas, S., Baker, N., &Szokolay, S. (2001). Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings. McGraw Hill.
7. Sustainable Energy Research Team, University of Bath. (2006). Inventory of Carbon and Energy. Bath, UK: University of Bath.

Research Articles

1. Ibn Mohammed, T., Greenough, R., Taylor, S., QzawaMeida, L., &Acquaye, A. (2013). Operational vs. embodied emissions in buildings - A review of current trends. Energy and Buildings, 232-245.
2. Praseeda, K., Mani, M., & Reddy, B. (2013). Assessing impact of material transition and thermal comfort models on embodied and operational energy in vernacular dwellings (India). International Conference on Advances in Energy Research 2013 (pp. 342-351). Mumbai: Elsevier.
3. Praseeda, K., Reddy, B., & Mani, M. (2014). Embodied energy assessment of building materials in India using process and input-output analysis. Energy and Buildings, 667-686.
4. Reddy, B., &Jagadish, K. (2001). Embodied energy of common and alternative building materials and technologies. Energy and Buildings, 129-137.
5. Reddy, B., & Kumar, P. P. (2009). Embodied energy in cement stabilized rammed earth walls. Energy and Buildings, 380-385.

AR6.7OE: OPEN ELECTIVE IV

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 6.7OE	Open Elective IV							3

COURSE OVERVIEW

The course provides the students to select any subject which they feel would help them to fully realize their potential. The student can opt for any Open course approved by the University.

COURSE OBJECTIVE

To enable the candidate to choose a course of his/her interest and to develop skills in multi-disciplinary subjects in order to broaden exposure and scope for employability.

GUIDELINES FOR SELECTION OF THE COURSE

(i) Courses offered on SWAYAM/NPTEL platforms or elective courses offered by the university which do not have pre-requisites and which are approved by the academic committee and the Board of Studies of ICFAI School of Architecture shall be offered as open-electives.

(ii) Subject to approval of the academic committee of ISArch, a student may opt any professional elective course of lower semesters as open elective in a semester, given he/she hasn't pursued that course earlier.

(iii) The Approved courses shall be sent to the SWAYAM Coordinator of the University, with details of the course and the university/platform offering the course.

(iv) An Internal Faculty member shall coordinate with the course coordinator of a particular course being offered.

(v) The Courses being offered can be across other disciplines but the intent of an open elective shall focus on employability and skill enhancement.

REGISTRAR
THE ICFAI FOUNDATION FOR HIGHER EDUCATION
Deemed-to-be-University Under Section 3 of the UGC Act, 1956

SEVENTH SEMESTER SYLLABUS

AR 7.1 PC ARCHITECTURAL DESIGN STUDIO VII

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 7.1PC	Architectural Design Studio VII	250		250	500	180	216	12

COURSE OVERVIEW

The course aims toward a connection-unforeseen, yet present, in the notion of architecture-*meaning & memory.* It lays a foundation towards producing/ creating ideas intervening scenarios familiar and common, aiming to change and seeking attachment of the human mind.

COURSE OBJECTIVES

In the later part of the last century the theme of the relationship between architectural form and the technological possibilities triggered not just due to newer materials but along with its possible functions, unthought-of, unsought before, but definitely lingering in the shadows, hinting towards its need. In general, it is an addition to our expanded technical and building knowledge. The word interventional means- aimed at changing a process or situation, or an act of intervening, interfering or interceding with the intent of modifying the outcome. (Cambridge Dictionary +medicinenet.com) The architecture of a place, dictates certain changes along with its growth, age and time. The aspect that brings about a certain change to uphold the place from defunctity, decay and deterioration, is an intervening, interfering element of architecture sought to bring its people back to recognizing, relating and recreating memories to a place. "How can one imagine that the result obtained today will not be exactly the same as that arrived at any point on earth and at any time, even in the most distant foreseeable future?" (Pier Luigi Nervi, 1965) Hence, this Semester shall be an experiment to figure out and find the appropriate measures and metamorphosis to revive an architecture forgotten and neglected.

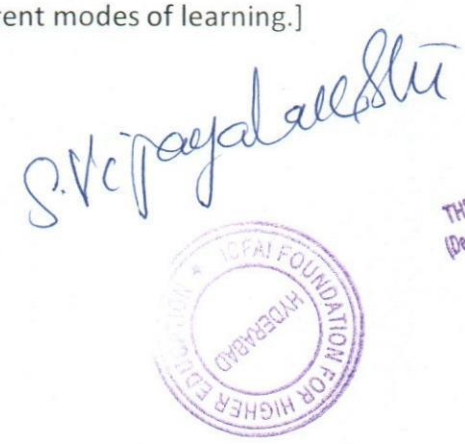
COURSE OUTCOME

The connection between the two- memory + city, needs to be analysed, tested, experimented and then suggested in a materialized form intimately tied to everyday life.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), A mix of bibliographical and videographical

references is desirable, to ensure better engagement from the students and catering to different modes of learning.]



AR 7.2 PC ESTIMATION, COSTING AND SPECIFICATIONS

Code	Course Title	Distribution of marks				No. of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR7.2PC	Estimation, Costing and Specifications	50	50		100	45	54	3

COURSE OVERVIEW

The course introduces the concepts of: quantification of building materials and process to derive estimated costs of works as per standard procedures and; material and performance specifications for describing works for effective building contracts.

COURSE OBJECTIVE

The objective of this course is to impart training in taking out quantities of building elements, rate analysis and preparation of estimates and to understand the language and vocabulary of specification writing, develop skills of specification writing for various building materials and building works.

COURSE CONTENTS

UNIT – I: Introduction to Quantity Surveying

Definitions and terms used, principles, units of measurements. Methods of preparing preliminary estimates (plinth area and cubic content method), basic differences and advantages.

UNIT – II: Rate analysis

Deriving rates for items from labor and material costs based on Schedule of Rates, scheduled and non-scheduled items, Establishing market rates.

UNIT – III: Detailed Building Estimation

Method of obtaining detailed quantities of building items from excavation to finishes manually and through BIM software, Bill of Quantities (BOQ) and Bill of Materials (BOM)

UNIT – IV: Estimation of Services

Preparing approximate estimates for services like water supply, plumbing, electrical work, mechanical equipment and air conditioning. (for residential buildings).

UNIT – V: Specifications

Definition, purpose, procedure for writing specifications for the purpose of calling tenders, types of specification, implications of variations and incomplete specification's impact on building costs. General specifications for 1st, 2nd, 3rd and 4th class buildings.

UNIT – VI: Specifications Writing

Detailed specifications, writing of specifications for items like earthwork excavations, foundation, CRS masonry, DPC, PCC, RCC, brickwork, doors and windows (wooden), mortars, plaster, painting, flooring like terrazzo flooring and tiles, ceramic tiles, marble, granite, distemper, snowcem, glazing, specification, writing to include materials, tests pre and post installation, modes of measurements.

Note: Small-scale projects to be undertaken to understand costing principles and terms. Final costing exercise to be carried out where students can undertake the costing of their studio design project.

COURSE OUTCOME

Ability to take off quantities from drawings for preliminary and detailed estimates, analyse rates and prepare cost estimates for a small building project. Ability to prepare general and detailed specifications and a contract for a small building project.

REFERENCES

1. Dutta, B.N. 1998. Estimating and Costing in Civil Engineering. 24th edition, UBSPD Ltd.
2. Birdie G.S., 2005, Text Book of Estimating and Costing (Civil Engineering) DhanpatRai Publishing
3. M. Chakraborti, Estimation, Costing, Specification and Valuation in Civil engineering.
4. Rangwala, S.C. Estimating and Costing, Charotar Publishing House.
5. CPWD – Standard Schedule of Rates (latest edition)
6. CPWD- Specifications (latest edition)
7. CPWD-Rate Analysis (latest edition)
8. Indian Standards Institution. National Building Code of India 1983. Indian Standards Institution, New Delhi, 1984.

AR7.3.1PE – PROFESSIONAL ELECTIVE VII - BUILDING PERFORMANCE AND COMPLIANCE

Course Code	Course Title	Distribution of marks				Sessions	Credits
		IA	EE	EJ	TM		
AR7.3PE	PROFESSIONAL ELECTIVE VII	50	50	-	100	45	3

COURSE OVERVIEW

This course gives an overview of approaches to building performance evaluation and compliances. An overview on the mandatory and voluntary compliances in building industry in Indian scenario. A part of the course is to deal with specifics of these performance compliance in any area (of the faculty's expertise) via a project (for example energy, acoustics etc.,

COURSE OBJECTIVE

To introduce the concepts of performance evaluation and compliances of built forms specifically in Indian context.

COURSE CONTENT

UNIT I: Introduction to Building Performance

Fundamentals of building performance evaluation; goals of evaluating building performance; general process and models of evaluating building performance (including evaluation stages like (i) goal and stakeholder needs, (ii) functional requirements, (iii) performance requirements, (iv) performance indicators, (v) verification or testing methods, (vi) functional systems and (vii) agents that act on the systems); various directions/aspects of building performance like contextual criteria, energy, lighting conditions etc.; feedback into design

UNIT II: Mandatory Compliances in Building Industry In India

Various organizations (like BIS, BEE, etc.,) that set minimum standards in building performance; understanding goals of minimum criteria set by various agencies; scope of some of the mandatory compliance codes like NBC, SP41, ECBC etc,; local building bye laws.

