St. PETER'S INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Deemed to be University U/S 3 of the UGC Act, 1956)
Avadi, Chennai – 600 054.

BACHELOR OF ARCHITECTURE (B.Arch.)

(I to X SEMESTERS)

REGULATIONS AND SYLLABI

UNDER

CHOICE BASED CREDIT SYSTEM

(REGULATIONS – 2025)

ST. PETER'S SCHOOL OF ARCHITECTURE

VISION OF THE DEPARTMENT

To nurture and equip young minds, develop creative and competent architects endowed with intellectual disciplines, who aspire to create a sustainable built environment that responds to climate, context and the changing needs and aspirations of the society, fully able to meet the challenges of design and management of building projects.

MISSION OF THE DEPARTMENT

Empowering individuals through a holistic and interdisciplinary approach to Architecture thereby creating professionals with a social conscience, environmental sensibility and a sense of social responsibility.

To establish the study of architecture as a foundation for life-long learning, career preparation, and a richer and contented life by developing communication skills and the ability to think critically, while promoting intellectual curiosity, aesthetic understanding, civic engagement, and appreciation of diversity.

B.Arch. PROGRAMME

(Regulations 2025)

REGULATIONS AND SYLLABI UNDER CHOICE BASED CREDIT SYSTEM

(Effective from the Academic Year 2025)

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

I. Become a practicing architect who can provide holistic and innovative solutions to needsand problems of society.

II. Find gainful employment in architectural firms/ building sector and contribute in designand decision making.

III. Be a part of organizations that influence policy and contribute to larger changes in societyand environment.

IV. Contribute to the discipline of architecture through higher studies, research and development.

V. Become a thinker and entrepreneur who can direct creative vision, explorations, servicesand products towards a better future in an interconnected world.

2. PROGRAMME OUTCOMES (POs)

After going through the 5 years of study, our B.Arch. graduates will exhibit to:

PO#	Graduate Attribute	Programme Outcomes
1	Analysis and Design Skill	Analyze and design architectural projects of all scales in a competent, innovative and appropriate manner as the situation
2	Understanding of Form and Architecture	Represent, understand and analyze forms and attributes of architecture in different ways (manual/ graphic/ diagrammatic/ digital means) so as to inform the architectural design process.
3	Ability for Cognition, Expression and Communication	Understand situations through experience and express ideas through various modes- reading, writing, speaking, art, cognitive mapping, etc., that are consistent with the self and the world.
4	Historical, Social and Cultural Awareness	Identify/ analyze/ understand with sensitivity the various cultural, social and historical aspects of architecture as well as make meaningful and contextual design decisions.
5	Critical and Creative Thinking	Critically understand/ theorize existing situations and makepositive creative transformations towards the future.
6	Knowledge in Making of Building	Understand and contribute to constructional aspects of buildings involving material strength and choice, building component and structural design.
7	Support and Services to Buildings	Understand and work out basic and advanced services for a building in an optimal manner so as to enhance the quality of life
8	Environment and Physical Context	Understand the relationships between environment and architecture and design livable buildings that are sensitive to as well as tap the potential of the environment at different
9	Skill in Building analysis and Optimization of Design	Calculate/analyze building costs and environmental performance and optimize design for varied criteria.
10	Profession and Ethics	Serve as a competent and ethical professional architect.
11	Life Long Learning, Research and Development	Understand and address specific aspects of the discipline of architecture in depth through rigorous exploratory and experimental studies and research.
12	Larger contribution to Society	Understand broader interdisciplinary connections with architectureand engage them to serve as a catalyst for positive change.

3. PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO#	Programme Specific Outcomes
1	To nurture individuals towards a better understanding of learning methods to bridge gap between theory and practice.
2	To respond to innovative needs environmental and social responsibility that one should acquire towards excellence in the field both in academics and practice.
3	. To develop a culture of enquiry, a thirst to excel in a particular field of knowledge and an ability to have a broad-minded perspective to things.
4	To nurture an intent to unlearn and reinterpreted learning's through the change, proceeding towards efficient and sustainable response to varied situations.

4. MAPPING OF PEO / PO MAPPING

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	3	3	2	3	3	3	3	3	3	3	2	3
II	2					2	2	2	2	3		
III				2	3			3				3
IV		2	1	3	2						3	
V			1	1	3			2			2	3

5. MAPPING OF COURSE OUTCOME AND PROGRAMME OUTCOME:

Year	Sem	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	1	Mathematics		2				3				2		
		History of Architecture & Culture - I	1	3	2	2								
		Architectural Drawing - I		3				2						
		Introduction to Language & English Skills			3		2							
		Art Studio			3									
		Basic Design	3	2	2	2	3							1
	2	Mechanics of Structures - I						3						
		Theory of Architecture				3	2							
		Architectural Drawing - II		3				2						
		Building Materials & Construction - I		2				3		2				
		Model Making & Architectural Delineation	2	3	3		2							
		Architectural Design - I	3	2	2	2	3	2		2				
		Vedic Principles in Traditional Indian Architecture												
II	3	History of Architecture & Culture - II				3	2							
		Mechanics of Structures - II		2				3						
		Building Materials & Construction - II						3	2	2				
		Site Surveying & Planning	2					2	3	3			3	
		Climate & Built Environment						2		3				
		Computer Aided Visualization	2	2	3									
		Architectural Design - II	3	2	2	2	3	2	1	2				
	4	Design of Structures - I						3						
		Environmental Science for the Built Environment								3				
		Building Materials & Construction - III						3		2				
		Building Services - I						2	3					
		Elements of Architecture						2		3				
		Architectural Design - III	2	2	2	3	1	3	2	3			2	2
	5	Design of Structures - II						3						
		History of Architecture & Culture - III				3	2							

III		Urban Housing				2	2	1	1	2				
		Building Materials & Construction - IV						3						
		Building Services - II						2	3	3				
		Architectural Design - IV	3	2	2	2	3	1	1	1				1
	6	Design of Structures - III						3						
		History of Contemporary Architecture				3	2							
		Professional Elective – I				3								
		Building Materials & Construction - V						3		2				
		Building Services - II						2	3	3				
		Architectural Design - V	3	2	2	2	3	2	2	3	2			2
IV	**7**	Human Settlements & Planning											3	
		Professional Practice & Ethics										3	2	3
		Professional Elective – II											3	
		Specification, Estimation and Valuation						2			3			
		Architectural Design Detailing	2	2	3									
		Architectural Design - VI	3	3	2	2	3	1	1	2	1	1	2	2
		Educational Tour												
	8	Practical Training	2	2	3	2	2	3	3	3	2	3	2	3
V	**9**	Dissertation	1	2	3	3	2	1	1	1	1	1	3	3
		Urban Design Development		1	2	3	2			2				
		Professional Elective - III											3	
		Professional Elective - IV											3	
		Professional Elective - V											3	
	10	Professional Elective - VI											3	
		Thesis	3	3	3	3	3	3	3	3	3	3	3	3

6. PROFESSIONAL CORE COURSES (PCC):

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	25ARUT102	History of Architecture & Culture - I	PCC	1	2	0	3	3
2.	25ARUJ121	Architectural Drawing - I	PCC	1	0	1	2	2
3.	25ARUP111	Art Studio	PCC	1	0	2	3	3
4.	25ARUS151	Basic Design	PCC	5	0	10	15	15
5.	25ARUT202	Theory of Architecture	PCC	1	2	0	3	3
6.	25ARUJ221	Architectural Drawing - II	PCC	1	0	1	2	2
7.	25ARUJ222	Building Materials & Construction - I	PCC	1	0	2	3	3
8.	25ARUP211	Model Making and Architectural Delineation	PCC	1	0	2	3	3
9.	25ARUS251	Architectural Design - I	PCC	5	0	10	15	15
10.	25ARUT301	History of Architecture & Culture - II	PCC	1	2	0	3	3
11.	25ARUJ321	Building Materials & Construction - II	PCC	1	0	2	3	3
12.	25ARUJ322	Site Surveying & Planning	PCC	1	0	1	2	2
13.	25ARUP311	Computer Aided Visualization	PCC	1		2	3	3
14.	25ARUS351	Architectural Design - II	PCC	5	0	10	15	15
15.	25ARUJ421	Building Materials & Construction - III	PCC	1	0	2	3	3
16.	25ARUT402	Elements of Architecture	PCC	1	0	2	3	3
17.	25ARUS451	Architectural Design - III	PCC	5	0	10	15	15
18.	25ARUT502	History of Architecture & Culture - III	PCC	1	2	0	3	3
19.	25ARUT503	Urban Housing	PCC	3	0	0	3	3
20.	25ARUJ521	Building Materials & Construction - IV	PCC	1	0	2	3	3
21.	25ARUS551	Architectural Design - IV	PCC	5	0	10	15	15
22.	25ARUT602	History of Contemporary Architecture	PCC	3	0	0	3	3
23.	25ARUJ621	Building Materials & Construction - V	PCC	1	0	2	3	3
24.	25ARUJ622	Building Services - III	PCC	2	0	1	3	3
25.	25ARUS651	Architectural Design - V	PCC	5	0	10	15	15
26.	25ARUT701	Human Settlements & Planning	PCC	3	0	0	3	3
27.	25ARUT702	Professional Practice & Ethics	PCC	3	0	0	3	3
28.	25ARUJ721	Specification, Estimation and Valuation	PCC	1	2	0	3	3
29.	25ARUJ722	Architectural Design Detailing	PCC	2	0	1	3	3
30.	25ARUS751	Architectural Design - VI	PCC	5	0	10	15	15
31.	25ARUP911	Dissertation	PCC	2	0	0	2	2
32.	25ARUT901	Urban Design Development	PCC	3	0	0	3	3
33.	25ARUS951	Architectural Design - VII	PCC	5	0	10	15	15
34.	25ARUS1051	Thesis	PCC	2	0	15	17	17

7. BUILDING SCIENCES & APPLIED ENGINEERING COURSES (BSC & AEC):

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	25ARUT101	Mathematics	BSC & AEC	2	2	0	4	4
2.	25ARUT201	Mechanics of Structures - I	BSC & AEC	2	2	0	4	4
3.	25ARUT302	Mechanics of Structures - II	BSC & AEC	2	2	0	4	4
4.	25ARUJ322	Site Surveying & Planning	BSC & AEC	1	0	1	2	2
5.	25ARUJ323	Climate & Built Environment	BSC & AEC	1	0	2	3	3
6.	25ARUT401	Design of Structures - I	BSC & AEC	2	2	0	4	4
7.	25ARUT403	Environmental Science for the Built Environment	BSC & AEC	2	0	0	2	2
8.	25ARUJ422	Building Services - I	BSC & AEC	2	0	1	3	3
9.	25ARUT501	Design of Structures - II	BSC & AEC	2	2	0	4	4
10.	25ARUJ522	Building Services - II	BSC & AEC	2	0	1	3	3
11.	25ARUT601	Design of Structures - III	BSC & AEC	2	2	0	4	4
12.	25ARUT632	Vernacular Architecture (PE)	BSC & AEC	3	0	0	3	3
13.	25ARUJ622	Building Services - III	BSC & AEC	2	0	1	3	3
14.	25ARUT635	Earthquake Resistant Architecture (PE)	BSC & AEC	3	0	0	3	3
15.	25ARUT732	Structure & Architecture (PE)	BSC & AEC	3	0	0	3	3
16.	25ARUT931	Glass Architecture & Design (PE)	BSC & AEC	3	0	0	3	3
17.	25ARUT932	Steel Architecture & Design (PE)	BSC & AEC	3	0	0	3	3
18.	25ARUT9310	Advanced Structures (PE)	BSC & AEC	3	0	0	3	3
19.	25ARUT939	Landscape Architecture (PE)	BSC & AEC	3	0	0	3	3
20.	25ARUT933	Construction Technology (PE)	BSC & AEC	3	0	0	3	3
21.	25ARUT934	Smart Cities (PE)	BSC & AEC	3	0	0	3	3
22.	25IKS001	Vedic Principles in Traditional Indian Architecture (PE)	BSC & AEC	3	0	0	3	3
2	25ARUT9313	Parametric Architecture (PE)	BSC & AEC	3	0	0	3	3

8. PROFESSIONAL ABILITY ENHANCEMENT COMPULSORY COURSES (PAECC):

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	25ARUP811	Practical Training	PAECC	6	0	10	16	16
2.	25ARUT702	Professional Practice & Ethics	PAECC	3	0	0	3	3
3.	25ARUP911	Dissertation	PAECC	0	0	10	10	2
4.	25ARUT1031	Construction & Project Management (PE)	PAECC	3	0	0	3	3

9. SKILL ENHANCEMENT COURSES (SEC):

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	25ARUJ122	Introduction to Language & English Skills	SEC	1	0	1	2	2
2.	25ARUP311	Computer Aided Visualization	SEC	1	0	2	3	3
3.	25ARUT9312	Artificial Intelligence in Design Process	SEC	1	0	2	3	3

SL. NO	Subject Area	Credits per Semester										Credits Total
		I	II	III	IV	V	VI	VII	VIII	IX	X	
1	PCC	18	26	21	21	24	21	24		18	17	190
2	BSC & AEC	4	4	9	9	7	10	3		9		55
3	PAECC							5	14	6	3	28
4	IKS		2									2
5	SEC	2		3								5
	Total	29	32	33	30	31	31	32	16	33	20	**280**

1. **Eligibility:** Candidates who passed an examination at the end of the 10+2 scheme of examination with at least 50% aggregate marks in Physics, Chemistry & Mathematics and also at least 50% marks in aggregate of the 10+2 level examination or passed 10+3 Diploma Examination with Mathematics as compulsory subject with at least 50% marks in aggregate (with effect from the Academic year 2019-20 as per the Gazette Notification in respect of CoA dated 13th February, 2019)

   and

   who passed National Aptitude Test in Architecture (NATA) administered by the Council of Architecture are eligible for admission to I year of 5-year B.Arch. Degree programme.

2. **Duration:** Five Years comprising 10 Semesters. Each semester has a minimum 90 working days with a minimum of 5 hours a day. Candidates who have completed the duration of the programme of study are permitted to appear for the arrear subjects' examinations, if any within two years after the duration of the programme.

3. **Medium:** English is the medium of instruction and examination.

4. **Weightage for Continuous and End Assessment:** The weightage for Continuous Assessment (CA) and End Assessment (EA) is 40:60 for theory courses and 50:50 for Theory cum Studio and Studio Courses unless the ratio is specifically mentioned in the Scheme of Examinations. The Question Paper is to be set for a maximum of 60 Marks.

5. **Choice Based Credit System:** Choice Based Credit System is followed with one credit equivalent to one hour for a theory paper and two hours for a practical per week in a cycle of 18 weeks (that is, one credit is equal to 18 hours for each theory paper and one credit is equal to 36 hours for a practical in a semester) in the Time Table. The total credit for the programme (10 semesters) is **280.**

6. **Passing Requirements:** The minimum pass mark (raw score) be 50% in End Assessment (EA) and 50% in Continuous Assessment (CA) and End Assessment (EA) put together. No minimum mark (raw score) in Continuous Assessment (CA) is prescribed unless it is specifically mentioned.

7. **Grading System:** Grading System on a 10 Point Scale is followed with 1 mark = 0.1 Grade point to successful candidates as given below.

CONVERSION TABLE

(1 Mark = 0.1 Grade Point on a 10 Point Scale)

Range of Marks	Grade Point	Letter Grade	Classification
90 to 100	9.0 to 10.0	O	First Class
80 to 89	8.0 to 8.9	A	First Class
70 to 79	7.0 to 7.9	B	First Class
60 to 69	6.0 to 6.9	C	First Class
50 to 59	5.0 to 5.9	D	Second Class
0 to 49	0 to 4.9	**F**	**Reappearance**

Procedure for Calculation

Cumulative Grade Point Average (CGPA) = $\frac{\text{Sum of Weighted Grade Points}}{\text{Total Credits}}$

= $\frac{\sum (CA+EA)\, C}{\sum C}$

Where Weighted Grade Points in each Course = Grade Points (CA+EA) multiplied by Credits

= (CA+EA)C

Weighted Cumulative Percentage of Marks(WCPM) = CGPAx10

C- Credit, CA-Continuous Assessment, EA- End Assessment

CURRICULUM DESIGN GUIDELINES

Course Code pattern for Theory courses											
Regulation Code	Dept. Code			Type of course	Year	Course No. in 3-4 digits			CA	EA	Total
25 for Reg. 2025	A	R	U	T for Theory	1,2,3,4, 5	1st digit (1-9)	2nd digit (0)	3rd digit (0-15)	40	60	100
Course Code pattern for Theory cum Studio courses											
Regulation Code	Dept. Code			Type of course	Year	Course No. in 3 digits			CA	EA	Total
25 for Reg. 2025	A	R	U	J for Joint	1,2,3,4, 5	1st digit (1-9)	2nd digit (2)	3rd digit (0-3)	50	50	100
Course Code pattern for Studio courses											
Regulation Code	Dept. Code			Type of course	Year	Course No. in 3 digits			CA	EA	Total
25 for Reg. 2025	A	R	U	S for Studio	1,2,3,4, 5	1st digit (1-9)	2nd digit (3)	3rd digit (1)	60	40	100
Course Code pattern for Lab Oriented courses											
Regulation Code	Dept. Code			Type of course	Year	Course No. in 3 digits			CA	EA	Total
25 for Reg. 2025	A	R	U	L for Lab	1,2,3,4, 5	1st digit (1-9)	2nd digit (1)	3rd digit (1)	40	60	100

YEAR	COURSE CODE	COURSE TITLE	CATEGORY UC/PC/PE/OE	SUB CATEGORY ENGG/HUMANITIES/MGMT/SCIENCES	CONTACT PERIODS	L	T	P/S	C	MARKS		
										CA	EA	Total
	I SEMESTER											
	THEORY											
	25ARUT101	Mathematics	PC	BS	4	2	2	0	4	40	60	100
	25ARUT102	History of Architecture & Culture - I	PC	HS	3	1	2	0	3	40	60	100
	THEORY CUM STUDIO											
	25ARUJ121	Architectural Drawing I	PC	ES	2	1	0	1	2	50	50	100
	25ARUJ122	Communication English	PC	PAEC	2	1	0	1	2	50	50	100
	STUDIO											
	25ARUP111	Art Studio	PC	PLC	3	1	0	2	3	60	40	100
	25ARUS151	Basic Design	PC	PLC	15	0	5	5	10	60	40	100
	TOTAL				29	6	9	9	**24**	300	300	600
	II SEMESTER											
	THEORY											
	25ARUT201	Mechanics of Structures I	PC	ES	4	2	2	0	4	40	60	100
	25ARUT202	Theory of Architecture	PC	PC	3	1	2	0	3	40	60	100
	THEORY CUM STUDIO											
	25ARUJ221	Architectural Drawing II	PC	ES	2	1	0	1	2	50	50	100
	25ARUJ222	Building Materials and Construction I	PC	PC	3	1	0	2	3	50	50	100
	STUDIO											
	25ARUP211	Model Making and Architectural Delineation	PC	PLC	3	1	0	2	3	60	40	100
	25ARUS251	Architectural Design I	PC	PLC	15	0	5	10	15	60	40	100
	25IKS001	Vedic Principles & Traditional Architecture	IKS	IKS	2	2	0	0	2	60	40	100
	TOTAL				32	8	9	15	**32**	340	360	700

III SEMESTER											
THEORY											
25ARUT301	History of Architecture and Culture II	PC	HS	3	1	2	0	3	40	60	100
25ARUT302	Mechanics of Structures II	PC	ES	4	2	2	0	4	40	60	100
THEORY CUM STUDIO											
25ARUJ321	Building Materials and Construction II	PC	PC	3	1	0	2	3	50	50	100
25ARUJ322	Site Surveying and Planning	PC	PC	2	1	0	1	2	50	50	100
25ARUJ323	Climate and Built Environment	PC	BS	3	1	0	2	3	50	50	100
STUDIO											
25ARUP311	Computer Aided Visualization	PC	PAEC	3	1	0	2	3	50	50	100
25ARUS351	Architectural Design II	PC	PLC	15	0	5	10	15	60	40	100
TOTAL				31	7	9	17	**33**	290	310	600
IV SEMESTER											
THEORY											
25ARUT401	Design of Structures I		ES	4	2	2	0	4	40	60	100
25ARUT402	Elements of Architecture		PC	3	3	0	0	3	40	60	100
25ARUT403	Environmental Science for the Built Environment		BS	2	2	0	0	2	40	60	100
THEORY CUM STUDIO											
25ARUJ421	Building Materials and Construction III		PC	3	1	0	2	3	50	50	100
25ARUJ422	Building Services I		ES	3	2	0	1	3	50	50	100
STUDIO											
25ARUS451	Architectural Design III	PC	PLC	15	0	5	10	15	60	40	100
TOTAL				30	10	7	13	**30**	290	310	600

V SEMESTER											
THEORY											
25ARUT501	Design of Structures II	PC	ES	4	2	2	0	4	40	60	100
25ARUT502	History of Architecture and Culture III	PC	HS	3	1	2	0	3	40	60	100
25ARUT503	Urban Housing	PC	HS	3	3	0	0	3	40	60	100
THEORY CUM STUDIO											
25ARUJ521	Building Materials and Construction IV	PC	PC	3	1	0	2	3	50	50	100
25ARUJ522	Building Services II	PC	ES	3	1	0	2	3	50	50	100
STUDIO											
25ARUS551	Architectural Design IV	PC	PLC	15	0	5	10	15	60	40	100
TOTAL				31	8	9	14	**31**	280	320	600
VI SEMESTER											
THEORY											
25ARUT601	Design of Structures III	PC	ES	4	2	2	0	4	40	60	100
25ARUT602	History of Contemporary Architecture	PC	HS	3	3	0	0	3	40	60	100
	Professional Elective I	PE	PE	3	3	0	0	3	40	60	100
THEORY CUM STUDIO											
25ARUJ621	Building Materials and Construction V	PC	PC	3	1	0	2	3	50	50	100
25ARUJ622	Building Services III	PC	ES	3	2	0	1	3	50	50	100
STUDIO											
25ARUS651	Architectural Design V	PC	PLC	15	0	5	10	15	60	40	100
TOTAL				31	11	7	13	**31**	280	320	600

VII SEMESTER											
THEORY											
25ARUT701	Human Settlements & Planning	PC	PC/OE*	3	3	0	0	3	40	60	100
25ARUT702	Professional Practice and Ethics	PC	HS	3	3	0	0	3	40	60	100
	Professional Elective II	PE	PE	3	3	0	0	3	40	60	100
THEORY CUM STUDIO											
25ARUJ721	Specification, Estimation and Valuation	PC	PAEC	3	1	2	0	3	50	50	100
25ARUJ722	Architectural Design Detailing	PC	PC	3	2	0	1	3	50	50	100
STUDIO											
25ARUS751	Architectural Design VI	PC	PLC	15	0	5	10	15	60	40	100
25ARUP711	Educational Tour **	PC	PLC	2	-	-	2	2	-	-	-
TOTAL				32	12	7	13	**32**	280	320	600
VIII SEMESTER											
PROFESSIONAL INTERNSHIP											
25ARUP811	Practical Training	PAEC	PLC	16	0	6	10	16	60	40	100
TOTAL				16	0	6	10	**16**	60	40	100
IX SEMESTER											
THEORY											
25ARUP911	Dissertation	PC	HS	6	0	1	5	6	60	40	100
25ARUT901	Urban Design Development	PC	HS	3	3	0	0	3	40	60	100
	Professional Elective III	PE	PE	3	3	0	0	3	40	60	100
	Professional Elective IV	PE	PE	3	3	0	0	3	40	60	100
	Professional Elective V	PE	PE	3	3	0	0	3	40	60	100
STUDIO											
25ARUS951	Architectural Design VII	PC	PLC	15	0	5	10	15	60	40	100
TOTAL				33	12	6	15	**33**	180	220	400

X SEMESTER											
THEORY											
	Professional Elective VI	PE	PE	3	3	0	0	3	40	60	100
STUDIO											
25ARUS1051	Thesis	PC	PLC	12	0	7	10	17	60	40	100
TOTAL				20	3	7	10	**20**	100	100	200
GRAND TOTAL OF CREDITS FOR ALL 10 SEMESTERS OF STUDY								**280**			
PROFESSIONAL ELECTIVES											
Professional Elective I (III-year VI sem)											
25ARUT631	Theory of Design		PE	3	3	0	0	3	40	60	100
25ARUT632	Vernacular Architecture		PE	3	3	0	0	3	40	60	100
25ARUT633	Visual Communication and Architecture		PE	3	3	0	0	3	40	60	100
25ARUT634	Road Safety & Civic Sense		PE	3	3	0	0	1	40	60	100
25ARUT635	Earthquake Resistant Architecture		PE	3	3	0	0	1	40	60	100
25ARUT636	Industrial Safety		CE	3	3	0	0	1	40	60	100
Professional Elective II (IV-year VII sem)											
25ARUT731	Interior Design		PE	3	3	0	0	3	40	60	100
25ARUT732	Structure and Architecture		PE	3	3	0	0	3	40	60	100
25ARUT733	Architectural Journalism and Photography		PE	3	3	0	0	3	40	60	100
25ARUT734	Chennai – Evolution and Architecture		PE	3	3	0	0	3	40	60	100
Professional Elective III (V year IX sem)											
25ARUT930	Contemporary Building Materials		PE	3	3	0	0	3	40	60	100
25ARUT931	Glass Architecture and Design		PE	4	2	0	2	3	40	60	100
25ARUT932	Steel Architecture and Design		PE	3	3	0	0	3	40	60	100
25ARUT933	Construction Technology		PE	3	3	0	0	3	40	60	100
25ARUT934	Smart Cities		PE	3	3	0	0	3	40	60	100
25ARUT935	Architectural Criticism		PE	3	3	0	0	3	40	60	100

Professional Elective IV (V year IX sem)											
25ARUT936	Contemporary Process in Architectural Design		PE	3	3	0	0	3	40	60	100
25ARUT937	Energy Efficient Architecture		PE	3	1	2	0	3	40	60	100
25ARUT938	Architectural Conservation		PE	3	3	0	0	3	40	60	100
25ARUT939	Landscape Architecture		PE	3	3	0	0	3	40	60	100
Professional Elective V (V year IX sem)											
25ARUT9310	Advanced Structures		PE	3	3	0	0	3	40	60	100
25ARUT9311	Sustainable Architecture and Planning		PE	3	3	0	0	3	40	60	100
25ARUT9312	Artificial Intelligence in Design Process		PE	3	3	0	0	3	40	60	100
25ARUT9313	Parametric Architecture		PE	3	3	0	0	3	40	60	100
Professional Elective VI (V year X sem)											
25ARUT1031	Construction and Project Management		PE	3	3	0	0	3	40	60	100
25ARUT1032	Disaster Management		PE	3	3	0	0	3	40	60	100

Part A: 10 questions (with equal distribution to all units in the syllabus). Each question carries 2 marks.

Part B: 5 questions with either or type (with equal distribution to all units in the syllabus). Each question carries 8 marks.

(b) **Assessment of Studio Courses:** Portfolio examined through a viva voce Examination by one internal faculty and one external faculty appointed by CoE.

(c) **Assessment of Educational Tour:** Students are taken to a tour to various historic and architectural buildings present either North India or South India to provide practical and experimental learning that compliments the syllabus. No Examination is conducted and the 2 Credits can be awarded directly to the student.

(d) **Assessment of Architectural Thesis:** Every candidate shall submit at the end of the X Semester a thesis on a subject approved by the Thesis Review Committee constituted by the Head of the department which shall comprise of the Head of the Department/ Thesis Coordinator, supervisor of thesis and two external architects. The thesis shall be evaluated for a weightage of 60% of the total marks by the review committee through continuous internal assessment with a minimum of 5 reviews with equal weightage for each review.

For the X Semester Architectural thesis, the end semester viva – voce examination will be conducted by a panel of two external examiners (including

Practicing Architects) appointed by the CoE who shall each award 50% of the marks allocated for Viva Voce Examination. The head of Department /Thesis Coordinator and the Supervisor of the thesis shall be present for the viva voce examination.

(d) **Assessment of Practical Training:**

(i) Every candidate shall undergo practical training in the IX Semester

(ii) Every candidate is required to undertake the entire duration of practical training.

(iii) Continuous assessment for Practical Training shall be done for a weightage of 50% of the total marks out of which 80% of the marks will be assigned by the practicing architect in whose office the candidate is undergoing training. The principal Architect will give three assessments in each semester as per the academic schedule of the University and 20% will be awarded by the coordinator(s) of the practical training for the submitted portfolio of works at the end of the Semester.

(iv) Practical Training shall commence on the reopening day of the IX semester and conclude on the last working day of that semester as per the academic schedule of the Institute.

(v) Final Portfolio will be examined through a viva voce Examination by one internal faculty & one external examiner appointed by CoE at the end of IX semester.

Effective Period of Operation for the Arrear Candidates: Three Year grace period is provided for the candidates to complete the arrear examination, if any.

Registrar

SYLLABUS

25ARUT101	MATHEMATICS	L	T	P/S	C	Total Marks
		2	2	0	4	100

COURSE OBJECTIVE

- Identifying practical problems to obtain solutions involving trigonometric and exponential functions.
- Studying the properties of lines and planes in space, along with sphere and providing a tool too.
- Understand 3D material.
- Understand functions of more than one variable, along with differentiation under integral sign.
- Solving differential equation of certain type.
- Analyzing data collection and interpretation of results using statistical tools.

Unit - 1 TRIGONOMETRY AND MENSURATION 9 hrs.

Use of Mathematics in Architecture with Examples.Trigonometric (sine, cosine and tan functions) and exponential functions, De-Moiver's theorem. Area of plane figures, computation of volume of solid figures.

Unit - 2 THREE-DIMENSIONAL ANALYTICAL GEOMETRY 9 hrs.

Direction cosines and ratio's – Angle between two lines – Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere.

Unit - 3 INTEGRATION AND FUNCTIONS OF TWO VARIABLES 9 hrs.

Integration of rational, trigonometric and irrational functions, properties of definite integrals, Reductions formulae for trigonometric functions, Taylor's Theorem - Maxima and Minima (Simple Problems).

Unit - 4 ORDINARY DIFFERENTIAL EQUATIONS 9 hrs.

Linear equations of second order with constant coefficients – Simultaneous first order linear equations with constant coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form.

Study Examples: Study of Eiffel tower Differential Equation,Heat Loss building Calculation

Unit - 5 BASIC STATISTICS AND PROBABILITY 9 hrs.