UNIT III: Voluntary Compliance in Building Industry in India

Various voluntary compliances available in India, their goals and benefits of these; impact of these voluntary compliances on the built environment; emphasis on more prevalent sustainability rating systems and their comparison.

UNIT IV: Specifics of Building Performance and Compliance

Faculty may choose a particular area / domain of performance (like energy, acoustics, lighting etc.,) and discuss specifics of performance evaluation and compliance in that specific topic through the project. (Depending on the progress of the design studio the faculty may tie this exercise with the design studio else any project can be taken for demonstration and academic exercises).

COURSE OUTCOME

The course imparts knowledge regarding the big picture of the building performance and its compliances in Indian scenario. As this topic is vast and diverse, this course brings the specifics of building performance and compliance to the class in either coordination with the design studio based on the brief of the studio or through a project-based exercise.

REFERENCES

1. Bureau of Energy Efficiency. (2017). *Energy Conservation Building Code.* Delhi: Bureau of Energy Efficiency.
2. Bureau of Indian Standards. (1987). *SP 41 - Handbook on Functional Requirements of Buildings.* Delhi: Bureau of Indian Standards.
3. Bureau of Indian Standards. (2016). *SP 7: National Building Code.* Delhi: Bureau of Indian Standards.
4. Town and Country Planning Organisation, MoUD. (2016). *Model Building Byelaws.* Delhi: Ministry of Urban Development, GOI.
5. Wilde, P. d. (2018). *Building Performance Analysis.* UK: Wiley-Blackwell.

AR7.3.2PE: PROFESSIONAL ELECTIVE VII - OPTIMIZATION OF CONSTRUCTION WASTE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 7.3. PE	PROFESSIONAL ELECTIVE VII	50	50	-	100	45	54	3

COURSE OVERVIEW

This course makes the students understand that Construction waste is an outcome of several activities throughout the project life cycle. This subject is designed to throw light on this topic (which is generally ignored) and make them a responsible professional by teaching fundamentals for achieving holistic control of Construction Waste.

COURSE OBJECTIVES

1. To Create awareness about construction waste generation, its consequences and mitigation.
2. To familiarize students about relevant technical terminology of this subject.

COURSE CONTENT

UNIT I: Introduction to Construction waste

Introduction to Construction Industry (with specific relevance to enormous construction waste generation), Construction and Demonization waste, Construction waste definition, Classification of Construction Waste, Physical Waste, Non-Physical Waste, Construction waste audit, Need for sustainable Construction waste management (CWM)

UNIT II: Designing out construction waste

Principles for designing to address construction waste, Design for Flexibility and Deconstruction, Waste-efficient Procurement, Composite construction methods, Industrialized Building System, Off-site Construction.

UNIT III: Construction waste management concepts

Construction waste management hierarchy, Lean Construction principles, Concept of value engineering, Supply Chain Management, Reverse logistics in waste management plan of project, Extended Producer Responsibility.

UNIT IV: Current research, Role of Government and other Bodies

Construction waste management in India, factors affecting construction waste generation in Construction Industry, Responsible stakeholders, Barriers and Motivation for CW reduction, Role of C&D guidelines, LEED, IGBC and Government in mitigating construction waste.

Suggestive Note: This Course can be supported with relevant case studies for better practical exposure to students.

COURSE OUTCOME

Understanding that optimization of construction waste is of paramount importance in achieving sustainability. Designing consciously bearing in mind the need to minimize the inception of Construction Waste throughout the Building life cycle.

REFERENCES

1. Construction management Fundamentals by Knutson, Schexnayder, Fiori, Mayo, TataMcGraw Hill, 2nd Edition, 201
2. Construction Project management—Planning, Scheduling and controlling—K. K.
3. Chitkara—Eight reprint 2004, Tata McGraw Hill Publishing Company Limited.
4. Purchasing and Inventory Control- by K. S. Menon, Wheeler Publication.
5. Materials Management, P.Gopalakrishnan, Prentice Hall
6. Handbook of materials management, P.Gopalakrishnan, Sundershan, Prentice Hall.
7. Inventory Management, L.C.Jhamb, Everest Publ.
8. Charles J. Kibert, "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons Inc
9. Value Engineering: Analysis And Methodology By Del Younke
10. guidelines on environmental management of construction & demolition (c & d) wastes

AR7.4.1PE: PROFESSIONAL ELECTIVE VIII - HUMAN PSYCHOLOGY AND ARCHITECTURE

Code	Course Title	Distribution of marks				No. of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR7.4PE	PROFESSIONAL ELECTIVE VIII	50	50		100	45	54	3

COURSE OVERVIEW

The course introduces to the students, the relatively new field of architectural psychology which is born out of the synthesis between architecture and behavioral psychology. This course gives insight into how elements of the physical environment influence human attitudes and behaviors.

COURSE OBJECTIVE

The objective of this course is to explore the impacts of architecture on humans, their feelings and behavior, and to formulate recommendations for the planning and design of buildings and outdoor spaces.

COURSE CONTENTS

UNIT – I: Introduction to Environmental Psychology

Definitions and history, understanding the brain and the senses, overview of psychological experience of space, foundations of human interactions with their physical world.

UNIT – II: Influence of Architecture on Human Psyche

Impact of architecture on health, security and crime, personality and evolvement, use and behavior.

UNIT – III: Psychological Effects of Space and Light

Space: Impacts of space arrangements, shape, form, volume, edges and patterns; privacy; views; functionality and flexibility.

Light: Impacts of light on human moods, productivity and concentration, sleep cycles, decision making.

UNIT – IV: Color Psychology

The color wheel, biological reaction to color stimulus, sub-consciousness, conscious symbolism association, cultural influence, fashion trends influence, personal relations, effects of various colors.

UNIT – V: Proxemics: Influence of Architecture on Social Interaction

Introduction to proxemics; fundamental aspects of proxemics: distance, space, modes of behavior and perception; intimate space, personal space, social space, public space and behavioral patterns in those spaces.

UNIT – VI: Integrated Applications of Psychology-based Design Principles

Understanding users based on social, non-social, less active, more active; application of design principles for – intellectual living, artisan living, teammate living, sophisticated living.

Note: Suggested final assignment – term paper on 'Psychology based design principles' with special focus on any one of the following – homes, work places, retail spaces, learning environments and health care facilities – as per student's choice.

COURSE OUTCOME

This course allows the student (future architect/designer) to anticipate a user's future experience through understanding human behavior and to inculcate a better design approach towards user-sensitive design.

REFERENCES

1. Burnette, C. (1971). Architecture for human behavior. Philadelphia Chapter: AIA.
2. Canter, D. and Lee, T. (1974). Psychology and the built environment. New York: Halstead Press.
3. Clovis, H. (1977). Behavioral Architecture. McGraw Hill.
4. Zeisel, J. (1984). Enquiry by design: Tools for Environment-Behavior Research. Cambridge: Cambridge University Press.
5. Zeisel, J. and Eberhard, J. P. (2006). Inquiry by Design - Environment/Behavior/Neuroscience in Architecture, Interiors, Landscape and Planning. New York: W. W. Norton & Company.
6. Goldberger, P. (2009), Why architecture matters.
7. Goldhagen, S. (2017), Welcome to your world: How the built environment shapes our lives.
8. Botton, A. (2006), The Architecture of Happiness.
9. Akin, O. (1989), Psychology of Architectural Design.
10. Bechtel, R. and Churchman, A. (2003), Handbook of environmental psychology.
11. Augustin, S. (2009), Place Advantage: Applied Psychology for Interior Architecture.
12. Sussman, A. and Hollander J. B. (2014), Cognitive Architecture: Designing for How We Respond to the Built Environment.
13. Busbea, L. D. (2021), Proxemics and the Architecture of Social Interaction.

AR7.4.2PE: PROFESSIONAL ELECTIVE VIII - ARCHITECTURAL ILLUMINATION

Code	Course Title	Distribution of marks				No. of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR7.4PE	PROFESSIONAL ELECTIVE VIII	50	50		100	45	54	3

COURSE OVERVIEW

Understanding the elements and principles of Architectural Illumination designs in the context of interiors and exteriors will help in arriving at appropriate Illumination design solutions for any given situation.

COURSE OBJECTIVE

The course is intended to give an in-depth understanding of the scientific and design aspects of Architectural Illumination in Buildings, Interiors and Exteriors.

COURSE CONTENTS

UNIT-1.

Light and Vision: basic units, photometry and measurement, relevant codes for lighting.

Quality and quantity of light of different sources of light. Daylight, Incandescent lamps, halogen lamps, electric gas discharge lamps, fluorescent lamps, high discharge lamps. A market survey of lamps with cost and technical specifications.

UNIT-2.

Design of Lighting: Lumen method, point by point method, design tools, design documentation, simple numerical.

Specific lighting design requirement of different buildings such as homes, offices, industrial, hospital, art galleries, museums and exhibitions. Case study of at least one type of building by each student with the analysis of simulation models.

UNIT-3.

Outdoor Lighting: Roads, High masts, Tunnel, Landscape Lighting, decorative, façade, spot lighting. Lighting as determinant of form for building architecture with graphic examples.

UNIT-4.

Day lighting: Advantages of Day lighting, design tools in day lighting, case studies and various examples, behavior of day lighting in interior spaces. Potentials of day lighting as an energy resource. Day light analysis with simulation models.

Integration of day lighting with artificial, lighting controls, intelligent building systems for lighting.

UNIT-5.

Conservation of energy in lighting: use of daylight, optical fiber lighting, LED for lighting and the emerging trends and technologies in lighting.