The arithmetic mean, median, mode, standard deviation and variance - Regression and correlation - Elementary probability - Laws of addition and multiplication of probabilities - Conditional probability – Independent events.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will be able to

CO1: Relate the mathematical trigonometric concepts to the development of architectural concepts and design elements

CO2: Relate the application of analytical geometry in the architectural practice for element property analysis, site surveying & planning, setting out design on site and area calculations of various shapes & planes.

CO3: Understand the application of integration and functions of two variables in architecture.

CO4: Understand the application of differential equations in the design of famous architectural marvels

CO5: Understand the application of statistics and probability in the project management of architectural projects

TEXT / REFERENCE BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Gupta S.C and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 9th Edition,1996.

USEFUL WEBSITES:

- https://en.wikipedia.org/wiki/Mathematics_and_architecture
- https://www.colorado.edu/today/2005/01/04/elegant-shape-eiffel-tower-solved-mathematically-cu-boulder-prof#:~:text=Weidman%20said%20the%20Eiffel%20Tower,for%20the%20effects%20of%20wind.
- https://www.youtube.com/watch?v=YtKkGzyXQ1w
- https://www.youtube.com/watch?v=RI0hgYUIYDY
- https://www.embibe.com/exams/real-life-applications-of-trigonometry/#:~:text=Architects%20use%20trigonometry%20to%20calculate,sun%20shading%20and%20light%20angles.
- https://prezi.com/u7xd5pnaqllh/how-trigonometry-is-used-in-architecture/
- https://sciencing.com/use-trigonometry-architecture-6631509.html
- https://en.wikipedia.org/wiki/Trigonometry
- https://prezi.com/wrffk8lpncxv/calculus-in-architecture/

25ARUT102	HISTORY OF ARCHITECTURE & CULTURE - I	L	T	P/S	C	Total Marks
		1	2	0	3	100

COURSE OBJECTIVE

- To give an overall understanding of the architecture in India up to the colonial period as parallel and sequential productions rising from the cumulative effect of forces operating and intersecting in the Indian subcontinent.
- To inform about specific and prominent modes of architecture in terms of evolution, function, morphology and character.
- To give exposure to works that are architecturally exemplary and/or representative.
- To appreciate architecture as giver of particular and universal meaning.

Unit - 1 EARLY INDIA AND ITS CULTURAL PRODUCTIONS 10 hrs.

Overview of early history of the Indian subcontinent bringing out different conjectures. Indus Valley Civilization and its society, culture and urbanism. Vedic culture, settlements and architecture through textual and inscriptional sources as well as conjectures. Outline of textual sources related to architecture and town planning in ancient India. Political, religious and cultural history of India in the first millennium outlining various empires.

Evolution of Hinduism, Buddhism and Jainism. Interrelationships among them and timelines. Architecture of early Mauryan empire. Buddhist architecture and art. Stupas, chaitya halls and viharas. Hindu temple form – principles, morphology, meaning, symbolism, iconography and rituals, classification. Early Hindu temple architecture and rock cut architecture of Guptas, Chalukyas and Pallavas. Influence of Buddhist architecture on them.

Study of important monuments for all the above.

Unit - 2 ARCHITECTURE OF SOUTHERN INDIA 10 hrs.

Outline history of South India with particular emphasis on Bhakthi movement and evolution of temple town urbanism and architecture.
Art and architecture under the Pallavas, Cholas, Pandyas, Nayaks and Vijayanagara kingdom with specific focus on Hindu temple architecture. Influence of social and political history on them.
Hoysala architecture.
Study of important monuments for all the above.

Unit - 3 ARCHITECTURE OF NORTHERN INDIA 7 hrs.

Architecture of Gujarat, Orissa, Madhya Pradesh and Rajasthan with specific focus on Hindu temple architecture.
Architecture of step wells in Northern India and their socio-cultural importance.
Study of important monuments for all the above.

Unit - 4 INTRODUCTION TO ISLAMIC ARCHITECTURE AND EARLY ISLAMIC ARCHITECTURE IN INDIA 9 hrs.

Brief history of Islam. Islamic architecture of the world as rising from Islam as a socio-cultural and political phenomenon. Early political history of Islam in India. Evolution of building types in terms of forms and functions. Principles and characteristics of Islamic architecture - to include aspects of religion, geometry, structure, materials, decoration, light.
Early Islamic architecture of Punjab. Evolution of Islamic architecture under the Delhi Sultanate - Slave, Khaji, Tughlaq, Sayyid and Lodi dynasties.
Study of important monuments for all the above.

Unit - 5 REGIONAL ISLAMIC ARCHITECTURE, MUGHAL ARCHITECTURE AND AFTER IN INDIA 9 hrs

Political History of the Mughals. Spread of Islam into other regions of India and their architectural expressions - Gujarat, Bengal, Malwa and the Deccan. Study of important monuments for all the above.
Mughal architecture and urbanism under Humayun, Akbar, Shahjahan and Aurangazeb. Outline of Post Mughal Islamic architecture. Study of important monuments for all the above.
Outline of architecture and study of important monuments related to Islam in Tamil Nadu.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have acquired

- An understanding of the diversity of architecture in India and sensitivity towards its syncretic aspects.
- The ability to appreciate particular cultural, symbolic, spatial and material qualities in architecture and cities as givers of meaning and continuity
- The ability to appreciate universal qualities of architecture and their effects.

TEXT / REFERENCE BOOKS

- Satish Grover, 'Buddhist and Hindu Architecture in India', CBS, 2008.
- Satish Grover, 'Islamic Architecture in India', CBS, 2012.
- Percy Brown, 'Indian Architecture (Buddhist and Hindu Period)', Taraporevala and Sons, Bombay, 2014.
- Percy Brown, 'Indian Architecture (Islamic Period)', Taraporevala and Sons, Bombay, 2014.
- K.A. Nilakanta Sastri, 'A History of South India: From the Prehistoric Times to the Fall of Vijayanagar', Oxford University Press, 2007.
- Ananda K. Coomaraswamy, 'The Dance of Siva: Essays on Indian Art and Culture', Rupa Publications, 2013.

USEFUL WEBSITES:

- https://www.britannica.com/art/Indian-architecture
- https://www.floma.in/interesting-reads/history/9-indian-architectural-styles-that-developed-the-course-of-history
- https://www.youtube.com/watch?v=iYAiqTOz3vg
- https://www.youtube.com/watch?v=QTh9l7WLxl4
- https://www.youtube.com/watch?v=z_PWMzKrShQ
- https://www.youtube.com/watch?v=8oMLJnkR1qw
- https://www.youtube.com/watch?v=iYAiqTOz3vg
- https://www.youtube.com/watch?v=oUssv4vEU4w
- https://www.youtube.com/watch?v=juc3msgLMoc
- https://www.youtube.com/watch?v=f8NRoUqczzc
- https://www.youtube.com/watch?v=QTh9l7WLxl4&list=RDCMUCTLWMavGF65R3p0JzCCmRTA&start_radio=1
- https://www.youtube.com/watch?v=NBG9uHHzxcc
- https://www.youtube.com/watch?v=3yw0a7GvS7Q
- https://www.youtube.com/watch?v=I4KV_qCZsyQ
- https://www.youtube.com/watch?v=qPn0NsZDtkk
- https://www.youtube.com/watch?v=_WypT8RPUxg
- https://www.youtube.com/watch?v=WIcxPIv2lWE

25ARUJ121	ARCHITECTURAL DRAWING – I	L	T	P/S	C	Total Marks
		1	0	1	2	100

COURSE OBJECTIVE

- To understand drawing as a medium to visualize and communicate design ideas.
- To understand the concepts of Architectural Drawing with the introduction of drafting fundamentals.
- To understand the language of Architectural representations through Architectural Drawing systems.
- To introduce the basics of measured drawing.

Unit - 1 GEOMETRICAL DRAWING: INTRODUCTION TO DRAFTING 10 hrs.

Introduction to fundamentals of drawing/ drafting: Construction of lines, line value, line types, lettering, dimensioning, representation, format for presentation, use of scales etc.
Construction of lines and angles, construction of triangles, circles, tangents, curves and conic sections.

Unit - 2 PLANE GEOMETRY AND SOLID GEOMETRY 10 hrs.

Construction and development of planar surface – square, rectangle, polygon etc.
Introduction of multi- view projection – projection of points, lines and planes. Multi- view projection of solids – cube, prism, pyramids, cones, cylinders etc. Sections of solids, true shape of solids.

Unit - 3 ARCHITECTURAL DRAWING SYSTEMS 7 hrs.

Communicating Architectural Design Ideas from Concept to Construction - Case studies of Architect's Sketches translated as Drawing systems – Types of Projection systems and Pictorial systems – Types of Pictorial systems such as Multi view, Para line and Perspective drawings.

Unit - 4 MULTIVIEW AND PARALINE DRAWINGS 9 hrs.

Principles of Orthographic views – Reading multi view drawings - Representing materials in Architectural Design and Construction drawings – Drafting of Building Components in Plans – Elevations – Sections through Case studies of Architects' drawings – Construction of Para line drawings – Isometric and Axonometric.

Unit - 5 MEASURED DRAWING 9 hrs.

Introduction to fundamentals of measured drawing, format for presentation methods,
Techniques of measuring buildings and their details –Measured drawing of simple objects like furniture, ornamentation, measured drawing of building components like column, door, window, cornice, etc. isometric projections of simple construction details of the building components.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have acquired

CO1: An understanding on the concepts of architectural drawing as well as representation skills

CO2: An understanding on the building representation in 2D and 3D among students in addition to preparation of measured drawing.

TEXT / REFERENCE BOOKS

- I.H.Moris, *Geometrical Drawing for Art Students*; Universities Press 2012.
- Francis D. K. Ching, "*Architectural Graphics*", John Wiley and Sons, 2009. Satish Grover, *'Islamic Architecture in India'*, CBS, 2012.
- Francis D.K.Ching with Steven P.Juroszek, "*Design Drawing*" John Wiley & Sons, Inc. Second edition, reprint 2012.

USEFUL WEBSITES:

- https://www.britannica.com/topic/isometric-drawing
- https://www.archdaily.com/889367/20-technical-architecture-drawing-tips
- https://www.archisoup.com/architectural-drawing
- https://www.designingbuildings.co.uk/wiki/Types_of_drawings_for_building_design
- https://www.designingbuildings.co.uk/wiki/Types_of_drawings_for_building_design
- http://arch-student.com/pin/how-to-draw-isometric-perspective-architecture-drawing-tutorials/
- https://archinect.com/forum/thread/130868126/detailed-isometric-drawings-best-and-efficient-way
- http://www.theplanjournal.com/article/crafting-architectural-measured-drawings#:~:text=Merriam%20Webster's%20states%20that%20a,of%20the%20building%20and%20delineate
- https://micharchijourney.wordpress.com/semester-3-5/methods-of-documentation-and-measured-drawings-3/
- https://www.firstinarchitecture.co.uk/measured-survey-how-to-measure-a-building/

25ARUJ122	INTRODUCTION TO LANGUAGE & ENGLISH SKILLS	L	T	P/S	C	Total Marks
		1	0	1	2	100

COURSE OBJECTIVE

- Enhance communication skills in English by developing their listening, speaking, reading and writing skills.
- Develop their speaking skills with specific reference to prospective/actual clients, suppliers, business partners and colleagues.
- Enhance their reading particularly, rules and regulations, catalogues, architecture journals and textbooks.
- Develop their writing skills especially writing emails, proposals and reports.

Unit - 1 INTRODUCTION 10 hrs.

Listening- short talks, interviews and discussions from various media Speaking-negotiating meaning, convincing people- describing places- Reading- texts on architecture-Writing- process descriptions -Vocabulary Development-Abbreviations and Acronyms. Grammar- Suitable tenses to write descriptions and describe.

Unit - 2 SPEAKING, READING AND WRITING 10 hrs.

Listening –listen to talks for specific information- Speaking- Speaking- preparing a presentation using the computer, participating in small group discussion- Reading- lengthy articles related to architecture and construction Writing- writing formal emails, vocabulary- appropriate words to describe topics in architecture, Grammar- suitable grammar for writing a report.

Unit - 3 DESCRIPTIVE PRESENTATION 7 hrs.

Listening- Descriptions of place, conversations and answering questions, Speaking- making a power point presentation on a given topic, Reading- architecture manuals, Writing- writing a report, writing essays-descriptive essays, Vocabulary- adjectives of comparison, Grammar-collocations

Unit - 4 ANALYTICAL PRESENTATION 9 hrs.

Listening- TED talks, Speaking- participating in group discussions, Reading- reading and interpreting visual information, Writing- writing analytical essays and argumentative**,** Vocabulary-suitable words to be used in analytical and argumentative essays, Grammar- subject-verb agreement.

Unit - 5 PROJECT PROPOSAL PRESENTATION 9 hrs.

Listening- ink talks and longer talks, Speaking- talking about one's project proposal, Reading-reading essays on construction, buildings, different schools of architecture, Writing- writing proposals, Vocabulary- related vocabulary, Grammar- Cohesive devices.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have acquired

CO1: Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, and argue using appropriate communicative strategies.

CO2: Read different genres of texts, infer implied meanings and critically analyze and evaluate them for ideas as well as for method of presentation.

CO3: Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

CO4: Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.

TEXT / REFERENCE BOOKS

- Sharon Hendenreich *English for Architects and civil Engineers* - Springer, 2014 ISBN 978-3-658-030-63- (e-book).
- Chris Mounsey: *Essays and Dissertation* (Oxford University Press) February 2005.
- Sidney Greenbaum: *The Oxford English Grammar* (Oxford University Press) March 2005.
- Krishna Mohan and Meera Banerji: *Developing Communication Skills* (Mac Millan india Ltd)[2000].
- Krishna Mohan and Meenakshi Raman: *Effective English Communication* (Tata Mc-Graw Hill) [2004].

USEFUL WEBSITES:

- http://www.arkenglish.net/
- https://www.youtube.com/watch?v=UfTcNVqEMIs
- www.cambridgescholars.com
- www.robertdwatkins.com/Englishworkbook.pdf

25ARUP111	ART STUDIO	L	T	P/S	C	Total Marks
		1	0	2	3	100

COURSE OBJECTIVE

- To develop presentation skills, visual expression and representation, imaginative thinking and creativity through hands on working with various mediums and materials.
- To familiarize the students with the various mediums and techniques of art through which artistic expression can be achieved
- To involve students in a series of exercises which will look at graphic and abstract representations of art
- To sensitize students to the grammar of visual perception by involving them in a series of free hand exercises to understand form, proportion, scale, figure ground etc.,

Unit - 1 BASICS OF DRAWING 9 hrs.

Introduction to Drawing through various period of History - Seeing (Observation / Proposition / Scale / Texture through study of still life and natural objects), Visualizing (Memory Drawing / Exploratory Drawing), Expressing (Qualities of Lines / Drawing tools and Quality of Expressions – Pen, Pencil, Charcoal, Marker) – Abstraction and communication (Sketching and Free hand perspective Drawing)

Unit - 2 DRAWING FROM OBSERVATION 9 hrs.

The processes of seeing, Imagining and Representing - Observations on Line and Shape - Observation on Tone and Texture - Observations on Form and Structure - Observations on Space and Depth - Sketching Exercises related to the contents specified above.

Unit - 3 GRAPHIC DESIGN 9 hrs.

Introduction to history of Graphic Design – Visual perception theory (Gestalts) – Principle of Compositions – Colour Theory – Type Design and Typography (Layouts / Format / Calligraphy) – Environmental Graphics (Signage / Logo / enhancing the built environment) – Exercises in environmental graphic design, color and composition.

Unit - 4 PAINTING 9 hrs.

Introduction to Art / Artists' / Movements and Styles before and after industrial revolution and its implication on design and architecture – Mediums, Techniques and Tools (Water colours / Posters / Acrylic / Inks / Brushes / Knives / Mixed Media) - Exercises using various techniques and mediums.

Unit - 5 CULTURE - CRAFT - TECHNOLOGY 9 hrs.

Understanding Culture and Craft – Understanding Craft and Technology – Material exploration (Wood / Metal / Clay / Printing) - to be Explored as Workshop Modules - Print Making / Wood Carving / Clay Sculpting / Casting / Sheet Metal etc.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have acquired

CO1: Exposure to various mediums, techniques and tools.

CO2: Mastery in sketching, visualizing and expression through manual drawing, sensitized to culture, craft and context.

CO3: Skill in Handling Materials and in Making Products.

TEXT / REFERENCE BOOKS

- The Thames and Hudson Manual of Rendering with Pen and Ink by Robert W. Gill
- Webb, Frank, "The Artist guide to Composition", David & Charles, U.K., 1994.
- Ching Francis, "Drawing a Creative Process", Van Nostrand Reinhold, New York, 1990.
- Alan Swann, "Graphic Design School", Harper Collins, 1991.
- Envisioning Architecture – an analysis of drawing, Iain Fraser & Rod Henmi, 1991
- Moivahuntly, "The artist drawing book", David & Charles, U.K., 1994.

USEFUL WEBSITES:

- http://www.ijetch.org/vol8/874-A0128.pdf
- https://www.youtube.com/watch?v=ivP1sxVDKwA
- https://www.youtube.com/watch?v=3zJ1F2tXvPY
- https://www.youtube.com/watch?v=7itdNUtEiWA

25ARUS151	BASIC DESIGN	L	T	P/S	C	Total Marks
		5	0	10	15	100

COURSE OBJECTIVE

- To understand the elements and principles of Basic Design as the building blocks of creative design through exercises that will develop originality, expression, skill and creative thinking.
- To involve students in a number of exercises to understand the grammar of Design and Visual composition.
- To enable the understanding of 3D Composition by involving students in a number of exercises which will help generation of a form from a two dimensional / abstract idea.
- To understand architecture as a craft, of making and of putting together.
- To sensitize students to materials both planar and plastics and Processes involved in working with them.
- To draw inspiration and clues from nature.
- To introduce Drawing as an analytical tool.
- To introduce students to History of Design and craft.

UNIT - 1 ELEMENTS OF DESIGN & SPATIAL DESIGN 30 hrs.

Introduction to Spatial Design, Form and Structures through Basic Design – Elements of Design: Properties, qualities and characteristics of point, line, direction shape, form, colour and texture. Seminars and Creative workshops that are aimed at teaching, Elements and Principles of Visual Composition and Pattern making Exercises involving the above in the form of Design studios

UNIT - 2 PRINCIPLES OF DESIGN: 45 hrs.

Principles of Design: Scale, Proportion, Balance, Harmony, Rhythm and Contrast. Seminars and Creative workshops that are aimed at exploring massing theories of additive & subtractive forms and their application in a Visual composition Exercises involving the above in the form of Design studios. Seminars and Creative workshops that are aimed at exploring Colour theories and their application in a Visual composition Exercises involving the above in the form of Design studios.

UNIT - 3 CONCEPTS OF VISUAL PERCEPTION 45 hrs.

Concepts of Visual perception: Study of texture and schemes of texture both applied and stimulated and their application. Material and Form / Structures – Nature based enquiry into form both Linear and Planar, fluid and plastic forms using simple material like Mount Board, metal foil, box boards, wire string, thermocol, clay, plaster of Paris etc. Study of Solids and voids to evolve sculptural forms and spaces using specific process-oriented methods like casting, mouldings etc.

UNIT - 4 ANALYTICAL APPRAISAL OF DESIGN 30 hrs.

Analytical appraisal of an iconic Design like a rietvelt chair, Eames chair etc., for form, function, visual characteristics, ergonomics etc. /evolution of a craft.
Analytical appraisal of building form in terms of visual character, form and function, play of light and shade, solids and voids, colors and texture.

Total: 150 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have acquired

CO1: An understanding of the qualities of different elements as well as their composite fusions.

CO2: An ability to engage and combine the elements of design in spontaneous as well as intentional ways in order to create desired qualities and effects.

CO3: Required skills – observation / analysis / abstractions / interpretation / representations / expressions through models and drawings. Understanding by making.

TEXT / REFERENCE BOOKS

- V.S.Pramar, *Design fundamentals in Architecture*, Somaiya Publications Pvt. Ltd., New Delhi, 1973.
- Francis D. K. Ching - *Architecture - Form Space and Order* Van Nostrand Reinhold Co., (Canada), 1979.
- C. Lawrence Bunchy - *Acrylic for Sculpture and Design*, 450, West 33rd Street, New York, N.Y. 10001, 1972.
- Exner. V, Pressel. D, *Basics Spatial Design*, Birkhanser, 2009.

USEFUL WEBSITES:

- https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.behance.net%2Fgallery%2F1112205%2FRed-and-Blue-Chair&psig=AOvVaw0MtE33UOBqnuVd5pdEzNNN&ust=1593798781130000&source=images&cd=vfe&ved=0CA0QjhxqFwoTCPDEkeCUr-oCFQAAAAAdAAAAABAD
- https://www.youtube.com/watch?v=LIY7f6kK3Jk
- https://www.youtube.com/watch?v=lEU5NUICzFY

II SEMESTER

25ARUT201	MECHANICS OF STRUCTURES I	L	T	P/S	C	Total Marks
		2	2	0	4	100

COURSE OBJECTIVE

- To make students aware of how structural resolutions are important in realization of architectural design concept. At this stage, students shall be exposed to forces, moments, and resolution of forces.
- To make the students understand basic properties of solids and sections which influence their behavior under the effect of various types of forces.

Unit - 1 FORCES AND STRUCTURAL SYSTEMS 9 hrs.

Principles of statics – Forces and their effects-Types of force systems - Resultant of concurrent and parallel forces – Lami's theorem – principle of moments – Varignon's theorem – principle of equilibrium – Types of supports and loadings – Determination of reactions for simply supported beams = simple problems.

Unit - 2 ANALYSIS OF PLANE TRUSSES 6 hrs.

Analysis of plane trusses **-** Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilevered trusses by method of joints and method of sections.

Unit - 3 PROPERTIES OF SECTION 10 hrs.

Properties of section – Centroid – Moment of Inertia – Section modulus – Radius of gyration – Theorem of perpendicular axis – Theorem of parallel axis – simple problems.

Unit - 4 ELASTIC PROPERTIES OF SOLIDS 12 hrs.

Elastic properties of solids –concept of stress and strain –deformation of axially loaded simple bars-types of stresses- Concept of axial and volumetric stresses and strains (excluding composite bar).

Unit - 5 ELASTIC CONSTANTS 8 hrs.

Elastic constants – Elastic Modulus – Shear Modulus – Bulk Modulus – Poisson's ratio – Relation between elastic constants – Application to problems.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will be able to

CO1: Apply the concepts of action of forces on a body.
CO2: To apply the equilibrium concepts.
CO3: Understand the basic geometric properties and the behavior of materials under the effect of forces.

TEXT / REFERENCE BOOKS

- R.K.Bansal – *A text book on Engineering Mechanics*, Lakshmi Publications, Delhi,2005.
- R.K.Bansal – *A textbook on Strength of Materials*, Lakshmi Publications, Delhi 2007.
- P.C.Punmia, *Strength of Materials and Theory of Structures*; Vol. I, Lakshmi Publications, Delhi 1994.
- S. Ramamrutham, Strength of Materials – Dhanpatrai & Sons, Delhi, 1990.
- W.A.Nash, Strength of Materials – Schaums Series – McGraw Hill Book Company,1989.
- R.K. Rajput – Strength of Materials, S. Chand & Company Ltd. New Delhi 1996.

USEFUL WEBSITES:

- https://www.youtube.com/watch?v=hY8Cl0KlgWY
- https://www.youtube.com/watch?v=Yn-9voH1gZ4
- https://www.youtube.com/watch?v=qdP7040xvzU
- https://www.youtube.com/watch?v=08ChRvOt9iI
- https://www.youtube.com/watch?v=EXNZ6_dVhPw

25ARUT202	THEORY OF ARCHITECTURE	L	T	P/S	C	Total Marks
		1	2	0	3	100

COURSE OBJECTIVE

- To understand that architecture is a dynamic interface between man and his environment: through its constituent aspects and elements.
- To understand the various principles of architectural design, with which the above objective is attained.
- To understand that architecture is communicative medium involving aspects of expression and experience.
- To understand the various possibilities of approaching architectural design, through examples from historical and contemporary examples.

Unit - 1 ARCHITECTURE – ITS ELEMENTS 6 hrs.

Defining Architecture; an overview of the complexities of various layers and factors involved in Architecture. - Architecture as an organic entity and its components - function, form, structure, skin, material, circulation, character etc. - Architecture as a building entity and its elements - floor, walls, columns, roof, openings, stairs, etc; - their definition, evolution, attributes and spatial roles - Form/space making and its elements - points, lines, planes and volume; Various configuration of these elements in space making.

Unit - 2 NATURE AND MAN – ARCHITECTURE AS AN INTERFACE 6 hrs.

Nature - its five basic elements - earth (material, site, vegetation etc), water (rain, humidity etc), fire (light, temperature, radiation), wind (ventilation), sky (space); The dynamic interactions between elements of nature and elements of architecture - Human being – the five basic senses - their role in perception of built environment - vision (light, color, views etc), hearing (sound, noise, silence), tactility (texture, thermal and physical feeling), smell, spiritual. The Functional, psychological and aesthetic relevance in architecture - The demonstration of architecture as an experiential interface between human senses and his environment explained with relevant Architectural examples. Case studies of relevant architectural examples and exercises.

Unit - 3 ARCHITECTURAL DESIGN - ITS PRINCIPLES 12 hrs.

Introduction to Design; A brief overview of design and its principles in other fields. (Arts, crafts, nature etc); Architectural design - its tools (elements), objectives (experience and expression) and means (principles) - Principles of Design - proportion, scale, order, repetition, rhythm, harmony, balance, emphasis, hierarchy, symmetry, axis, datum etc. Creative exercises to assimilate all the principles of design. Application of design principles at various levels – site level, building level and detail level – Evolution of architectural form - Basic 3d forms, Transformation of form, principles involved – space, spatial relationships and spatial organization, principles involved. Relevant examples from modern and traditional architecture. Case studies of relevant modern and traditional architectural examples and creative exercises to understand the principles of transformation.

Unit - 4 EXPRESSION AND EXPERIENCE IN ARCHITECTURE 9 hrs.

Architecture as an expressive medium, semiotics involved in various elements, aspects, and principles of architecture. Examples of spatial narratives – Experiencing architecture – Aspects influencing the experience and expression – place, people, society, culture, history, tradition, time etc. Creative seminars, workshops & case studies through works of architects.

Unit - 5 CONCEPTS IN ARCHITECTURE 12 hrs.

Conceptualizing architecture, various approaches – Understanding Concepts behind the various architectural manifestations in relevant traditional, historical, vernacular examples in the context of the India and West world.
Understanding Concepts, ideas, philosophy behind the works of few architects choosing from the modern, postmodern and contemporary periods in the context of the India and West world.

Total: 45 Periods / Hours

COURSE OUTCOMES:
On completion of the course the student will have

CO1: A thorough understanding on the definition of architecture; elements of architectures of form.
CO2: An exposure to the principles of architecture and applications of the same in buildings and spaces.
CO3: An understanding the meaning of character and style of buildings with examples.
CO4: An exposure to students on ideologies and philosophies of architectures of contemporary.
CO5: An exposure to analysis and experience of architecture through case studies and architects through examples.

TEXT / REFERENCE BOOKS:

- Francis D.K.Ching, *Architecture-Form, Space and Order*, Van Nostrand Reinhold Company, New York, 2007.
- Yatin Pandya, "*Elements of Space Making*", Mapin Publishing Pvt. Ltd, 2014.
- V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Delhi, 1997 – 3rd edition.
- Eri J. Jenkins; Drawn to Design - Analyzing Architecture through Free Hand Drawing; BV GMbH Basel; 2013. (available in an EPVB ebook edition)

USEFUL WEBSITES:

- https://www.youtube.com/watch?v=v4iRCmqiXro
- https://plato.stanford.edu/entries/architecture/tradition.html
- https://www.youtube.com/watch?v=kH8WwdAwNpM
- https://www.youtube.com/watch?v=c8ccsE_IumM
- https://www.youtube.com/watch?v=yyKXJhHwqWk
- https://www.youtube.com/watch?v=fI1OeMmwYjU
- https://www.youtube.com/watch?v=vmHoGicPQQQ

25ARUJ221	ARCHITECTURAL DRAWING - II	L	T	P/S	C	Total Marks
		1	0	1	2	100

COURSE OBJECTIVE

- To involve students in a number of exercises that will help them develop the skill of representation in advance drawing techniques involving perspective and sciography.
- To involve students in a number of exercises that will help to understand the measured drawing method to document buildings of architectural interest using simple and advance techniques of representation.

Unit - 1 PERSPECTIVE METHODS 9 hrs.

Introduction to the concept of perspective drawing. One point and two-point perspective of simple geometrical shapes like cube, prism, combination of shapes using picture plane method and measuring point method. Introduction to three-point perspective.

Unit - 2 PERSPECTIVE: BUILDING INTERIOR 9 hrs.

Construction of one, two and three-point perspective grids - Construction of one- and two-point perspective of building interiors. Understanding the basic human proportion and scale. Adding of human figures, planters, furniture etc. in an interior perspective scene. Basic applications of shade and shadows and rendering techniques.

Unit - 3 PERSPECTIVE: BUILDING EXTERIOR 9 hrs.

Principles of shade and shadow – construction of shadow of simple geometrical shapes – construction of sciography on building, shadows of architectural elements.
Introduction to short cut perspective method. Construction of one-, two- and three-point perspective of building exterior. Adding of human figures, trees etc., Application of light and shadow and rendering techniques of building materials.

Unit - 4 MEASURED DRAWING: HISTORIC DOCUMENT STUDY 9 hrs.

Documentation and drawing of a simple historic building along with the relevant study of the building based on its history, morphology and context. Measured drawing using pen and ink rendering technique.

Unit - 5 MEASURED DRAWING: BUILDING DOCUMENTATION 9 hrs.

Complete documentation of a building of special interest in terms of building construction, architectural excellence or technology using photographs, tapes etc. Measured drawing of plans, elevations, sections, isometric projections of building details etc. using pen and ink rendering technique.

COURSE OUTCOMES:

On completion of the course the student will have

CO1: Ability to construct the 3d views and perspective drawings of the buildings.