COURSE OUTCOME

The basic principles of Architecture Illumination of different Building typologies with emphasis on art science and technology are imparted. The understanding of the intensities, colour, in the Lighting for various human activities gives rise to meaningful designing of built environments. Thus, when it comes to Buildings, interiors, outdoor Landscapes, roads, city level activities, the knowledge helps in its necessities and intensities in problem solving.

REFERENCES

1. Moore, Fuller. Concepts and practice of Architectural Day Lighting. Van Nostrand Reinhold co., New York, 1985.
2. Valia, Anil. Designing with light: A Lighting H.B. International Lighting Academy, Mumbai, 2002, Architectural Physics: Lighting.
3. Hopkinson R.G, Her Majesty stationery office, London.
4. David Egan. M, Concepts in Architectural Lighting McGraw Hill Book Company, New York, 1983.

AR7.5OE: OPEN ELECTIVE V

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 7.5OE	Open Elective V							3

COURSE OVERVIEW

The course provides the students to select any subject which they feel would help them to fully release their potential. The student can opt for any Open course approved by the University.

COURSE OBJECTIVE

To enable the candidate to choose a course of his/her interest and to develop skills in multi-disciplinary subjects in order to broaden exposure and scope for employability.

GUIDELINES FOR SELECTION OF THE COURSE

(i) Courses offered on SWAYAM/NPTEL platforms or elective courses offered by the university which do not have pre-requisites and which are approved by the academic committee and the Board of Studies of ICFAI School of Architecture shall be offered as open-electives.

(ii) Subject to approval of the academic committee of ISArch, a student may opt any professional elective course of lower semesters as open elective in a semester, given he/she hasn't pursued that course earlier.

(iii) The Approved courses shall be sent to the SWAYAM Coordinator of the University, with details of the course and the university/platform offering the course.

(iv) An Internal Faculty member shall coordinate with the course coordinator of a particular course being offered.

(v) The Courses being offered can be across other disciplines but the intent of an open elective shall focus on employability and skill enhancement.

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AR7.6EE RESEARCH METHODOLOGY IN ARCHITECTURE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 7.6EE	Research methodology in Architecture	50	50		100	45	54	3

COURSE OVERVIEW

The Research methodology in Architecture course is the first part of the three courses designed with emphasis on research philosophy and practice in the field of Architecture. This is a foundation course which aims to impart the basic knowledge about conducting research in Architecture. Various systems involved in scientific studies are introduced to the student. The course is inductive in nature and is designed to expose students to various examples in order to motivate them to introspect and identify their research interests.

COURSE OBJECTIVE

This course aims to equip the students with the ability to question the nature of reality and to design the systems of inquiry for empirical findings. The course also aims to motivate students to identify their research interests, which in turn would build a foundation for research contribution in the field of architecture.

COURSE CONTENT

UNIT I: Introduction to research

Definition of research and its contribution to the field of scientific knowledge. Types of research and an overview of basic research terminology (Variables, Data, Population, Sample, tabulation, coding, analysis, results, hypothesis, interpretation, etc.).

UNIT II: Introduction to research philosophy

World views on studying and understanding the nature of reality. Research paradigms and ontological, epistemological and axiological approaches to conducting a research. The importance and process involved in framing a research question.

UNIT III: Research in the domain of Architecture

The comparison between research and design in Architecture. Various approaches to conducting research in Architecture. Introduction to thesis writing at undergraduate level. Discussions about various cases of architectural thesis writing and diversity in approach. Primary types of research methodologies and methods used in the domain of Architecture with case references.

UNIT IV: Introspection

Exercises to motivate students identify their area of research interests. Practical sessions on framing research questions and research design for empirical findings.

COURSE OUTCOME

On completion of the course, the students will be equipped with the fundamental knowledge about the importance of research and its philosophy. The students will acquire skills to conduct basic research in the field of Architecture. This course persuades the students to introspect and understand their research interests, which in turn will form a foundation for their future research contributions.

REFERENCES

1. Linda Groat and David Wang, Architectural Research methods. John Wiley & Sons Inc., 2002.
2. C.R.Kothari, Research Methodology, methods and techniques. New Age International Publishers, 2004.
3. ElzbietaDanutaNiezabitowska, Research methods and techniques in Architecture. Routledge, 2018.

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AR7.7EE PORTFOLIO MAKING WORKSHOP

Code	Course Title	Distribution of marks				No. of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR7.7EE	PORTFOLIO MAKING WORKSHOP	50		50	100	45	54	3

COURSE OVERVIEW

The course enhances the skill of students by engaging multiple forms of representation, drawings, written and visual, students will explore methods that facilitate describing and representing their design work making an Architectural Portfolio. Students should not get carried away and over present their work in Photoshop and avoid adding unnecessary information in their portfolios. This course shall help students to prepare their portfolios for 8th semester practical training and be industry ready.

COURSE OBJECTIVE

To introspect their existing works and compile them in an orderly fashion, students may project their interest, skills, strengths, extracurricular interests, managing skills, leadership skills etc.

COURSE CONTENTS

Different mediums of representation will then be studied in order to hone an understanding of the relationship between form and content, and more specifically, the understanding of particular modes of representation as different filters through which their work can be read. This course shall encourage students to research on a variety of works highlighting their interest and strengths, like a writing portfolio, technical portfolio, presentation portfolio, video portfolio and also work on the oral presentation skills.

Portfolios must include works from all relevant art and architecture courses, hobbies and interests, varied skills of model making, photography, including recently completed courses. Students need to have different portfolios and with the option of customizing based on where the student is planning to send their portfolio.

Course may be taught as modules preferable in the beginning of semester.

COURSE OUTCOME

In the Portfolio submission, contents shall reflect the evidence of creativity, curiosity, originality, problem-solving skills and desire to make and build. The quality of the portfolio's composition is as important as the quality of any single project. It should be carefully curate and assemble to tell a compelling story of individuals and their interests, and motivation to study architecture.

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REFERENCES

1. Harold Linton, 2012. Portfolio Design. 3rd illustrated reprint edition, Published: W.W. Norton.
2. Lesley Lokko, KaterinaRuedi Ray, Igor Marjanovic · 2007. The Portfolio, 1st edition, Publisher: Routledge
3. David Dernie, 2014. Architectural Drawing. Publisher: Laurence King Publishing
4. Alex Hogrefe, 2016, Visualizing Architecture volume 4 – Architecture Portfolio, Volume 4 , Publisher: Alex hogrefe visualization LLC
5. Margaret Fletcher, 2020, Visual Communication for Architects and Designers – Constructing the Persuasive Presentation. Publisher: Taylor & Francis
6. Margaret Fletcher, 2016. Constructing the Persuasive Portfolio - The Only Primer You'll Ever Need. Publisher: Taylor & Francis
7. Geoffrey Makstutis, 2010. Architecture – An Introduction. Publisher: Laurence King Publishing
8. Karen Lewis, 2015. Graphic Design for Architects A Manual for Visual Communication, Publisher: Taylor & Francis
9. Diane Bender, 2017. Design Portfolios Presentation and Marketing for Interior Designers. Publisher: Bloomsbury Academic.
10. Vincent Hui, 2019. The Architecture Portfolio Guidebook The Essentials You Need to Succeed, Publisher: Routledge

EIGHTH SEMESTER SYLLABUS

AR8.1EE: PRACTICAL TRAINING

Code	Course Title	Distribution of marks				No. of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR8.1EE	PRACTICAL TRAINING	500		500	1000			30

COURSE OVERVIEW

Students are required to undergo mandatory Practical Training in the office of a competent practicing architect registered with the Council of Architecture or in the architectural wing/ private or non- governmental voluntary organization for the duration of one semester; students are required to be involved in the works produced in the office; evaluation shall be through a seminar presentation using hard copy of the endorsed works undertaken in the office.

COURSE OBJECTIVE

This course enables the students:

1. To understand the fundamental processes of designing of buildings and its execution at site, through live projects and handling of issues related to construction and construction management.
2. To develop apprentice's confidence in interacting with various key players in building design and construction processes.
3. To harness skill related to preparation of Working and detail drawings, quantity survey, etc. and comprehend or experience the usual conflict among various building services and the possible solutions for the project, both at design stage and execution at site.

COURSE CONTENT

Each candidate shall have to prepare a detailed report along with necessary drawings, readings, observations, log sheets about the following aspects:

1. **Log Sheet and Office Certificate:** A student shall fill the log sheets, as a record of his every day work with due authentication and shall submit the same, along with the certificate and confidential report from the Employer.
2. Students have to submit all the working details prepared by each of them, during the Training Period related to various works – (**Sketch designs, presentation drawings, Municipal drawings according to the byelaws, Workings drawings and details, Estimates, bill of quantities & specifications, Discussions with Clients, Structural Consultants and Services Consultants, Inspection and management of site,**

Preparation of 3d or Physical Models, perspectives and photographs, Innovative Details, Reports, progress charts, Architectural Research, Competition Design etc.), duly authenticated by the office. Students have to cover at least 5 chapters stated above.

For preparing the reports, students have to follow the guidelines as stated below:

1. They have to prepare reports strictly as per the subject and content stated in the syllabus.
2. They have to submit hard copies of all the documents on the date of submission at the department for evaluation by the panel of faculty members.

Note: Students have to inform the department before finalizing the training office along with the necessary details. Students have to start preparing these reports while working in the office where they are undergoing the Practical Training, as no separate time will be provided after completion of the training period for preparing these reports. Further, they will also have to be ready for the Grand Viva, which will cover their overall knowledge for both academic and practical aspects thus learned during the training period after the evaluation of the reports.