CO2: Understanding of advanced documentation and measured drawing techniques

TEXT / REFERENCE BOOKS

- Francis D. K. Ching; Design Drawing; John Wiley & Sons; 2010
- Rerdow Yee; *Architecture Drawing - A Visual Compendium of Types & Methods* ; John Wiley & Sons; 2012
- Mo Zell, *The Architecture Drawing Course – Understand the principles & master the practices,* Thames & Hudson; 2014

USEFUL WEBSITES:

- https://www.youtube.com/watch?v=Xn_0wEwZNEU
- https://www.youtube.com/watch?v=vyeZbyEvZ28
- https://www.youtube.com/watch?v=olFj0ZlAITA
- https://www.youtube.com/watch?v=h0qgGUFkass

25ARUJ222	BUILDING MATERIALS AND CONSTRUCTION – I	L	T	P/S	C	Total Marks
		1	0	2	3	100

COURSE OBJECTIVE

- To have an understanding of the properties, characteristics, strength and application of naturally occurring building materials such as Stone, Bamboo, Lime and Mud.
- To study the principles of designing components of load bearing structures – foundation, plinth, wall, openings etc. with naturally occurring building materials.

Unit - 1 BUILDING MATERIALS 6 hrs.

Introduction to Building materials – Naturally occurring building materials such as Stone, Bamboo, Lime and Mud – Characteristics and Applications.

Unit - 2 BUILDING COMPONENTS – 01 – FOUNDATIONS 6 hrs.

Introduction to Building Components – Foundations – Foundations suitable for construction with stone, bamboo, lime and mud – Exercises on Foundations in History and Today's context.
Construction drawing plates comprising of technical plan, elevation and section along with sketches and details showing method of construction.

Unit - 3 BUILDING COMPONENTS – 02 - WALLS 12 hrs.

Introduction to Building Components – Walls – Walls suitable for construction with stone, bamboo, lime and mud – Exercises on Walls in History and Today's context.
Construction drawing plates comprising of technical plan, elevation and section along with sketches and details showing method of construction.

Unit - 4 BUILDING COMPONENTS – 03 – OPENINGS / FENESTRATIONS 9 hrs.

Introduction to Building Components – Openings – Openings/Fenestrations suitable for construction with stone, bamboo, lime and mud – Exercises on Openings / Fenestrations in History and Today's context.
Construction drawing plates comprising of technical plan, elevation and section along with sketches and details showing method of construction.

Unit - 5 FINISHES 12 hrs.

Introduction to Finishes – Paints, Plastering, Glazes and Varnishes – Exercises on different finishes in History and Today's context for building components with stone, bamboo, lime and mud – Market survey of Paints, Plastering materials, Glazes and Varnishes. Exercises on finishes in History & Today's context.
Construction drawing plates comprising of technical plan, elevation and section along with sketches and details showing method of construction.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will

CO1: Have knowledge of construction details using naturally occurring building materials such as stone, bamboo, mud and lime through drawing as well as doing a literature or live case study.

CO2: Be able to create drawing plates comprising of technical plan, elevation and section along with sketches and details showing method of construction.

TEXT / REFERENCE BOOKS

- Arora S.P. and Bindra S.P., "*Text book of Building Construction*", Dhanpat Rai & Sons, New Delhi, 2012.
- Klans Dukeeberg, *Bambus – Bamboo*, Karl Kramer Verlag Stuttgart Germany, 2000.
- National Building Code of India 2005- Part 6 Structural Design- Section 3 Timber and Bamboo.
- Francis D.K. Ching, *Building Construction Illustrated* John Wiley & Sons 2000.
- Ghanshyam Pandya, M.P. Ranjan, Nilam Iyer, *Bamboo and Cane Crafts of Northeast India*; National Institute of Design (2004).
- WB Mckay *Building construction, Vol 1,2*, Longman UK 1981
- Barry, The Construction of Buildings; Affiliated East West press put Ltd New Delhi, 1999.

USEFUL WEBSITES:

- https://issuu.com/communityarchitectsnetwork/docs/the_bamboo_book_final_12-5-13
- https://www.humanitarianlibrary.org/sites/default/files/2014/02/INBAR_technical_report_no20.pdf
- http://naturalhomes.org/img/bamboo-in-construction.pdf
- https://villagevolunteers.org/wp-content/uploads/2011/06/Bamboo-House-Building-Manual.pdf
- https://law.resource.org/pub/in/bis/S03/is.sp.20.1991.pdf
- https://core.ac.uk/download/pdf/82416927.pdf
- https://www.getty.edu/conservation/publications_resources/teaching/ea_construction.pdf
- http://www.eartharchitecture.org/uploads/mud_english.pdf

25ARUP111	MODEL MAKING AND ARCHITECTURAL DELINEATION	L	T	P/S	C	Total Marks
		1	0	2	3	100

COURSE OBJECTIVE

- To introduce students to analytical and illustrative drawing techniques as tools in the materialization and expression of thoughts.
- To introduce model making as a generative process, a tool in Design generation.
- To inculcate the dynamic act of constructing in thinking process.
- To understand the challenges of proper craftsmanship.

Unit - 1 LINE, RENDER AND MIXED MEDIA 6 hrs.

Free hand sketching in architectural representation- pen, charcoal, ink, water colour, paints, mixed media, collages, line cutting, print making as tools. Creative assignments that require study, analysis, documentation with weightage given to representational expression and techniques.

Unit - 2 DIAGRAMMING 6 hrs.

Conceptual sketches - Plan, section, elevation, perspectives, isometric / oblique projections, axonometric /parallel projection, photography and montage as techniques in Architectural delineation from study till presentation. Creative assignments that require study, analysis, documentation with weightage given to representational expression and techniques.

Unit - 3 DESIGN PROCESSES AND MODEL MAKING TECHNIQUES 12 hrs.

Generative / geometry, fractals, parametric / material explorations (both in traditional materials like mount, foam, thermocol, clay, plaster of Paris, paper Mache, wood and new age materials like polystyrene, Aerocon blocks, plastics, meshes, and processes like carpentry, casting, moulding, welding, laser cutting etc. Explorative exercises that involve research through a process for example nature to structure and the evolution of a structural system that can be fabricated to scale.

Unit - 4 PRESENTATION MODELS 9 hrs.

Exploration in varying scales of models through instruction in techniques – Residential to urban – Historic / Contemporary buildings. Explorative exercises involving topography, textures, landscapes, human elements etc.

Unit - 5 STUDY MODELS AS A TOOL IN ARCHITECTURAL DESIGN PROCESS 12 hrs.

Exploration of the physical model as a tool through all phases of architectural design process, ranging from conceptual to specific design solutions – This Unit will have to integrate with the Architectural Design course in this semester.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have

CO1: Explored the conventional and less conventional techniques of representation in an attempt to creative visualization and to understand drawings as vehicles of thinking.

CO2: Versatility in making models ranging from study to presentation and in varying scales and materials

TEXT / REFERENCE BOOKS

- Robert. W Gill – Rendering with Pen + Ink - Thames, and Hudson – 2007.
- Rendow Yee, Architectural Drawing a Visual Compendium of Types and Methods, Wiley, 2013
- Mo Zell – The Architectural Design course, Understand the Principles and Master The Practices, Thames, and Hudson, 2008.

USEFUL WEBSITES:

- https://www.youtube.com/watch?v=itD5U_WIqao
- https://www.youtube.com/watch?v=Kfj2-A5rJoQ
- https://www.youtube.com/watch?v=SxCYtRfCm8o
- https://www.youtube.com/watch?v=5iliAFm2rcU
- https://www.youtube.com/watch?v=tSbokTGNABQ
- https://www.youtube.com/watch?v=TipNigD283w

25ARUS151	ARCHITECTURAL DESIGN I	L	T	P/S	C	Total Marks
		5	0	10	15	100

COURSE OBJECTIVE

- To enable the conceptualization of form, space and structure through creative thinking and to initiate architectural design process deriving from first principles.
- To involve students in a design project(s) that will involve simple space planning and the understanding of the functional aspects of good design.
- To involve students in a small-scale building project(s) which will sensitize them to intelligent planning that is responsive to the environmental context.
- To involve students in building case study by choosing appropriate examples to enable them to formulate and concretize their concepts and architectural program.
- To engage in discussion and analytical thinking by the conduct of seminars/ workshops.
- To enable the presentation of concepts through various modes and techniques that will move constantly between 2D representation and 3D modeling.

CONTEXT

Scale and Complexity: projects involving small span, single space, single use spaces with simple movement, predominantly horizontal, as well as simple function public buildings of small scale; passive energy.

Areas of focus/ concern:

- Architectural form and space.
- Aesthetic and psychological experience of form and space in terms of scale, colour, light, texture, etc.
- Function and need: user requirements, anthropometrics, space standards, circulation.
- Image and symbolism.

Unit - 1 PROJECT – 1 MAJOR 60 hrs.

Typology/ project: bedroom, bathroom, kitchen, shop, exhibition pavilion, children's environment. Detailed drawings with furniture layout, electrical layout, flooring design, wall elevation showing finishes, detailed sections (minimum 2nos.) showing the construction details and materials of construction and other relevant building services.

Unit - 2 PROJECT – 2 MAJOR 60 hrs.

Typology/ project: Snack bar, residence, petrol bunk, fire station.
Detailed drawings with furniture layout, electrical layout, flooring design, wall elevation showing finishes, detailed elevations (minimum 2nos.) and sections (minimum 2nos.) showing the construction details and materials of construction other relevant building services.

Unit - 3 PROJECT – 3 MINOR 30 hrs.

Typology/ project: bedroom, bathroom, kitchen, shop, exhibition pavilion, children's environment, snack bar, residence, petrol bunk, fire station. Detailed drawings with furniture layout, electrical layout, flooring design, wall elevation showing finishes, detailed elevations (minimum 2nos.) and sections (minimum 2nos.) showing the construction details and materials of construction other relevant building services.

Total: 150 Periods / Hours

COURSE OUTCOMES:

On completion of the course the student will have

CO1: Understanding and hands-on experience of the basic functional aspect of designing simple building type and its relevant spatial organization.

CO2: Acquired knowledge to reciprocate and sensitize the design/concept to the environment and the design skill of the project

TEXT / REFERENCE BOOKS

- Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGraw Hill Education; 4th edition, 2014.
- Joseph De Chiara, Julius Panero, Martin Zelnik, Time Saver Standards for Interior Design and Space Planning, McGraw Hill 2011.
- Ernst Neuferts Architects Data, Blackwell 2012.
- Ramsey et al, Architectural Graphic Standards, Wiley 2008.

USEFUL WEBSITES:

- https://bis.gov.in/index.php/standards/technical-department/national-building-code/
- http://www.cmdachennai.gov.in/pdfs/DCR.pdf
- http://52.172.182.107/BPAMSClient/default.aspx
- https://www.kmcgov.in/KMCPortal/downloads/Building_%20Rules2009.pdf
- https://mmrda.maharashtra.gov.in/documents/10180/7761832/5.pdf/e09991a2-b29e-4e04-a33e-a40aca6e2689?version=1.1

25IKS001	VEDIC PRINCIPLES AND TRADITIONAL INDIAN ARCHITECTURE	L	T	P/S	C	Total Marks
		2	0	0	2	100

COURSE OBJECTIVE:

- Explore the philosophical foundations of Vedic architecture, including concepts like Brahma, Vastu, and the significance of sacred geometry.
- Learn about the principles of spatial planning and design in Vedic architecture, such as the Mansar and Pragya systems, and how they relate to the natural environment.
- Study the use of traditional materials and construction techniques in Vedic architecture, including their sustainable and culturally significant aspects.
- Develop an appreciation for the cultural and environmental significance of Vedic architecture and its relevance to contemporary design challenges.
- Integrate Vedic principles with modern sustainable design practices, promoting energy efficiency, water conservation, and waste reduction.

UNIT - 1 FOUNDATIONAL PRINCIPLES 7 Hrs

Understanding the concept of the cosmic energy (Purusha) manifesting within the built environment and its implications for spatial arrangement. Analyzing how Vedic principles utilize natural elements like sun, wind, and water to create balance and well-being. Examining the principles of aligning buildings with natural forces for optimal energy flow and environmental harmony.

UNIT - 2 ARCHITECTURAL APPLICATION 10 Hrs

Studying Vedic principles for planning temple cities in India, including layout, zoning, and functional relationships. Exploring Vedic principles in Kautilya's Arthashastra and other texts for urban design and settlement patterns. Understanding how Vastu Shastra guides building placement, room arrangement, and material choices to create auspicious spaces.

UNIT - 3 VEDIC TEXTS AND LITERATURE 10 Hrs

Examining architectural treatises based on Vedic hymns and their influence on Vastushilpa (ancient Indian architecture). Studying references to advanced city life in Sanskrit and Tamil epics to understand societal structures and urban vibrancy.

UNIT - 4 SUSTAINABLE DESIGNS 11 Hrs

Incorporating Vedic principles for solar orientation and passive cooling strategies in building design. Examining the use of natural, non-toxic materials and local resources in construction, aligning with Vedic principles of harmony with nature.

UNIT - 5 CASE STUDIES 7 Hrs

Analyzing the layout and design of ancient temple cities like Madurai as case studies.Exploring how Vedic principles are applied in residential and vernacular architecture, focusing on sustainable and context-sensitive design.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1: Students will be able to describe the key principles and concepts of Vedic architecture, including its philosophical underpinnings, spatial organization, and material selection.

CO2: Students will be able to apply Vedic principles in architectural design projects, creating spaces that are harmonious with nature and culturally relevant.

CO3: Students will be able to develop sustainable design solutions that incorporate Vedic principles, promoting energy efficiency, water conservation, and waste reduction.

CO4: Students will be able to critically evaluate built environments, identifying both the strengths and weaknesses of different architectural styles and incorporating Vedic principles where appropriate.

CO5: Students will be able to effectively communicate their design ideas using various visual and written media, effectively conveying the cultural and environmental significance of their work.

REQUIRED READINGS:

- Dr.V.Ganapati Sthapati - :Sthapatya Veda" Dakshina Publishing House, Chennai-41, India, 2001.
- Stella Kramrisch - The Hindu Temple Vol.I Motital Banarsidass Publishers Pvt. Ltd., Delhi - 1991.
- K.S.Subramanya Sastri - Maya Matam - Thanjavur Maharaja Sarjoji Saraswathi Mahal Library - Thanjavur - 1966.
- Dr.V.Ganapati Sthapati - :Sthapatya Veda" Dakshina Publishing House, Chennai-41, India, 2001

REFERENCES:

- Bruno Dagens - Mayamatam, Vol.I & II IGNCA and Motilal Bamarsidars Publishers Pvt. Ltd., Delhi - 1994. 63
- Dr.V.Ganapati Sthapati - Vastu Purusha Mandalam, Dakshina Publishing House, Chennai, 1998.
- Ananda Kentish Coomaraswamy, Symbolism of Indian Architecture" – Historical Research
- Documentation Programme, Jaipur, 1983
- Stella Kramrisch - The Hindu Temple Vol. II Motital Banarsidass Publishers Pvt. Ltd., Delhi 1991.

III- SEMESTER

AART2108	HISTORY OF ARCHITECTURE AND CULTURE II	L	T	P/S	C	Total Marks
		1	2	0	3	100

OBJECTIVES:

- To inform about the development of architecture in the Ancient Western World and the cultural and contextual determinants that produced that architecture.
- To understand architecture as evolving within specific cultural contexts including aspects of politics, society, religion and climate.
- To gain knowledge of the development of architectural form with reference to Technology, Style and Character in the prehistoric world, Ancient Egypt, West Asia, Greece, Rome, Medieval times and Renaissance period.