COURSE OUTCOMES

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

1. Understand the various aspects of concept making, design and execution of an ongoing project.
2. Exposure to working in a practical field with the usual complexities starting from initial design to site execution.
3. Exposure to various aspects of Tendering process and its relevance in the construction field and interaction with various key players in the construction process.

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NINTH SEMESTER SYLLABUS

AR9.1PC: ARCHITECTURAL DESIGN STUDIO IX

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR9.1PC	Architectural Design Studio IX	250		250	500	240	288	16

COURSE OVERVIEW

In this Studio, the Students shall utilize the experience gained in their previous semester (internship) as well as test their knowledge of the scope of work involved in the conception of a work of Architecture toward applying it within their projects in order to understand the complexity of the intrinsic services, nodes and agencies involved in the formulation, construction and operation of a work of Architecture. This semester shall work within the typologies and scales which possess the possibility of such an investigation into the utilitarian, formal and functional complexity of Architecture.

COURSE OBJECTIVES

Complexity in Architecture is the simultaneous involvement of diverse disciplines in the conception, construction and operations phases of a building. This Complexity could also refer to the nature of a building's program, the situation of a building in its context, the justification of its very existence in the socio-economic, political and cultural sense as well as the service-served relationship that it may satisfy with respect to an individual, a community, a group of communities, a state, a nation or even the world. In this Semester, the Design Studio shall undertake the challenge of working with complexity in Architecture while understanding the contradictions therein. To do this, we must define the nature of the said complexity which shall define the program of the studio project.

In this Studio, the students shall learn to design an Architectural Project which employs a wide range of disciplines in its construction and operations. Such assimilation of varying services within a building dictates the amalgamation or separation of circulation and hierarchies; the ordering of the public, semi-public and private spaces; the distribution of security, building services and crowd control; the impact of the built in a localized sense- human psychology, ease of access, comfort and spatial efficiency as well as in the larger perspective- the relationship of the building with its contextual factors as well as its viability and existential justification. Architecture of such complexity often caters to several diverse communities and due to the prevalence of the multitude of internal organelles that facilitate its operations, it also plays the role of a multi-cellular organism within which several smaller worlds may exist, each functioning in its own way and in its own specialized manner. The objective of this

Studio, therefore, is for a student to comprehend these inherent complexities in such Architectural typologies and gain the over-arching perspective necessary for an Architect tasked with handling projects of this Nature.

COURSE OUTCOMES

The Typologies of the aforementioned complexity could cater to a wide range of functions, from Hospitality to Healthcare, from Institutions to Office Complexes, From Cultural Facilities to Commercial ones, from Administration to Law, from Transportation to a Trans-typological amalgam defined by a unique architectural program. The Scale of such project must ensure the cross-community outreach of its service, the usability of its facilities by a wide demographical diversity as well as having the suitable scale which could afford a large influx of people, service providers and set itself up as a prominent centre of its chosen activity or function within a city, suburb, a town, a village, a state or the Nation. The students shall demonstrate the ability to design and represent such complexity in their drawings and their in-depth understanding of all parts of such an Architectural organism shall be guided by the faculty in charge.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), A mix of bibliographical and videographical references is desirable, to ensure better engagement from the students and catering to different modes of learning.]

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AR9.2PC: URBAN DESIGN

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR9.2PC	Urban Design	50	50		100	45	54	3

COURSE OVERVIEW

This course will enable students to understand the complexities of urban form through different dimensions of urban design. It will help the students to understand architecture in the context of the cities. The course aims at learning the most recent sustainable urban developments.

COURSE OBJECTIVE

1. To understand the scope and nature of Urban Design as a discipline.
2. To understand the evolution of urban forms.
3. To sensitize towards the interpretation of the various layers of the city.
4. To introduce various components and stakeholders involved in city planning.
5. To understand the role of urban conservation and sustainable development in urban design.

COURSE CONTENT

UNIT I - INTRODUCTION TO URBAN DESIGN

Urban design as a discipline, definitions, discussions on the interface between Architecture, Urban Design and Urban Planning. Methods and techniques used in Urban Design studies/projects *(e.g. mapping, photo documentation, sketching etc).*

UNIT II - HISTORY OF URBANITY

Morphology of early cities (e.g. classical cities, medieval towns, neoclassical cities, industrial towns, American grid planning, characteristics of Hindu and Muslim city plans etc). Modern movements in city design *(e.g. garden city concept, city beautiful movement).* Colonial city planning and urbanism *(e.g. white town and black town, cantonment town in India. Lutyen's Delhi, Chandigarh city planning etc).*

UNIT III - ELEMENTS OF URBAN SPACE

Discussions on the various dimensions of urban design. Study components of urban space *(e.g. block, density, neighbourhoods, streets).* Concepts associated with urban design (e.g. Neighbourhood Unit, Radburn concept, New Urbanism, Defensible Spaces, imageability and townscape concepts by Kevin Lynch and Gordon Cullen, the concept of place and genius loci etc). Social aspects of urban space *(e.g. works of Jan Gehl, Jane Jacobs, William Whyte etc).*

Jane Jacob's walk of Hyderabad may be conducted to understand the elements of Urban Space.

UNIT IV - PLANNING TOOLS AND TECHNIQUES FOR URBAN DESIGN

Role of planning agencies and development authorities, city development plan, master plan, zoning regulations, land use regulations, government policies affecting urban design (*e.g. urban land ceiling act, land acquisition act, land pooling techniques, AMRUT, JNNURM, smart city development*). Basic understanding of the elements of utility services in the city *(e.g. transportation and infrastructure planning etc*).

UNIT V - URBAN CONSERVATION, URBAN LANDSCAPE AND SUSTAINABLE DEVELOPMENT TECHNIQUES

Role of urban conservation in urban design. Introduction to various charters, HRIDAY. Approach to urban landscape design. Understanding the contemporary trends in Urban landscapes. Sustainable development goals, concepts of urban ecology and urban sustainability. Understanding the sustainable urban documentation methods and design strategies through the most recently formed long-term sustainable urban environments.

COURSE OUTCOME

The students will be able to understand the interface between architecture, urban design and urban planning. They will be able to interpret the general morphology of urban space. Understand the complexities and the role of various stakeholders that influence the development of urban form. The students are expected to understand the ways to attain spatial quality improvement by considering it as a major social need in unplanned urban sites.

REFERENCES

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3. Banerjee, T., & Loukaitou-Sideris, A. (Eds.). (2011). Companion to urban design. Routledge.
4. Gehl, J., & Svarre, B. (2013). How to study public life (Vol. 2). Washington, DC: Island press.
5. Jacobs, J. (2016). The death and life of great American cities. Vintage.
6. Lynch, K. (1960). The image of the city (Vol. 11). MIT press
7. Cullen, G. (2012). Concise townscape. Routledge.

AR9.3BS: GREEN BUILDING ARCHITECTURE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR9.3BS	Green Building Architecture	50	50		100	45	54	3

COURSE OVERVIEW

This course introduces students to the Green Rating Systems and intricacies of building documentation towards certification.

COURSE OBJECTIVE

This course introduces students to the Green building concepts, various rating systems available in India and across the globe. This course also exposes the students to the process of green building certification and professional associations with rating agencies.

COURSE CONTENT

UNIT I – Introduction to Green Building Architecture

Concepts of Green Architecture and parallel concepts, UN Sustainable Development Goals, Mandatory Codes in India regarding Green Concepts (EIA, PCB norms, BEE-ECBC, NBC, Byelaws,), Indian Perspective towards rating systems, Various rating systems across the globe (LEED, CASBEE, BREEAM, Green Star, Passivhaus, etc.), Green rating systems prevalent in India (Griha, IGBC, LEED, etc.,).

UNIT II – Scale/Type of Development – Scope of Work – Variants of Rating System

Scale of Projects and changing concerns, Rating systems for various types of development and scope of work, comparison of assessment criteria.

UNIT III – Details of Rating system – Building Level

Details of any two rating systems (choice of the faculty) may be discussed in a comparative approach along with mandatory codes. Examples of the documentation for accreditation and design feedbacks in Projects.

UNIT IV – Process of professional association & project certification

Professional associations with rating agencies in India (Griha, IGBC, LEED) – Accredited Professional, memberships, evaluators, etc., Methods of project registration and certification, Framework/Templates of project certifications.

Note:

- Assignment may include study and documentation of a project in the format required for certification.

- Students may be encouraged to go for Green Accredited Professional Certification through the course

COURSE OUTCOME

At the end of the course, students are expected to understand concepts of green rating systems in detail and know the process of professional associations with the rating agencies. They should be able to identify the right rating system applicable for the project and based on the framework of certification they should be able to make appropriate design decisions to make building more sustainable and to get higher Green rating.