UNIT I -WISDOM OF THE ANCIENTS THRO RIVER VALLEY CIVILIZATION **6hrs**

Response to culture and context in building shelter in the Neolithic period- R. Nile and the architecture of Egypt with relevant examples – Urban form in the Indus Valley and the Tigris and Euphrates basin and relevant examples of architecture.

UNIT II -CLASSICAL WORLD **12hrs**

Landscape and culture of Greece –Greek character – Greek polis and democracy – Domestic architecture– Evolution of the Greek temple and the building of the Acropolis –Public architecture: Theatre and Agora- optical illusions in architecture- City Planning.
Roman history: Republic and Empire –Religion, culture, lifestyle - Roman character – Roman urban planning –architecture as imperial propaganda: forums and basilicas – structural forms: materials and techniques of construction spanning large spaces with relevant examples - domestic architecture.

UNIT III - EARLY CHRISTIANITY AND CHRISTIAN KINGDOMS **12hrs**

Birth and spread of Christianity – transformation of the Roman Empire – early Christian worship and burial. Church planning – Basilica concept and Centralized plan concept with relevant examples in the West and in the Byzantine.
The Carolingian Renaissance – Feudalism and rural manorial life – Papacy – Monasticism – Craft and merchant guilds. Medieval domestic architecture – Romanesque churches with relevant examples in Europe – Development of vaulting.

UNIT IV- THE AGE OF CHURCH BUILDING **6hrs**

Development of Gothic architecture Church plan, structural developments in France and England with using relevant examples of church architecture in Europe – wooden roofed churches.

UNIT V - IDEA OF RE-BIRTH AND RENAISSANCE IN EUROPE **9hrs**

Idea of rebirth and revival – Humanism –Development of thought – Reformation- the Renaissance patron – Urbanism Renaissance architecture: Brunelleschi and rationally ordered space – ideal form and the centrally planned church using relevant examples– palace and villa architecture with relevant examples – Mannerist architecture- The Renaissance in transition – works of Michelangelo; Sir Christopher Wren, Andrea Palladio, Inigo Jones- Baroque and palace building in France.

Total: 45 Periods / Hours

OUTCOMES:

CO1: An understanding about the spatial and stylistic qualities associated with architecture.

CO2: An Understanding of architecture as an outcome of various social, political and economic upheavals, and as a response to the cultural and context.

TEXTBOOKS:

1. Sir Banister Fletcher, A History of Architecture, CBS Publications (Indian Edition), 20th Edition 2002.

2. Spiro Kostof – A History of Architecture – Setting and Rituals, Oxford University Press, London, 1986.

3. Francis D.K. Ching et al; A global history of Architecture; John Wiley's sons, 2nd edition 2010.

REFERENCES:

1. Leland M Roth; Understanding Architecture: Its elements, history and meaning; Westview press, 3rd revised edition; 2014.

2. S. Lloyd and H.W. Muller, Ancient Architecture: History of World Architecture – Series, Phaidon Press, London, 2004.

3. Gosta, E. Samdstrom, Man the Builder, McGraw Hill Book Company, New York, 1970.

4. Bussagh; Marco; Understanding Architecture; I.B.Tauris & co. Ltd; 2005.

USEFUL WEBSITES:

1.https://besthistorysites.net/ancient-biblical-history/greece

2. https://en.wikipedia.org/wiki/Ancient_Roman_architecture

3. https://en.wikipedia.org/wiki/Ancient_Egyptian_architecture

4. https://www.youtube.com/watch?v=tWDflkBZC6U

AART2109	MECHANICS OF STRUCTURES II	L	T	P/S	C	Total Marks
		2	2	0	4	100

OBJECTIVES

- To enable understanding of the basic concepts of shear force and bending moment acting on beams subjected to different loading conditions.
- To give knowledge about how to determine stresses in beams and strength of sections.
- To give knowledge about how to calculate deflection of beams.
- To enable study of theory of columns.
- To give an understanding of the concept of indeterminate structure and its analysis.

UNIT I SHEAR FORCE AND BENDING MOMENT 6Hrs

Basic concepts. Shear force and bending moment diagrams for cantilever and simply supported beams subjected to different types of loadings - Point loads, uniformly distributed loads. Overhanging simply supported beams. Point of contra flexure.

UNIT II STRESSES IN BEAMS 11Hrs

Theory of simple bending. Bending stress distribution. Strength of sections. Shearing stress distribution in beam sections.

UNIT III DEFLECTION OF BEAMS 11Hrs

Slope and deflection at a point. Double Integration method and Macaulay's method for simply supported and cantilever beams.

UNIT IV COLUMNS 8Hrs

Short and long columns. Concept of elastic stability. Euler's theory. Assumptions and load carrying capacity of columns with different end conditions. Concept of effective length. Slenderness ratio. Limitations of Euler's theory. Rankine's formula.

UNIT V STATICALLY INDETERMINATE BEAMS 9Hrs

Introduction. Determination of degree of statical indeterminacy for beams and frames. Analysis of propped cantilever using Moment Area method - central point load, uniformly distributed loads.

Total: 45 Periods / Hours

OUTCOME

CO1: Ability to apply the concepts/techniques of finding stresses.
CO2: Ability to use simple bending theory to find deflection in beams.
CO3: Ability to analyse and solve different types of columns.
CO4: Ability to analyse the different types of indeterminate beams.

TEXTBOOKS

1. R.K. Bansal, 'A Text Book on Strength of Materials', Laxmi Publications, New Delhi, 2006.
2. B.C. Punmia et al, 'SMTS-I, Strength of Materials', Laxmi Publications, 2015.

REFERENCES

1. M.M. Ratwani & V.N. Vazirani, 'Analysis of Structures, Vol. 1', Khanna Publishers, Delhi, 2012.
2. Timoshenko, S.P. and D.H. Young, 'Elements of Strength of Materials', 5th edition, East West Press, 2011.
3. A.R. Jain and B.K.Jain, 'Theory and analysis of structures', Vol. 1, Nemchand and Bros, Roorkee, 1987.
4. R.K. Rajput, 'Strength of Materials', S.Chand, 2006.

25ARUJ321	BUILDING MATERIALS & CONSTRUCTION II	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES

- To give an introduction to brick, clay and timber products in building construction.
- To enable an understanding of the principles, methods of construction and applications of the above for structural and non-structural building components.
- To enable design and detail using all these materials in simple buildings.

UNIT I INTRODUCTION TO BRICK AND CLAY PRODUCTS 6 hrs

Brick and clay as basic building materials and brief history of their use through examples. Types of brick and clay products. Outline of their manufacture, characteristics and applications in building construction. Products to include different types of bricks for masonry, roofing products such as pot/pan tiles and Mangalore tiles, flooring tiles such as clay, ceramic and vitrified tiles, Hourdi tiles, current innovations. Understanding of product literature. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT II BRICK AND CLAY IN BUILDING CONSTRUCTION 12hrs

Basic principles of brick bonding and its types. Mortar, plastering, pointing, finishes for brick. Construction principles and procedures for building components using brick and clay products. Components to include foundation, load bearing walls, partition walls, compound walls, parapet walls, roofs, arches, lintels, coping, steps, flooring, paving of different types. Principles for innovative and composite construction using brick and clay products. Products to include prefabricated brick panels, precast curved brick arch panels, reinforced brick/ reinforced brick concrete slabs, prefabricated floor/ roof using structural clay units, Hourdi block roofing, current innovations. Drawings/ models of the principles. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ photos.

UNIT III INTRODUCTION TO TIMBER AND TIMBER PRODUCTS 9hrs

Timber as basic building material and brief history of its use with examples. Timber sources, classification, characteristics, defects, conversion, seasoning, storage, uses, preservation, finishes (including paint, varnish, enamel, special paints and coatings). Market forms of timber. Types of industrial timber products. Outline of their manufacture, characteristics and applications in building construction. Products to include plywood, particle board, block board, fibre board, cement bonded particle board, sustainable products, current innovations. Understanding of product literature. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT IV TIMBER IN BUILDING CONSTRUCTION 12hrs

Joints in timber. Construction principles and procedures for timber wall, floor, roof trusses (to include lean to, couple, collar, king post, queen post and roof covering material), staircase. Construction principles and procedures for different types of timber doors, windows and ventilators. The types, whichever is applicable for each, will include materials (panelled, flush, glazed), swing, mechanisms of operation (fixed, openable, sliding, folding, sliding and folding, pivoted, revolving, top hung, bottom hung, louvred), nature - (french, corner, bay).

Construction principles and procedures using timber/ industrial timber/ gypsum products for partitions (fixed, sliding, sliding and folding), panelling, false
ceiling, flooring. Hardware and fixing for all the above as applicable. Drawings/ models of the principles. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT V DESIGN USING BRICK, CLAY, TIMBER AND TIMBER PRODUCTS 6hrs

A design exercise involving use of brick, clay and timber products in appropriate structural and nonstructural components in a simple, small project of any basic typology. The project will integrate knowledge from all the previous units. Design and construction details in the form of drawings and models.

Total: 45 Periods / Hours

OUTCOME:

CO1: Familiarity with the properties and uses of basic building materials.
CO2: Knowledge about the construction details of the basic building materials.
CO3: Ability to design buildings using a combination of basic materials.

TEXTBOOKS

1. Don A. Watson, 'Construction Materials and Processes', McGraw Hill, 1972.
2. W.B. McKay, 'Building Construction', Person India, Vol, 1 2013,Vol II, 2012.
3. S.C Rangwala 'Building Construction' Charotar Publishing House, India, 2016.
4. S.K.Sharma, 'A Text book of Building Construction', S. Chand & Co Ltd., New Delhi, 1998.
5. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
6. R.J. S. Spence and D.J. Cook, 'Building Materials in Developing Countries', John Wiley and sons 1983.
7. S. C. Rangwala, 'Engineering Materials', Charotar Publishing House India, 2015.
8. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

REFERENCES

1. American Institute of Timber Construction (AITC), 'Timber Construction Manual', Wiley Publishers, 2004.
2. Francis D.K Ching, 'Building Construction Illustrated', John Willey & Sons, 2008.
3. Willis H Wagner & Howard Bud Smith, 'Modern Carpentry', Good Heart–Wilcox Publishers,
Portland, 2003.
4. Barry, 'Construction of Buildings, Volume 1&2', Blackwell Publishing Ltd., Oxford, 2005.

USEFUL WEBSITES

- https://gosmartbricks.com/clay-brick-architecture/
- https://brickarchitecture.com/about-brick/why-brick/the-history-of-bricks-brickmaking
- https://www.dezeen.com/tag/wooden-architecture/
- https://architizer.com/blog/inspiration/collections/the-future-of-architecture-timber-revolution/

25ARUJ322	SITE SURVEYING AND PLANNING	L	T	P/S	C	Total Marks
		1	0	1	2	100

OBJECTIVES

- To inform about the ways in which the characteristics of sites can be understood.
- To enable an understanding of the macro and micro impact of buildings on it.
- To give understanding of the potential/ limitations site offers to the design of buildings.
- To give exposure to different terminologies and techniques associated with site, site surveying, site analysis and site planning.
- To explore all the above through a project.

UNIT I INTRODUCTION TO SITE AND SITE SURVEYING 10hrs

Definition of plot, site, land and region, units of measurements. Introduction to survey and need for surveying. Methods of surveying and context of use. Chain survey and Triangulation – instruments used, method of survey and plotting into survey drawing. Plain table, Compass and theodolite surveys - method, instruments used and application. Modern surveying Instruments such as EDMs and Total Stations and their application. Understanding of administrative maps and site drawings, including FMB. Introduction to measuring a site, drawing out a site plan from measurements and computing area by geometrical figures and other methods. Introduction to marking plans, layout plans and centerline plans. Importance and procedure for making these drawings and dimensioning. Procedure and precautions of setting out a plan on site. Understanding the above through site visits to real projects.

UNIT II SITE ANALYSIS 10hrs

Site as offering potential/ limitations to architectural design. Importance of site analysis. On site and off-site factors. Analysis of natural, cultural and aesthetic factors. Factors to include topography, hydrology, soils, vegetation, climate and microclimate, surface drainage, accessibility, size and shape, infrastructure, sources of water supply and means of disposal system, visual aspects, context of built environment. Introduction to detailed analysis involving aspects like contours, slope analysis, grading process, grading criteria, functional and aesthetic considerations. Maps of matrix analysis & composite analysis methods. Understanding the above through real projects/ case studies.

UNIT III SITE CONTEXT AND REGULATIONS 9hrs

Detailed understanding of context of the site. Introduction to master plans, land use for cities, development control rules. Site selection criteria for different building typologies. Impact of building developments on the surroundings including aspects such as traffic, noise, pollution, microclimate, etc., especially in the context of large-scale projects.
Understanding the above through real projects/ case studies.

UNIT IV PRINCIPLES OF SITE LAYOUT AND DEVELOPMENT 10hrs

Organization of pedestrian and vehicular circulation. Geometric calculation for movement. Types of roads, hierarchy of roads, networks, road widths and parking regulations. Principles of positive drainage and grading for drainage. Location and design of sewage treatment plants. Methods to control soil erosion. Location of utility lines to simplify maintenance. Planning for rain water harvesting. Incorporation of services such as drinking water pipelines, fire hydrants, communication and networking facilities at site. Vegetation, landforms and water as modifiers of microclimate. Understanding the above through real projects/ case studies.

UNIT V EXERCISE IN SITE SURVEYING AND PLANNING 6hrs

Application of all the knowledge gained in previous units through a real/ hypothetical project involving a real site. The process would involve choosing site for a building typology or vice versa, field exercise in measuring and drawing the site, detailed site analysis, schematic site layout and development. The project will be explored through analysis/ models/ sketches/ drawings.

Total: 45 Periods / Hours

OUTCOMES

CO1: Sensitivity towards aspects of site at macro and micro contexts.
CO2: Ability to exploit potential of site to design the built environment.
CO3: Ability to measure, draw, analyze and plan a particular site for a specific purpose.

TEXTBOOKS

1. Kevin Lynch, 'Site Planning', Third Edition, MIT Press, 1984.
2. Edward. T. White, 'Site Analysis', Archi Basic Press, 2014.
3. B.C.Punmia et al, 'Surveying Vol.I', Seventeenth Edition, Laxmi Publications, 2016.

REFERENCES

1. Joseph De.Chiarra and Lee Coppleman, 'Urban Planning and Design Criteria', Van Nostrand Reinhold Co., 1982.
2. Strom Steven, 'Site Engineering for Landscape Architects', John Wiley & Sons, 2013.
3. P.B.Shahani, 'Text of Surveying Vol.I', Oxford and IBH Publishing Co, 1980'
Development Control Rules', CMDA 2008.

25ARUJ323	CLIMATE & BUILT ENVIRONMENT	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES

- To introduce the concepts of human heat balance and comfort.
- To inform about the movement of sun and understand its impact on building design.
- To inform about the effects of wind and air with respect to siting and design of buildings.
- To give exposure to design strategies for building in different types of climatic zones.

UNIT I CLIMATE AND HUMAN COMFORT 9hrs

Climate and Civilization. Factors that determine climate of a place. Components of climate. Classification of climate for building designers in tropics. Characteristics of climate. Human body heat balance and heat loss. Effects of climatic factors on human body heat loss. Effective temperature, human thermal comfort. Use of C. Mahony's tables. Exercise related to the above.