REFERENCES

1. Griha Council. (2019). *GRIHA v.2019 - User Manual.* New Delhi: TERI Press.
2. Indian Green Building Council. (2016). *IGBC Green New Buildings Rating System version 3.* Hyderabad: Indian Green Building Council.
3. USGBC. (2021). *LEED v4.1 - Building Design and Construction.* U.S. Green Building Council.
4. USGBC. (2021). *LEED v4.1 - Interior Design and Construction.* U.S. Green Building Council.
5. Reeder, L. (2010). *Guide to Green Building Rating Systems.* Hoboken, New Jersey: Wiley.
6. Henderson, H., & Cortese, A. D. (2012). *Becoming a Green Building Professional.* Wiley.
7. USGBC. (2021). *LEED credit library.* Retrieved from U.S. Green Building Council: https://www.usgbc.org/credits
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AR9.4.1PE: PROFESSIONAL ELECTIVE IX - DISASTER MITIGATION & MANAGEMENT

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR9.4.1PE	Disaster Mitigation & Management	50	50		100	45	54	3

COURSE OVERVIEW

The course provides a holistic understanding of man-made and natural disasters and delves deep into the process of disaster mitigation covering disaster preparedness, management and response, institutional frameworks for disaster management, and the measures taken to build disaster resilient and resistant architecture.

COURSE OBJECTIVE

1. To equip the students with a basic understanding of disasters, its impacts and disaster management.
2. To impart the knowledge of the process of disaster management and disaster response.
3. To familiarize students with the measures taken by various institutions and agencies involved in the process of disaster preparedness, management, and mitigation.
4. To expose the students to the strategies and approaches to build disaster resistant and resilient structures.

COURSE CONTENT

UNIT I: DEFINITIONS & HISTORY OF DISASTERS

Understanding the definitions of disaster, hazard, disaster mitigation and disaster management; major natural and man-made disasters in the history of the world.

UNIT II: TYPES, CAUSES, IMPACTS AND MITIGATION MEASURES

Brief understanding of the types of Disasters-Endogenous, Exogenous, Pandemics/Epidemics; Causes of Disasters/ Hazards; Risk and Vulnerability Analysis; Impacts or Consequences; Precautionary and Control measures followed.

UNIT III: STAGES OF DISASTER MANAGEMENT AND DISASTER RESPONSE

Disaster Risk Reduction, Stages of Disaster Management (Pre-disaster stage Preparedness, Emergency stage, Post disaster Rehabilitation); Mitigation methods and Disaster management approach at every stage, Case studies across the world and in India.

UNIT IV: ORGANIZATIONS, RULES, ACTS AND POLICIES

Organizations that are involved in disaster mitigation practices and disaster management internationally and nationally; their roles and responsibilities; Acts, policies, programmes, plans, legislations. Factor of safety in structural design – implications in Architecture.

UNIT V: CONSTRUCTIVE APPROACHES

Components of disaster resilience, approaches and strategies for disaster resilience, Capacity Building, traditional and sustainable technologies for designing and constructing disaster resistant or disaster resilient structures across the vulnerable regions around the world.

Examples may include Great Musi Flood of 1908, current Pandemic of Covid 19 – Mitigation measures by BMC and other area

COURSE OUTPUT

Students will be able to describe the various stages of disaster management and mitigation. They will be able to prepare the measures for disaster preparedness and mitigation in the disaster-prone areas. They will be able to explain the technologies, approaches, and strategies for building disaster resilience in vulnerable regions through relevant case studies. This course will also enable them to formulate strategies for building resilient structures.

REFERENCES

1. Goel.S.L, (2006), 'Encyclopaedia of Disaster Management' 3 volumes, New Delhi: Deep & Deep
2. Zebrowski, Ernest Jr, (1997)-, 'Perils of a Results Planet: Scientific Perspectives on Natural Disasters', Cambridge University Press, Cambridge.
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4. Ministry of Home Affairs (MHA), (2004)-, 'National Programme for Capacity Building of Architects in Earthquake Risk Management (NPCBAERM)', National Disaster Management Division (Government of India), New Delhi.
5. Heide, Auf der E (1989), 'Disaster Response: Principles of Preparation and Coordination', C.V.Mosby, Baltimore.
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15. Sandeeka Mannakkara, S. W. (2018). *Resilient Post Disaster Recovery through Building Back Better.* Routledge.
16. Esther Charlesworth, I. A. (2015). *Sustainable Housing Reconstruction: Designing resilient housing after natural disasters.* Routledge.

AR9.4.2PE: PROFESSIONAL ELECTIVE IX – SMART CITIES

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR9.4.2PE	Smart Cities	50	50		100	45	54	3

COURSE OVERVIEW

The course offers a brief yet comprehensive insight into the concept of Smart cities and equips students with the knowledge of various aspects of smart cities such as planning, development, and management. It also introduces the students to the challenges and opportunities for the sustainable development of smart cities and the role of technology in creating smart solutions and an enabling environment for the functioning of these cities.

COURSE OBJECTIVE

1. To introduce students to the concept of smart cities and smart urban infrastructure.
2. To acquaint the students with the process of planning, implementing, and monitoring the smart cities and the associated challenges.
3. To introduce the students to the Internet of Things (IoT) and Information & Communication Technology (ICT) as important facilitators for proper functioning of Smart Cities.
4. To expose the students to successful Smart Cities of the world and broaden their understanding of smart city planning.
5. To familiarize students with the Indian Smart Cities and help them understand the process of planning Smart Cities in India.

COURSE CONTENT

UNIT I INTRODUCTION TO SMART CITIES AND SMART URBAN INFRASTRUCTURE

Introduction to City Planning, Challenges of Urbanization, Understanding Smart Cities, Need for Smart cities, Dimensions of Smart Cities – Understanding Four Pillars of Smart Cities - Social Infrastructure, Physical Infrastructure, Institutional Infrastructure (including Governance) and Economic Infrastructure and their components - city improvement (retrofitting), city renewal (redevelopment) and city extension (Greenfield development), Infrastructure of smart cities compared to other cities, Challenges for planning smart cities, Different conceptual approaches to Smart Cities.

UNIT II SMART CITIES – INDICATORS AND PERFORMANCE BENCHMARKS

Six indicators on smart city – Smart Economy, Smart Mobility, Smart People, Smart Living, Smart Governance and Smart Environment (including Smart waste and water management), New technologies available – Internet of Things (IoT) and use of Information and Communication Technology (ICT) as backbones of Smart cities. Understanding smart urban

energy systems - The infrastructure, services, and data/digital layers; Smart City Performance Measurement frameworks.

UNIT III GLOBAL EXPERIENCE OF SMART CITIES – EXPLORATION SMART CITY PLANNING AND DEVELOPMENT

Understanding the problems and potentials of contemporary cities, transition of these cities to Smart Cities; approaches to adopt effective management and governance; their managerial implication; Understanding role of city government in the network of people and their role in management/implementation of Smart Cities. Exploring global smart cities through case studies.

UNIT IV INDIA "100 SMART CITIES" – POLICY AND MISSION

Understanding Vision, Mission objectives & Initiatives and Governance of the Policy initiated by Govt. of India. Challenges to smart city planning, implementation, and management, Exploring smart cities in India through case studies and field work.

COURSE OUTCOME

Students will be able to develop an overall understanding of the smart city system and its components. They will be able to describe the different approaches to smart city design and implementation through analysis and inferences of global and Indian case-studies. Additionally, they will understand the major issues with the development and management of smart cities.

REFERENCES

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AR9.5EE: PRE-THESIS SEMINAR

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR 9.5EE	Pre-Thesis Seminar	50		50	100	45	54	5

COURSE OVERVIEW

Students shall choose a topic of interest in the field of architecture or other allied subjects which eventually aid their design process during the architectural thesis. The emphasis shall be on the critical thinking, understanding, and analysis of the chosen topic along with interpreting the various finding of the study and understanding their applicability to the design process during the architectural thesis. The pre-thesis seminar shall be conducted under the supervision of an internal guide who will be allotted to the students towards the end of Module I and the beginning of Module II. Also, a panel consisting of internal faculty members shall review the progress of work from time to time.

COURSE OBJECTIVE

1. To develop a strong theoretical foundation and clarity in the chosen allied subjects of architecture.
2. To develop a research attitude enabling an analytical and structured approach to any of the chosen areas of interest in the field of architecture or allied subjects of architecture.
3. To aid the application of the findings from the pre-thesis seminar to the design process during the Architectural thesis

COURSE CONTENT

MODULE I

Identify an area of interest from the field of architecture or allied subjects. Conduct a brief literature review. Prepare an outline defining the aim, objectives, scopes and limitations, methodology that shall be adopted.

MODULE II

Detailed literature review. Identifying the themes within the literature for the chosen area of interest. Identifying the gap in the literature. Identifying specific tools and techniques required to conduct the study. Case studies, data collection and data processing.

MODULE III

Analysis of the data. Interpretation of the results and their applicability in the design process during the architectural thesis.

MODULE IV

Presenting the study in the form of a report which follows standard referencing conventions and technical writing norms.

COURSE OUTCOME

The students will develop a research attitude that will enable them to develop a strong foundation and clarity for any subject of interest in the field of architecture or any other allied subject. The findings from the pre-thesis seminar will help them in developing a research-based strong foundation for their architectural thesis.

REFERENCES

1. Borden, I., & Ray, K. R. (2014). The Dissertation: A Guide for Architecture Students. Routledge
2. Vernooy, D.A., Shanahan, J.O. and Young, G. (2021). Undergraduate Research in Architecture: A Guide for Students. Routledge
3. Walliman, N. (2005). Your research project: a step-by-step guide for the first-time researcher. Sage.
4. Groat, L. N., & Wang, D. (2013). Architectural research methods. John Wiley & Sons.
5. Zeisel, J. (2006). Inquiry by design. Environment/behavior/neuroscience in architecture, interiors, landscape, and planning. W.W. Norton

TENTH SEMESTER SYLLABUS

AR10.1PC: ARCHITECTURAL DESIGN THESIS

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR10.1PC	Architectural Design Thesis	400		400	800	315	378	21

COURSE OVERVIEW

This Semester shall comprise of the culmination of nine semesters' worth of knowledge, investigation and training into the preparation of an Architectural Design Thesis through 'Research Design.' Herein, the focus shall be upon the evaluation of the prospective Architect's varying skills in Theorising, Programming the project, Formative impulse, Functional resolution, technical prowess, broad and focused perspective on inter-related conditions, divergent thinking and Communicative skills.

COURSE OBJECTIVE

Architecture and Planning are *Wicked Problems*, for there isn't one singular solution to a problem, nor is there a definitive consensus upon the existence of the problem itself. Often, the hurdle in Design originates from the framing of the problem in the first place, making the seeking of a solution all the more difficult. Towards the end, an Architect must realize that the design issues cannot be resolved or represented as a binary 'true-or false', but rather as a more graded good or bad. Handling such real time challenges within a studio environment results in a circular process of theorizing, proposal, design, testing and feedback. While an Architect tasked with a commission often does not have the right to be wrong, it is the cornerstone of a research studio which emphasizes investigation, scholarship and criticism. Being at the threshold of academics and Practice, it is therefore the objective of this Studio to enable a student to Propose and Design an Architectural Project of their choosing, aided by supporting research, feedback from their supervisors and defend their solution before a panel of academics and practitioners, whereby the Academic proposals would be tested in their theoretical and applied potentials highlighting the transitional nature of this final semester.

The Thesis Semester must attempt to move beyond the student's single loop learning system- a cyclic process between Actions (Designing) and Problems (Investigating the issues caused by the Design)-Actions (redesign)- until an adequate solution is reached. It must in-turn be supplemented by double-loop learning- wherein an Action followed by Investigation of the impact of the said action is also often interrupted by the critical questioning of the governing values or assumptions which were considered while framing of the Design Problem. This distinguishes this Studio from the previous ones, for it assumes the role as a meta-course.

Design by research is Applied Theory, while Research by Design is Emergent. The student may choose either of the two methods within this Semester. While the former stresses upon concrete supportive research upon which the design would be based, the latter is the investigation of a research question in continuum, aided by prototyping, testing, re-designing and often re-evaluating the foundational assumptions of the process. The Studio Supervisors must ensure that these two cases are supported and guided along their own innate methodology, for Design by Research produces an end-product reflecting its formative research, while Research by Design may potentially produce results contrary to its governing assumptions. Both of these ends are justified as a valued Thesis Project, provided they are supported by the student's methodical investigation, reasoning, response to feedback and the overall quality of work produced.

To sum up, the Architectural Design Thesis is a Research Studio which isn't merely a sum of their Architectural know how thus far, but a product of their overall growth as an individual which puts to test their ability to look at a problem through varying perspectives, balance the age-old form-function dichotomy with pathos and empathy, think divergently and display suitable prowess in the technical aspects of Architecture.

COURSE OUTCOMES

The students must define their research problem in the Pre-Thesis Lectures during their previous semesters, based upon which they shall propose the intent of their proposals.

Adopting Design by Research method, a student shall propose an Architectural Project, define its program and highlight the broad and narrow objectives intended to be achieved by the proposal. The Project must be designed over a real-world site, which shall also be proposed by the student. The appropriateness of the Site to the Proposal or vice versa must be discussed with the respective Supervisor. Following this, the student shall conduct relevant research helpful towards the conception of the project, establishing precedence and gaining insight into the construction, operations, contextual and environmental impact and propriety of the works. This research must lead to the design of an Architectural Project as defined by the student's program parameters.

> **Process**: Proposal > Architectural Programming > Case Studies > Field Study/studies (if possible or applicable) > Analysis of Site and Contextual Parameters > Conduct supportive Research > Design < > Discuss > Defence.
>
> **Example**: The Art Island: A Global Art School in Port Blair.
>
> Site: Port Blair, Andaman and Nicobar Islands.
>
> The project aims at designing a new Art School at Port-Blair which aims at creating a community of global citizen artists (artizens)and architects, fostering an environment of informal learning environments through its fluid programme and its reflection upon the built environment as well as the impact upon the socio-economic and cultural fabric of the Andamans.

In the Research by Design mode, the students shall begin with a preliminary assumption within a problem area within Architecture. The student shall reinforce his/her knowledge within the scope of the undertaking with relevant research to guide the process of experimentation. The student shall then proceed with modelling, prototyping, testing or fabricating their design iterations using a multitude of tools, including and not limited to digital techniques. The Project chosen towards such a thesis must have a real-world application within Architecture, vis a vis a building, element(s) of a building, Formal or functional prototypes corresponding to a set of parameters etc. It shall be the task of the supervising faculty to guide the student through the selection of their projects, ensuring an experimental approach in design and producing a substantive output. It is recommended that students select neither too narrow a scope (a single detail or a single space) nor an expansive one (Urban scale) considering the constraint of time and the high level of technicality involved. The final output of the student in this case shall not be judged solely based upon the achievement of its intended target, but the process of iterating, investigating and researching the design aspects of the selected topic as well as reaching confirmatory or contrary conclusions as a result of the process.

Process: Identify the Problem Area > Theoretical Research <> Case Studies to establish precedence > Formulate Guiding Assumptions <> Design <> Prototype <> Test <> Investigate/ document Data <> Inferences > Defence

Example: U2050- Art minus Architecture: Design of an Art School for the year 2050 considering Distance and Digital Learning.

Site: Hypothetical, since the project shall aim at recreating replicable prototypes.

What could such a campus look like if there's limited physical infrastructure at the location of the school, while simultaneously incorporating distributed spaces across the world tailored for such education while being digitally interconnected. The Project shall prototype spaces of learning which could enable virtual teaching with limited Physical Infrastructure. The Thesis attempts to predict the possibility, viability and impact of such an architecture upon the teaching and learning conditions in the year 2050.

REFERENCES

[The bibliographical/ Media/ Data References shall be specific to the studio project chosen, and would be selected by the concerned Faculty. The references chosen by the faculty shall include works alluding to Architectural project programming, Typology specific works (Collections Articles, Journals or Monographs), A mix of bibliographical and videographical references is desirable, to ensure better engagement from the students and catering to different modes of learning.]

AR10.2.1PE: PROFESSIONAL ELECTIVE X: INTELLIGENT BUILDING

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
10.2.1PE	Intelligent Building	50	50		100	45	54	3

COURSE OVERVIEW

In the current scenario we talk about intelligent, smart, automatic components in all fields. In case of a building, it is very necessary to reduce the energy consumption through different design method. Apart from different design method, we are moving towards different human made components which leads to conserve energy, making human life easy through different building automation system, network programming, sensors etc.

This course will enable students to understand the term Intelligent Building and the different ways to achieve that. This course will expose students to design as per the consideration of Micro climate components related to site, user interface, smart components and controlling and services through network or system integration and its optimization.

COURSE OBJECTIVE

1. To understand the meaning of Intelligent Building in broader term and its standard.
2. To understand the active and passive system within the building.
3. To understand the different system integration and building optimization with building envelope.
4. To study different communication system and safety and security system.
5. To go through different smart components and its manufacturer available in the market.

COURSE CONTENT

UNIT I INTRODUCTION TO TERM INTELLIGENT BUILDING

Introduction to Intelligent building and its standard; definition of key terms; introduction to different building elements; a historical overview of evolution of components and uses.

UNIT II ENERGY AND INTELLIGENT BUILDING

Energy consumption in building and its source; micro climate- its role and importance; Human comfort in building; energy conservation in building- different means; active and passive system.

UNIT III MANAGEMENT SYSTEMS

Introduction to Advanced Building Energy Management System and its components; Building Automation; Intelligent control of Building components; automatic building services; system

integration and building optimization with building envelope; efficient parking system; integrated communication system and safety and security system

UNIT IV MODERN SMART COMPONENTS, DEVICES AND SYSTEM

Market study of different smart components and devices; Case studies of Intelligent building (National and International) and services along with analysis of pros and cons of the systems, services, usability and devices.

COURSE OUTCOMES

By the end of the course, students will have proper idea of intelligent building and its components in broader term, different smart devices and integrated networking and communication system and automation system in the market. This will further make them updated with the current scenario and demand in design quality and space management.

REFERENCE BOOKS

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2. Vaughn Bradshaw, "The Building Environment: Active and Passive Control Systems", 2006, Wiley.
3. Ali Malkawi, "Advanced Building Simulation", 2004, Spon Press, Taylor and Francis Group.
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10. Alessia Arteconi "Evaluation of Energy Efficiency and Flexibility in Smart Buildings" 2021, MDPI
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S. Vijayalakshmi

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AR10.2.2PE: PROFESSIONAL ELECTIVE X: ARCHITECTURAL JOURNALISM

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR10.2.2 PE	Architectural Journalism	50	50		100	45	54	3

COURSE OVERVIEW

To provide students with an understanding of the practical and intellectual issues regarding publication of magazines and books about architecture. To understand the current trends within publishing within the wider historical context.