UNIT II DESIGN OF SOLAR SHADING DEVICES 7hrs

Movement of sun. Locating the position of sun. Sun path diagram. Overheated period. Solar shading. Shadow angles. Exercise in the design of shading devices through models/ calculations/ drawings/ software.

UNIT III HEAT FLOW THROUGH BUILDING ENVELOPE- CONCEPTS 10hrs

The transfer of heat through solids. Definitions– Conductivity, Resistivity, Specific heat, Conductance, Resistance and Thermal capacity. Surface resistance and air cavities. Air to air transmittance (U value). Time lag and decrement. Material qualities of envelopes. Exercise involving calculation/ software for design analysis.

UNIT IV AIR MOVEMENT DUE TO NATURAL AND BUILT FORMS 10hrs

The wind. The effects of topography on wind patterns. Air currents around building. Air movement through buildings. The use of fans. Thermally induced air currents – Stack effect, Venturi effect, use of court yard. Exercise exploring air movement in architecture with physical models/ simulation through software.

UNIT V CLIMATE AND DESIGN OF BUILDINGS 9hrs

Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates. Climate responsive design exercise for different contexts through sketches/ drawings/ analysis/ detailing/ calculation.

Total: 45 Periods / Hours

OUTCOME

CO1: An understanding of heat balance in human beings.
CO2: An understanding of the effect of sun and wind on buildings.
CO3: An understanding of material effects in buildings.
CO4: Ability to design buildings with respect to climate.

TEXTBOOKS

1. O.H. Koenigsberger and Others, 'Manual of Tropical Housing and Building- Climatic Design',
Orient Longman, Madras, India, 2010.
2. Bureau of Indian Standards IS 3792, 'Hand book on Functional Requirements of Buildings other than Industrial Buildings- Part I – IV', New Delhi,1987.

REFERENCES

1. Martin Evans, 'Housing Climate and Comfort', Architectural Press, London, 1980.
2. B. Givoni, Man, 'Climate and Architecture', Architectural Sciences Series, Applied Science Publishers Ltd., London, 1981.
3. B. Givoni, 'Passive and Low Energy Cooling of building', Van Nostrand Reinhold, New York,1994.
4. Galloe Salam and Sayigh A.M.M, 'Architecture, Comfort and Energy', Elsevier Science Ltd., Oxford,1998.
5. Arvind Krishnan, Szokolay et.al, 'Climate Responsive Architecture- A Design Handbook for
Energy Efficient Buildings', Tata McGraw Hill, 2010.

25ARUP311	COMPUTER AIDED VISUALIZATION	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES

- To introduce computer operation principles and explore image editing through a graphical composition.
- To impart training in computer aided 2D drafting and 3D modelling through projects.
- To enable the use of computer applications to develop a design from the initial stages to the final outcome.
- To enable the rendering of a building so as to create a photo realistic image.

UNIT I INTRODUCTION TO COMPUTER AND IMAGE EDITING 10hrs

Technology of small computer system. Computer terminology. Operation principles of P.C. Introduction to application software, graphic system, use of printers, scanner, plotter, file management, etc. Understanding bitmap images and vector graphics, image size and resolution. Basic tools for editing and creating graphics. Exercise in creating visual compositions using digital graphics (pixels/vector).

UNIT II THE BASICS OF BUILDING MODELLING 10hrs

Creating a basic floor plan. Temporary dimensions. Adding and modifying walls. Working with compound walls. Using editing tools. Adding and modifying doors. Adding and modifying windows 2D Drafting exercise of a simple building.

UNIT III VIEWING THE BUILDING MODEL 10hrs

Understanding the drawing unit's settings, scales, limits, drawing tools, drawing objects, object editing, and text, dimensioning. Transparent overlays, hatching utilities, line type, line weight and colour. Multiline, polyline, etc. Styles, blocks and symbol library.
Drafting exercise on the above.

UNIT IV INTRODUCTION TO 3D MODELLING 10hrs

Slide facilities script attributes, V-port, editing session. Introduction to 3D-modelling technique and construction planes, drawing objects, 3D surfaces setting up elevation thickness and use of dynamic projections. Solid modelling with primitive command and Boolean operation. 3D sculpture exercise using 3D primitives (cubes, spheres etc.)

UNIT V 3D RENDERING AND SETTING 10hrs

Rendering and scene setting to create a photo realistic picture, understanding material mapping, environment setting and image filling. Exercise on visualising a building and exploring the potential of lights and camera.

Total: 50 Periods / Hours

OUTCOMES

CO1: Ability to express using digital tools in the realm of visual composition, drafting, 3D visualization and rendering.

TEXTBOOKS

1. Deke McClelland, 'Photoshop 7 Bible Professional Edition', Wiley John & Son INC, New York, 2000.
2. Aouad, 'Computer Aided Design guide for Architecture, Engineering and construction', Spon process, 2012.
3. Mohammed Saleh Uddin, 'Digital Architecture – 3D Computer Graphics from 50 top designers', 1999.

REFERENCES

1. Scott Onstott, 'AutoCAD 2015 and AutoCAD LT 2015 Essentials', AutoDesk Official press, 2014.
2. Fiorello. J. A., 'CAD for Interiors beyond the basics', Wiley publications, 2011.
3. Ryan Duell and Tobias Hathorn, 'AutoDesk Revit Architecture 2015: No Experience Required', AutoDesk Official Press, 2014.

USEFULWEBSITES

- https://www.autodesk.in/
- https://knowledge.autodesk.com/support/autocad/learn-explore

25ARUS351	ARCHITECTURAL DESIGN II	L	T	P/S	C	Total Marks
		0	5	10	15	100

OBJECTIVES

- To enable an understanding of the fundamental possibilities of architectural form and space in relation to human experience and use within the context of the immediate living environment.
- To get the above understanding through personal, first-hand exploration as well as through theoretical and literature studies.
- To use this understanding to create meaningful built environment in the context of small-scale projects that involve simple function and experience.

CONTENT

Designing a built environment requires the development of individual capacity for thought with respect to subjective and objective aspects. Studying and designing projects of small scale that involve a more immediate and basic experience is important in this context. The study and project exploration will involve the following aspects from first principles as well as through live studies and theory – human behaviour, activities and needs for various purposes, role of specific form/space in creating particular experiences and effects, built form-open space relationships, spatial organisation, environment behaviour aspects (especially those relating to children), site as a positive tool in all scales, potential of materials and construction. Through this, both the qualitative and quantitative attributes of design can be understood and engaged. This would give training in the ingenious use of architecture to fulfil goals towards a responsive and stimulating environment. The techniques used for study and presentation can align themselves towards the above, such as cognitive maps, sketches, manual drawings, physical models with simple materials. The scale and complexity of projects will be commensurate with this - small to medium size projects involving buildings/ small campuses with simple circulation, passive energy, multiples of single unit space, single use buildings. Some suggestive projects are small buildings or small campuses involving civic/ cultural use, uses related to children such as schools, facilities for people with special requirements. The number of projects is left to the discretion of the faculty based on scale and complexity.

Total: 135 Periods / Hours

OUTCOME

CO1: Ability to perceive, understand and represent fundamental attributes of form- space with respect to human experience and use.

CO2: Ability to ideate, innovate and create meaningful built environment in basic human situations.

TEXTBOOKS

1. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2001.
2. Kevin Lynch, 'Site Planning', MIT Press, Cambridge, 1967.
3. Steen Eiler Rasmussen, Experiencing Architecture; MIT Press; 1959.
4. Kent C. Bloomer and Charles W. Moore, 'Body, Memory, and Architecture', Yale University
Press, 1977.
Juhani Pallasmaa, 'The Eyes of the Skin - Architecture and the Senses', John Wiley: New York, 2005.

REFERENCES

1. Julius Panero, Martin Zelnik, 'Human Dimension and Interior Space', Whitney Library of Design, 1975.
2. Richard P. Dober, 'Campus Planning', Reinhold Book Corporation, 1963.
3. Sam F.Miller, 'Design Process: A Primer for Architectural and Interior Design', Van Nostrand Reinhold, 1995.
4. Dudek M, 'Schools and Kindergartens', Birkhauser 2007.

IV SEMESTER

25ARUT401	DESIGN OF STRUCTURES I	L	T	P/S	C	Total Marks
		2	2	0	4	100

OBJECTIVES

- To get introduced to basic structural members in timber and steel.
- To give knowledge to design different timber components in a building.
- To enable an understanding of the types, efficiency and strength, advantages and disadvantages of rivet and welded joints in steel.
- To enable the design of tension (beams) and compression (columns) steel members in a building under different conditions.

UNIT I TIMBER STRUCTURES - DESIGN OF BEAMS AND COLUMNS 9hrs

Grading of timber. Permissible stresses. Design of solid timber beams. Design of solid timber columns.

UNIT II STEEL STRUCTURES - BOLTED AND WELDED JOINTS 9hrs

Assumptions. Failure of bolted joints. Strength and efficiency of bolted joints. Types. Design of bolted joints for axially loaded members (excluding eccentric connections). Types of welded joints and their advantages and disadvantages. Design of fillet welds (excluding eccentric connections).

UNIT III STEEL TENSION MEMBERS 9hrs

Introduction. Net sectional area. Permissible stresses. Design of axially loaded tension member. Lug angle, tension splice.

UNIT IV STEEL COMPRESSION MEMBERS 9hrs

Introduction. Different sections. Built up section. Design of columns (excluding lacing, battening and other connections).

UNIT V STEEL BEAMS 9hrs

Introduction. Laterally supported and unsupported beams. Design of laterally supported beams.

Total: 45 Periods / Hours

OUTCOMES

CO1: Ability to design timber beams and columns by applying the code provisions.
CO2: Ability to design steel joints for maximum efficiency and strength.
CO3: Ability to design tension and compression members for different conditions by applying the code provisions.
CO4: Ability to design different types of laterally unsupported & supported beams for different conditions.

TEXTBOOKS

1. M.R. Shiyekar, 'Limit State Design in Structural Steel', PHI Learning Private Limited, 2010.
2. N. Subramanian, 'Design of Steel Structures', Oxford Higher Education, 2008.

REFERENCES

1. S.K. Duggal, 'Limit State Design of Steel Structures', McGraw Hill Education, Private Limited,2010.
2. Dr. V. L. Shah & Prof. Veena Gore, 'Limit State Design of Steel Structures', Structures Publications, Pune, 2012.
3. S.S. Bhavikatti, 'Design of Steel Structures by Limit State Method as per IS800-2007', I.K.International Publishing House Pvt, Ltd, 2012. 36

25ARUT402	ELEMENTS OF ARCHITECTURE	L	T	P/S	C	Total Marks
		1	3	0	4	100

OBJECTIVES:

- To introduce architecture as a discipline and to sensitize the students to the various functional aspects of architecture.
- To make them understand the meaning of Architecture and its visual aesthetic sense.
- To introduce the students to the ordering elements, principles of architecture.
- To gain Knowledge about the organization principles of Form and Space
- To gain Knowledge about the theoretical aspects of Design.
- To gain knowledge and understand the vocabulary of the architectural language through the analysis of selected buildings.

UNIT - 1 INTRODUCTION TO DESIGN AND ARCHITECTURE 7 Hrs

Definitions of Design, Architecture-context for architecture as satisfying human needs-functional, aesthetic finds and psychological –architecture as a discipline-introducing the various functional aspects of architecture: site, structure, skin, services, use, circulation etc.

UNIT - 2 ORDERING ELEMENTS 10 Hrs

Point, line, plane, form, shape, motif, pattern, light, colour, texture – understanding the elements with respect to architecture- Detailed study of the visual and emotional effects of geometric forms and their derivatives: sphere, cube, pyramid, cylinder and cone.

UNIT - 3 PRINCIPLES OF ARCHITECTURE 10 Hrs

Transformation of forms, Articulation of forms – mass-space/solid-void effects, articulation of edges, corners, surfaces -Proportion, scale, balance, rhythm, axis, symmetry, hierarchy, datum, unity, harmony, dominance with respect to architecture.

UNIT - 4 ORGANIZATION OF FORM AND SPACE 11 Hrs

Spatial Relationships: Space within space, interlocking spaces, adjacent spaces, space linked by a common space -spatial organization: centralized, linear, radial, clustered, grid -form-space relationships.

UNIT - 5 CIRCULATION AND ORGANISATION 7 Hrs

Circulation as organizing element: building approach, building entrance, configuration of the path, path space relationship, form of circulation space.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1. Student will understand on the definition of architecture; elements of architectures of form.

CO2. Student will be exposed to the principles of architecture and applications of the same in buildings and spaces.

CO3. Student will understand the meaning of character and style of buildings with examples.

CO4. Student will understand on ideologies and philosophies of architectures of contemporary.

CO5. Student will understand about the theoretical aspects of Architectural Design, knowledge in the Architectural terms and language.

TEXTBOOKS:

- Francis D.K. Ching, Architecture-Form, Space and Order, Van Nostrand Reinhold Company, New York, 2007.
- Simon Unwin, Analyzing Architecture, Routledge, London, 2003.
- Yatin Pandya, "Elements of Space Making", Mapin Publishing Pvt. Ltd, 2014.
- V.S. Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., NewDelhi,1997-3rdedition.

25ARUT403	ENVIRONMENTAL SCIENCE FOR THE BUILT ENVIRONMENT	L	T	P/S	C	Total Marks
		1	3	0	4	100

OBJECTIVES:

- To enable understanding of the environment, and its interrelationship with living organisms.
- To help understand the importance of environment by assessing its impact on humans and to envision the surrounding environment, its functions and its value.
- To give understanding of dynamic processes and features of the earth's interior and surface.
- To give awareness about integrated themes and biodiversity, natural resources, pollution control and waste management.
- To inform about scientific, technological, economic and political solutions to environmental problems.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 12hrs

Definition, scope and importance of environment. Need for public awareness. Concept of an ecosystem. Structure and function of an ecosystem – producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction to types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Introduction to biodiversity. Definition and types-genetic, species and ecosystem diversity. Bio geographical classification of India. Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity – habitat loss, poaching of wildlife, man wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity - In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds. Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 7hrs

Definition. Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards. Soil waste management. Causes, effects and control measures of municipal solid wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management - floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban/ Rural/ Industrial/ Agricultural.

UNIT III NATURAL RESOURCES 8hrs

Forest resources - Use and over-exploitation, deforestation, timber extraction, case studies. Mining, dams and their effects on forests and tribal people. Water resources - Use and overutilization of surface and ground water. Floods, drought, conflicts over water. Dams-benefits and problem. Mineral resources - Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources - World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources - Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies. Land resources - Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **9hrs**

From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; problems and concerns, case studies. Role of non-governmental organisations. Environmental ethics - Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. Wasteland reclamation. Consumerism and waste products. Environment protection act, Air (Prevention and Control of Pollution) act, Water (Prevention and control of Pollution) act, Wildlife protection act, Forest conservation act. Enforcement machinery involved in environmental legislation. Central and state pollution control boards. Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **9hrs**

Population growth, variation among nations. Population explosion. Family welfare programme. Environment and human health. Human rights. Value education. HIV/AIDS awareness. Women and child welfare. Role of information technology in environment and human health. Case studies.

Total: 45 Periods / Hours

OUTCOMES

CO1: Sensitivity towards the environment as a totality and knowledge about its importance.

CO2: An understanding of the role of public awareness and participation with respect to environmental issues, apart from laws.