COURSE OBJECTIVE

1. To introduce the aspect of Journalism in general, theories of journalism, techniques and processes.
2. To sensitize towards contemporary architectural reportage for building reviews, article or book reviews, interviews, panel discussions etc.
3. To introduce towards Digital and print Journalism

COURSE CONTENT

UNIT I INTRODUCTION TO JOURNALISM

Introduction to journalism, Understanding objectives of Journalism – Specialized

Journalism - Emphasizing on architectural journalism, Principles and history of Architectural Journalism; Introduction to good publications of contemporary design magazines, books and websites; Regional, National and International discussion forums

UNIT II STRUCTURE OF ARCHITECTURAL JOURNALS

Aspects and skills of journalism - research, reporting, writing, editing, photography, columnists, public relationships, criticism. Advent of Digital Architecture in journalism

UNIT III INTRODUCTION TO SOFTWARE

Introduction to software needed in journalism, walk-through of buildings, production of contemporary architectural journalism, magazine compilations.

Understanding the individual demands in the context of newspapers, radio, film, and television.

UNIT IV EDITING WRITE-UPS AND BOOK REVIEWS

Understanding aspects of editing write-ups - Editing for online newspaper and magazines – Maintaining the standards and guidelines as per publication; Text preparation, Mode of presentation – in line with the Subject matter.

Basic knowledge on Press laws, Press Council of India, Multimedia/online journalism and digital developments

UNIT V EXPLORATION IN ARCHITECTURAL WRITING

Understanding requirement for an architectural journal and current issues - types of journals, works of key architectural journalists. Exploration inwriting skills - Analysis of recent historical and contemporary examples, architectural criticism, thematic categories in architectural writing

COURSE OUTCOME

1. Understanding principles and history of architectural journalism and publishing
2. Being aware of numerous contemporary formats – print, video and digital for journalism
3. Developing skills to contribute towards their own publication

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AR10.3EE PROFESSIONAL PRACTICE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR10.3EE	Professional Practice	50	50		100	45	54	3

COURSE OVERVIEW

To give an overview about the architectural profession and the relevant legal aspects, thus exposing them to holistic practicalities involved in the architectural profession.

COURSE OBJECTIVES

- To familiarize students with intricacies of architectural practice by throwing light on the responsibilities, behavioral and legal aspects involved in Architectural profession.
- To expose students to diverse job opportunities with in Architectural profession as per their choice and expertise.
- To teach them the different means of getting projects and effective office management

COURSE CONTENT

UNIT -I INTRODUCTION

Role and responsibility of architect in society, Architectural profession as compared to others Professions, Difference between Profession and Business; Architects approach to works, ways of getting works, Architectural competitions, Architects relation with project stake holders; Pre-requisite for Indians to work in other countries.

UNIT –II REGULATING AND PROMOTING BODIES

Architect's Registration, Role of COA, IIA. Architects' Act 1972, code of professional conduct & ethics, scope of work of an architect, schedule of services, scale of charges; terms & conditions of engagement; works partly executed by other architect, various precautions to be taken before taking up the work.

UNIT-III ARCHITECTURAL FIRM

types of architectural firms, proprietorship firms & partnership firms combined concerns; possible funding for startup firms; staff structure; filing of records, correspondence and drawings, maintenance of accounts; presentations in meetings, recording minutes of meeting; clerk of works, inspection, works measurement, certificate of payment to contractors; bill of quantities, schedule of rates; WTO and GATT, their relevance to architectural profession in India.

Value Addition: Visit to Architects office (Prepare a checklist before visiting, Interact with Principal Architect and Staff; Document and Present in the class)

UNIT-IV TENDERS, CONTRACTS and INSURANCE

Tenders - Public, Limited and Negotiated tender documents and allied formalities.; Contracts - Types of Contracts, General principles of Indian Contract Act; Building contracts, Conditions and Forms of Contract, Dilapidation; Insurance;

UNIT-V ACTS and REGULATIONS

COA act, Indian Arbitration act, Arbitrator/Umpire, Award; Valuation, Factors affecting valuation of land/building; Easements; Land acquisition act; Consumer protection act; Transfer of property Act, registration, Stamp duty under Registration and Govt. Building Bye laws, National Building Code.

COURSE OUTCOME

By the end of the course, students should be aware of their role and responsibility as an architect, rules of Regulating Authority, various possible job opportunities, office management and relevant Legalities involved thus preparing themselves by all means to step in as a Professional.

REFERENCES

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AR10.4SE: FOREIGN LANGUAGE

Code	Course Title	Distribution of marks				No of Sessions		Credits
		IA	EE	EJ	TM	Min	Max	
AR10.4SE	Foreign Language				100			3

COURSE OVERVIEW

The course allows the students to select any foreign language course which they feel would help them in their career. The student may opt any non-Indian language course approved by the University, which they haven't pursued earlier in their program.

COURSE OBJECTIVE

To enable the candidate to choose a foreign language course of his/her interest and to develop basic communication skills in that language to broaden exposure and scope for employability or higher education in abroad.

GUIDELINES FOR SELECTION OF THE COURSE

1. Foreign language courses offered on SWAYAM/NPTEL platforms or foreign language courses offered by the university which do not have pre-requisites or have fulfilled the prerequisites and which are approved by the University shall be registered by the student.
2. The List of Approved courses shall be sent to the SWAYAM Coordinator of the University, with details of the course and the university/platform offering the course.
3. An Internal Faculty member shall coordinate with the course coordinator of a particular course being offered.
4. The Courses being offered are intended for employability and skill enhancement for prospects across the globe.
5. Currently German, Mandarin, French, Spanish and English literature (Undergraduate level) are being offered in Swayam platform. Based on student's aspirations for language learning and availability of resources at the university, the school will propose exact list of courses with course contents, that may be offered in a particular semester with approval from the University (starting from even semester of AY 2022-23).

GRADING AND EVALUATION SYSTEM

At ICFAI School of Architecture emphasis is on continuous and regular evaluation along with end semester examination / jury. Through-out the course, across all semesters and all subjects a considerable amount of marks are for continuous - internal assessment. At end of each semester, examination / jury is conducted, and combined performance of internal (during semester) and end term is considered together for final marks of each subject.

CREDITS REQUIRED FOR SUCCESSFUL COMPLETION OF PROGRAM

Each semester has 30 credits summing up to 300 credits at the end of the Program. The number of classes per subject every semester is directly proportional to the number of credits that the subject carries out. Students are supposed to attend at-least 75% of the classes (refer to attendance policy for more details) in each subject to be eligible to write end term exam or attend final jury as per subject. End-term examination or external Jury is conducted at the end of each semester for all courses. The Program structure provides the details of the marks, sessions and credits for each subject and for each semester through the Program. Credits are issued to students once the student pass the course

EVALUATION (MARKING)

The Evaluation system at ICFAI School of Architecture has two components; the Internal Evaluation component and End Exam / Jury component. Each component has a definite weightage and is reflected as specific percentage of marks in the scheme of evaluation as described in the Program structure. The marks of each subject at the end of each semester is the sum total of internal marks(IA) and end examination / jury mark (EE / EJ).

Total Marks of each subject (M) = Internal Assessment Marks (IA) + {End Exam Marks (EE) (or) End-term Jury Marks (EJ)}

M_i = IA + EE (or) M_i = IA + EJ *(depending on the subject)*

The marks obtained by each student in each subject remains absolute. The marks of each subject are totalled to form semester total marks.

$$\text{Semester Total Marks (Sem TM)} = \sum_{i=1}^{n} M_i$$

(where 'n' is the total number of subjects registered in the semester)

(Marks allotted for each subject is detailed in course structure)

Pass percentage for each subject at end of each semester is 45% and sum aggregate of all the subject marks together is 50%.

$$M_i \geq 45\%$$

$$\text{Sem TM } (\sum M) \geq 50\%$$

Grand Total at the end of complete program is the sum total of all the marks obtained in all semesters.

$$\text{Grand Total Marks for the whole course} = \sum_{1}^{10} (\text{sem TM})$$

GRADING

At ICFAI School of Architecture marks obtained by each student in each subject, semester total and Program Grand Total remains absolute. Though the marking is absolute a grade letter and grade point is also awarded based on the percentage of total cumulative marks obtained by the student for all the subjects together at the end of the complete Program. The grade point is on a scale of 10.

The method for obtaining grade point from the percentage of marks are as per the following table

Percentage of Marks	Grade Point	Grade Letter	Notes
85% - 100%	10	O	(outstanding)
75% - 84.99%	9	A+	(minimum grade for distinction)
70% - 74.99%	8.25	A	
65% - 69.99%	7.75	B+	
60% - 64.99%	7.25	B	(minimum grade for 1st division)
55% - 59.99%	6.75	C+	
50% - 54.99%	6.25	C	
0% - 49.99%	0	F	

(with reference from COA 2017 guide lines)

A student may be given 'F' if he has scored less than 45% in either one or more registered subjects or if his semester total marks are below 50%. If a student gets 'F' grade, then he/she may have to improve marks/grades in one or more subjects as per the evaluation and makeup policy.

Each course instructor should submit the marks of individual subject (both internal and external together) at the end of semester within 5 working days after the concerned subject end exam/jury. The faculty coordinator will compile the overall marks within 8 working days after the last exam/jury.

REPORTS

At the time of final grading, in certain cases, the Instructor-in-Charge / Faculty coordinator may report certain events/facts in place of marks or grades. These can be either for individual subject or for overall marks. These reports are not to be construed as grades. The various reports listed below are elaborated in the subsequent paragraphs.

- Incomplete (I)
- Grade Awaited (GA)
- Withdrawn (W)
- Registration Cancelled (RC), Required to Register Again (RRA) and Discontinued from the Program (DP)
- Not Cleared (NC).

a) Incomplete (I)

An Instructor-in-Charge who finds that a student has not fulfilled some requirement of a course before the deadline for transmitting the grades, is satisfied that the student is able to transmit a grade or a report without this fulfilment; can use his/her discretion to give the student an opportunity. The Instructor-in-Charge can within the deadline, send a report 'I' (Incomplete) for the student and also inform the student of the same.

It shall be the responsibility of the student to contact the Instructor-in-Charge and fulfill the requirement for replacement of the 'I' report within two weeks after the end of the semester; failing which the Instructor-in-Charge will communicate whatever grade/report is possible for that situation.

b) Grade Awaited (GA)

'GA' is given in situations where operational and practical difficulties may cause a delay in transmitting of a grade or a report. Some instances when GA is given are as follows:

I. pending case of unfair means
II. pending case of indiscipline
III. for IP courses where the student is at an off campus center and the dissemination of information between the Institute and the IP center is delayed
IV. if due to genuine reasons a student is unable to appear for end-semester examination on the scheduled date and his/her request for make-up has been granted

After the case has been decided, or the IP grade getting transmitted or the makeup taken and evaluated, the GA report is converted into a valid marks or grade or report.

Whenever the report GA appears in the grade sheet, it must be converted into a marks/grade or a report later.

c) Withdrawn (W)

A student may seek withdrawal from course(s) in a semester for any of the following reasons:

I. The student is unable to attend classes for the course(s) for a genuine reason.
II. The student is unable to cope up with the normal load and withdraws from the course(s) to reduce his/her academic load for the semester.

Request for withdrawal should be made to Academic coordinator, within ten weeks of commencement of the semester. In case of withdrawal within the stipulated time, the grade sheet/transcript of the student will indicate 'W' (withdrawn) against the course(s) from which the student has withdrawn his/her registration. If the withdrawal is made after the due date, the event will be reported as 'RC'. In either of the situations, the student will have to register for the course(s) at the next offer and obtain a valid letter grade.

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d) Registration Cancelled (RC), Required to Register Again (RRA), Discontinued from Program (DP)

If a student's registration for a course has been cancelled, it will be reported in the grade sheet as 'RC'. The following are the situations when an RC report is issued:

I. Cancellation is recommended as a part of disciplinary action against the student for resorting to unfair means during examination or other unprofessional behaviour
II. Cancellation is recommended due to less than the minimum required percentage of attendance.
III. Cancellation is recommended if a provisionally admitted student fails to submit the proof of necessary documents required for registration and/or does not satisfy the minimum eligibility requirements for the admission within the prescribed time limit.
IV. Cancellation is recommended when a student persistently and/or deliberately does not pay his/her dues.

RC itself has many contextual meanings:

I. When it is clearly known that the student is required to register again in the same course, the event will be reported as RRA (Required to Register Again).
II. If RC amounts to discontinuation from the program, it will be reported as DP (Discontinued from the Program).
III. If the cancellation of registration is not reported either as RRA or as DP but as RC, it does not necessarily mean that it is free from any constraint but that the meaning of the constraint must be construed from the context in which the RC is reported.

e) Not Cleared (NC)

If a student continued to remain registered in a course (with or without lab component) but gave the instructor inadequate opportunity to evaluate him by not attending the quizzes/tests/examinations/lab sessions and other components of evaluation, or by appearing in the same for the sake of appearing, without applying himself to the task at hand, the student will be given NC (Not Cleared).

It is to be noted that a NC cannot be ignored, except under the situations described in (ii) and (iii) below:

I. Whenever a student gets a NC report in a course which is in the compulsory package of his/her program, he/she is required to register again in the same course and get a valid grade.
II. If a student has a NC report in an elective course, he/she can either repeat the course to get a valid grade or ignore it to choose another course. However, a student must get valid grades in at least the prescribed number of electives in his/her program.

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III. If a student record has a NC report in a course which remains unaccounted for, after a process of transfer has been completed, although it will not be possible for him/her to wipe out the NC report from his/her transcript, he/she can still graduate.

IV. If a student gets a NC in IP/Thesis, he/she will be required to register in the same for one more semester.

CLAUSES/GUIDELINES REGARDING END-TERM JURY (WHERE EVER APPLICABLE)

a) End term jury other than Architectural Thesis

End term jury is conducted by a panel of members. The panel constitute three members, one external examiner, one course coordinator and one internal examiner (nominated by the course instructors). The weightage for evaluation will be as follows, external examiner - 60%, Course coordinator - 20%, internal examiner - 20%.

b) Architectural thesis jury

Final Architectural thesis jury is conducted by a panel of members. The panel constitutes of four members, two external examiners, thesis guide (of that particular student) and one internal examiner (nominated by the course instructors). The weightage for evaluation for each member will be as follows; each external examiner - 30% (both together 60%), student thesis supervisor - 20%, internal examiner - 20%.

MAKE UP POLICY

Make-up examination is permitted only for the end semester comprehensive examination and for the students who have been absent for genuine medical reasons. Make-up examination should be conducted within a gap of one week from the last date of main examination. Students absent in the end term exam must apply for permission to write makeup exam from the concerned authority.

RE-REGISTRATION OF COURSE & SUPPLEMENTARY EXAMINATION

The student may be asked to attend supplementary exam / jury under following conditions.

- If a student secures less than 45% in any subject, then he/she will have to attend supplementary exam/jury.
- If a student secures less than 50% in overall marks, then he/she will have to attend supplementary exam/jury in all subjects where he/she secures less than 50%.
- A student may be given an opportunity to improve his marks in a particular subject, if his/her marks fall in-between 45%-50%, but his semester total is equal to or more than 50%. (In this case the student has a choice of improving the marks or he/she may not choose to improve).

When a student repeats a course in which he/she has already received marks, as soon as new marks are obtained, the better of the two marks are considered in the calculation of Total

Marks for both continuous evaluation and end semester examination (Both Semester and Grand).

Supplementary examination will only improve the end exam / end jury component.

In case the student wishes to improve internal assessment marks or was asked to re-register for a course because of shortage in attendance; he/she may have to re-register the course and should have certain minimum contact hours with concerned faculty in mutually agreed free hours. The minimum contact hours will be higher of the following norms either,

a. 10% of the contact hours prescribed for that subject.

(or)

b. the percentage of attendance he/she was short-off in the original registered semester.

Supplementary examinations will be conducted at the end of each year in the summer vacation. The decision of whether or not to conduct a supplementary examination or to offer re-registration of a course in a particular academic semester will rest with the school.

- A Student can re-register or write supplementary exams for any 6 courses in a term of supplementary exam.
- There is no makeup examination for the supplementary exam
- The fee for course re-registration and supplementary exams have to be paid as per the institute policy.

Every student has to clear the supplementary exams as per the following clauses.

- First year supplementary exams to be cleared before registering for third year
- Second year supplementary exams to be cleared before registering for fourth year
- Third year supplementary exams to be cleared before registering for fifth year
- Fourth and Fifth year's supplementary exams have to cleared before 8 years from the date of admission in B Arch Program. (for the duration extended beyond 5 years, the student has to register every semester as per the institute norms).

a) Special Clause Regarding Architectural Thesis (10th Semester)

Architectural Thesis is in the final semester of the B Arch Program. As suggested by the council of Architecture, a candidate shall not be permitted to enrol/register for the tenth semester, Architectural Design Thesis course unless he/she has successfully completed Practical Training / Internship. (Clause 3.4 from 2017 COA Guidelines)

MARKS SHEET

A student's marks, grades, reports, etc., at the end of every semester/term will be recorded on a marks sheet, a copy of which will be issued to him/her. The marks sheet will be withheld when a student has not paid his/her dues or when there is a case of breach of discipline or unfair means pending against him/her.

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While registration with approval of the appropriate authority is a token of permission to pursue studies, the marks sheet is a complete record of the outcome of what was intended in the registration. The various marks and reports discussed in the handbook will be appropriately used to tally the marks sheet with the registration data. It would be evident that this tally between what was registered for and what was obtained in terms of marks and reports will apply to all courses except for any course which was originally registered for, but subsequently replaced by another course through substitution.

The tally is made on a course by course basis at the end of the term to determine which of the courses have been cleared. A course is deemed to have been cleared if the student obtains a minimum passing mark in the course. However, mere clearing of the prescribed courses does not tantamount to fulfilling the requirements of graduation.

While all marks secured, reports and other pertinent information for a semester are given in a marks sheet, the chronologically organized information from the marks sheets of a student with necessary explanation constitutes his/her transcript, which is issued at the time he/she leaves the institute or on request at an intermediate point.

ATTENDANCE POLICY

Every student needs to maintain a minimum attendance of 75% in every course for which he/she is registered. The faculty in-charge in consultation with academic coordinator can recommend to the Director/Principal, ICFAI School of Architecture for condonation upto a maximum of 10% for those students who face genuine difficulty in maintaining 75% attendance (with prior permission only). The student has to Periodically monitor his attendance and abide by the school attendance policy.

Condoning process has following steps

- Faculty in-charge is supposed to make a list of students with attendance between 65% and 75%.
- The data of these students on performance indicators (internal marking assessment) are examined.
- Assignments are designed for each student to make up the deficiency (in conjunction with the topics that they missed in class).
- If the assignments were completed to the satisfaction of the instructor the student is permitted to write the exam.

If the student's attendance in any subject is less than 65% then he/she is not allowed to sit for the examination. If a student doesn't write the end semester exam or if he is not permitted to attend the end exam / jury, he is supposed to re-register for that course when it happens again.