TEXTBOOKS

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

REFERENCES

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.

2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopaedia', Jaico Publ., House, Mumbai, 2001.

3. Dharmendra S. Sengar, 'Environmental Law', Prentice hall of India PVT LTD, New Delhi,2007.

4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

USEFUL WEBSITES

- https://en.wikipedia.org/wiki/Environmental_science
- https://swayam.gov.in/nc_details/NPTEL
- https://nptel.ac.in

25ARUJ421	BUILDING MATERIALS AND CONSTRUCTION III	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES

- To give an introduction to metals as material for building construction.
- To give knowledge about the principles, methods of construction and applications of metals for structural and non-structural building components.
- To provide familiarity with market forms of metals and finishes for them.
- To enable design and detail using metals in buildings.

UNIT I FERROUS METALS IN BUILDING CONSTRUCTION 12hrs

Iron and steel as building materials and brief history of their use through examples. Types of iron and their uses in building. Outline of manufacture of steel and steel alloys. Their properties, types, uses, protection and finishes. Corrosion of ferrous metals and its prevention. Fire protection of steel. Steel sections and products for structural and non structural use including current innovations. Joints in steel- welding, riveting, bolting. Stainless steel. Understanding of product literature. Site visits.

UNIT II STEEL IN NON-STRUCTURAL BUILDING COMPONENTS 12hrs

Construction principles and procedures for nonstructural building components using steel. Components to include doors, windows, ventilators, rolling shutters of different types as applicable - openable, sliding, pivoted, fixed, louvred. Glazing, hardware and fixing for components. Sketching/ drawing/ models of the principles. Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT III STEEL IN STRUCTURAL BUILDING COMPONENTS 12hrs

Construction principles and procedures for structural building components using steel. Components to include foundations, columns, beams, staircases, roofs (different types of trusses, space frames, etc), total structures such as geodesic dome. Connections between the different components and fixing. Materials for glazing, cladding, roof covering, etc., as required for particular components, and their fixing. Prefabrication in steel. Drawings/ models of the principles. Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT IV NON-FERROUS METALS IN BUILDING CONSTRUCTION 12hrs

Auminium and aluminium alloys in building construction. Brief history of their use through examples. Their manufacture, properties, durability, finishes and uses. Aluminium products such as extrusions, foils, castings, sheets, current innovations. Construction principles and procedures for non-structural building components using aluminium. Components to include door, window, ventilator of different types - openable, sliding, pivoted, fixed, louvred, etc., as applicable. Aluminium for interior components such as panelling, partitions and false ceiling. Glazing, hardware and fixing for components. Introduction to Aluminium curtain wall glazing. Sketching/ drawing/ models of the principles. Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/drawings/photos. Introduction to other non-ferrous metals such as copper, lead, zinc. Their manufacture, properties, uses and finishes.

UNIT V DESIGN AND DETAILING USING METALS **12hrs**

A design and detailing exercise involving metals, predominantly steel, as primary construction material in an appropriate typology involving a simple scale project. The project will integrate knowledge from all the previous units. Design and construction details in the form of sketches, drawings, models.

Total: 60 Periods / Hours

OUTCOME

CO1: Knowledge of properties of ferrous and non-ferrous metals as materials for buildings.

CO2: An understanding of possibilities of steel as an important building construction material.

CO3: Ability to design and detail structural and non-structural components of simple buildings using metals.

CO4: Ability to use metal innovatively in building projects.

TEXTBOOKS

1. P.C Vargheese, 'Building Materials', Prentice Hall of India, 2015.
2. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
3. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
4. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

REFERENCES

1. Gorenc, Tinyou, Syam, 'Steel Designer's Handbook', CBS Publishers and Distributors, NewDelhi, Bangalore, 2005
2. Alan Blanc, 'Architecture and Construction in Steel', E&FN Spon, London, 1993
3. Allan Brookes, 'Cladding of Buildings', E&FN Spon, London, 1998.
4. Mark Lawson, Peter Trebilcock, 'Architectural Design in Steel', Taylor and Francis, 2004.
5. Terri Meyer Boake, 'Understanding Steel Design', Birkhauser,

25ARUJ422	BUILDING SERVICES I	L	T	P/S	C	Total Marks
		2	0	1	3	100

OBJECTIVES

- To give information about water supply source, treatment and distribution.
- To give information about waste water disposal and sewerage systems.
- To give information about drainage system, refuse collection and disposal.
- To give exposure to sustainable practices in all the above contexts.
- To give an overall understanding of how to plan for all the above in small buildings, campuses and neighborhoods.

UNIT I WATER QUALITY, TREATMENT AND DISTRIBUTION 9 hrs

Sources of water supply. Water Quality. Water requirements for all type of residential, commercial, industrial buildings and *for* town. Water treatment methods – screening, aeration, sedimentation, filtration, disinfection, softening. Conveyance of water. Distribution of water. Water piping systems in all type of buildings. Choice of pipe materials. Types of fixtures and fittings. Water consumption calculations for various contexts. Water meters. Design and calculations of OHTs, UG Sumps and firefighting storage. Related mechanical equipment. Automation systems. Water heating systems, solar water heaters. Energy efficient systems. Green and sustainable concepts in the above where relevant. Understanding of service drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT II SULLAGE AND SEWAGE DISPOSAL 9 hrs

Sewage and sullage. Their disposal. Primary treatment. Types of sewer systems. Secondary treatment. Biological treatment. Modern types of sewage treatment plants - neighbourhood and site level. Related mechanical equipment. Sewer line, gradients, manholes, inspection chambers, septic tank, leach pits, traps. Byelaws for sanitation. Sanitary fittings and their requirements. Green and sustainable concepts in the above where relevant. Understanding of service drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT III STORM WATER DRAINAGE AND RAIN WATER HARVESTING 8 hrs

Basic principles of storm water drainage. Drain pipes and type of pipe. Storm water gutter. Rain water harvesting principles, Storage sumps. Different types of pavements and details for water percolation. Current ideas of sustainability in the above. Understanding of service drawings. Site visits with documentation in the form of sketches/ drawings/photos.

UNIT IV SOLID WASTE MANAGEMENT 10 hrs

Solid waste types, segregation and refuse collection. Disposal - Incinerator, composting, vermicomposting, sanitary land filling, bio gas system, modern renewable energy system. Current ideas of sustainability in the above. Understanding of service drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT V DESIGN OF SERVICES **9 hrs**

Schematic design of water supply, sewage, drainage and solid waste services in the context of a small building/ campus/ neighbourhood. The project will integrate knowledge from all the previous units. Design in the form of choice, details of system and layout/ drawings.

Total: 45 Periods / Hours

OUTCOMES

CO1: Understanding of water supply, sewage, drainage and waste systems in buildings.

CO2: Ability to conceptually plan/ design the above for a given simple context.

CO3: Awareness of sustainable principles and best practices.

TEXTBOOKS

- 'Manual of Water Supply and Treatment', second edition, CPHEEO, Ministry of works and housing, New Delhi, 1977.
- AFE Wise, JA Swaffied Water, 'Sanitary & Waste Services in buildings', V Edition, Mitchell Publishing, Co. Ltd., 2002.
- Punmia B.C., 'Waste Water Engineering', Laxmi Publications, 2009.
- Arceivala S.J., 'Waste Water Treatment for Pollution Control', Tata McGrawHill,2008.
- National Building Code - Bureau of Indian Standards.
- Indian Standard Code of Practice for Water Supply in Buildings, IS :2065 – 1983'.

REFERENCES

1. G.M. Fair, J.C. Geyer and D.Okin, 'Water and Waste water engineering Volume II', John Wiley & Sons, Inc. New York, 1968.
2. S.C.Rangwala, 'Water Supply and Sanitary Engineering', Charotar publishing house,
3. 'Renewable Energy, Basics and Technology, Supplement Volume on Integrated energy systems', Solar Agni systems, Sri Aurobindo Ashram, Pondicherry 605002.

USEFUL WEBSITES

- https://en.wikipedia.org/wiki/Sewage_treatment
- https://www.safewater.org
- https://www.unwater.org
- https://swayam.gov.in/nc_details/NPTEL
- https://nptel.ac.in/

25ARUS451	ARCHITECTURAL DESIGN III	L	T	P/S	C	Total Marks
		0	5	10	15	100

OBJECTIVES

- To create understanding of human-built environment as a holistic, living entity from macro to micro scales, and shaped by geographic and socio-cultural forces as well as by historic, political and economic factors, through study of and design within the context of rural settlements.
- To enable a comprehensive study of rural settlement and architecture in order to understand them as exemplar of collective design that evolved through various parameters.
- To observe changes in the above, analyse their nature and causes for them.
- If required, to explore possible policy and physical interventions towards positive changes within the context studied.
- To enable design process that engages context and community.

CONTENT

Rural settlements offer an opportunity to understand basic aspects of human built environment and what goes into its making/ influences it. The interrelationship between built form and society will be studied, understood and established, starting from either end as required. Study of specific modes of rural/vernacular/traditional architecture including their morphology, local materials and construction techniques, details, meaning, etc., will be done to give an insight into the particulars and universals of architecture. Appropriate tools and processes can be used to aid the understanding. These include different methods of historical and socio-cultural study, oral history, discussions, information collection, surveys, maps, perceptual sketches, documentation through drawings, demographic study, assimilation and analysis. Transformations across time need to be traced to understand constants and dynamics in human society. They will also be critically evaluated through discussions with experts. Rising from this, future changes can be projected/ envisaged and if found required, policy and physical interventions can be suggested/ explored. The physical interventions found necessary will be taken up as design situations. This could range from individual to community level and involve any aspect of the physical environment (including building projects) as the situation/viewpoint warrants. If the context does not warrant a building need, a small community-oriented building design will be given as a separate project in addition to the rural project. For building projects, the scale and complexity of planning and construction usually involved will be simple - small or medium span, ground plus two storeyed maximum, simple horizontal and vertical movement, simple/ local materials and construction, passive energy.

Total: 150 Periods / Hours

OUTCOME

CO1: Ability to collect, assimilate and integrate knowledge in a holistic manner.

CO2: Sensitivity towards the nature and values of unselfconscious and collective design as well as the interconnectedness of human society and environment.

CO3: Ability to observe and analyze changes in the above.

CO4: Ability to project future transformations and give possible/ appropriate ways to address issues, if any.

CO5: Sensitivity in design approach in community-oriented projects with respect to context collective values and needs.

TEXTBOOKS

1. Amos Rapoport, 'House, Form and Culture', Prentice Hall, 1969.
2. Bernard Rudofsky, 'Architecture without Architects', MoMA, 1964.
3. Rajendra Kumar Sharma, 'Rural Sociology', Atlantic, 2011.
4. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional 2001.

REFERENCES

1. Ramachandran H, 'Village Clusters and Rural Development', Concept Publications, 1980.
2. Thorbeck D, 'Rural Design', Routledge,2002.
3. Hassan Fathy, 'Architecture for the Poor', University of Chicago press, 1973.
4. R. C. Arora, 'Integrated Rural Development', S. Chand, 1979.

V SEMESTER

25ARUT501	DESIGN OF STRUCTURES II	L	T	P/S	C	Total Marks
		2	2	0	4	100

OBJECTIVES

- To inform about structural design through working stress and limit state methods.
- To enable use of the above two methods for the design of concrete beams and slabs under different conditions.
- To enable use of limit state method for design of a concrete staircase.

UNIT I DESIGN OF CONCRETE MEMBERS AND WORKING STRESS DESIGN OF CONCRETE BEAMS 9Hrs

Concept of elastic method, Ultimate load method and limit state method. Advantages of limit state method over other methods. Analysis and design of singly reinforced rectangular beam for bending.

UNIT II LIMIT STATE DESIGN OF CONCRETE BEAMS 9Hrs

Analysis and design of singly and doubly reinforced rectangular and flanged beams for bending.

UNIT III LIMIT STATE DESIGN OF CONCRETE SLABS 9Hrs

Behavior of one way and two-way slabs. Design of one way and two-way slabs for various edge conditions. Corner effects.

UNIT IV DESIGN OF CONCRETE CIRCULAR SLABS 9Hrs

Design of simply supported and fixed circular slabs subjected to uniformly distributed loads.

UNIT V DESIGN OF CONCRETE STAIRCASE BY LIMIT STATE METHOD 9Hrs

Types of staircases. Design of dog legged staircase.

Total: 45 Periods / Hours

OUTCOME

CO1: Ability to understand the different concepts of WSM and LSD methods using the code provisions.
CO2: Ability to design RCC beams and slabs by applying the above concepts.
CO3: Ability to design RCC dog legged staircase design using LSD.

TEXTBOOKS

1. S.N. Sinha, “Reinforced Concrete Design”, Tata McGraw Hill, 2002.
2. Shah H.J, 'Reinforced Concrete', Charotar, Vol. 1 2016, Vol.2 2014.

REFERENCES

1. P.Dayaratnam, 'Design of Reinforced Concrete Structures', Oxford and IBH Publishing Co.,1983.
2. C. Sinha and S.K. Roy, 'Fundamentals of Reinforced Concrete', S.Chand & Co., New Delhi,1983.
3. Dr. B.C. Punmia, 'Reinforced Concrete Structures' Vol, 1 & 2', Laxmi publication, Delhi, 2004.
4. IS 456 'Indian Standard, Plain and Reinforced Concrete, Code of Practice', Bureau of Indian Standards, 2000.
5. S.Unnikrishnan Pillai and Devados Menon, 'Reinforced Concrete Design', Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1999.

25ARUT502	HISTORY OF ARCHITECTURE & CULTURE III	L	T	P/S	C	Total Marks
		2	2	0	4	100

OBJECTIVES

- To introduce the condition of modernity and outline its impact on society, cities and architecture.
- To give a detailed understanding of modern architecture as new expression with different
- strands rising from various aspects and effects of modernity.
- To create an overall understanding of the architectural developments in India rising out of colonial modernity and nationalism.

UNIT I MODERNITY AND ARCHITECTURE 12Hrs

Overview of modernity as a historical phenomenon and its various aspects and manifestations, encompassing social, cultural, technological, economic and political changes. Outline of various strands of modernity in architecture. Enlightenment ideals, Neo Classical architecture and its types. Outline of Industrial Revolution and associated changes. Urban transformations in Europe and America. Housing projects. New building types and spaces. Industrial material of steel, glass and concrete. New construction techniques and standardization. Split of design education into architecture and engineering streams. Industrial exhibitions. Chicago School, skyscraper development and Louis Sullivan.

UNIT II REVIEWING INDUSTRIALISATION 7Hrs

Opposition to industrial arts and production - Arts and Crafts in Europe and America: Morris, Webb- Art Nouveau: Horta, Van De Velde, Gaudi, Guimard, Mackintosh - Vienna secession: Hoffman, Olbrich Wright's early works.

UNIT III EVOLUTION OF MODERN ARCHITECTURE - IDEOLOGIES, MOVEMENTS AND STYLES 8Hrs

Early modernism in Europe and America. Critique of ornamentation and Raumplan of Adolf Loos. Peter Behrens and Werkbund. Modern art and architecture - Expressionism, Futurism, Constructivism, Cubism, Suprematism and De–Stijl. Art Deco. Functionalism. Bauhaus. CIAM. International Style. Outline of works and architects associated with all the above.

UNIT IV MODERNIST ARCHITECTS AND THEIR WORKS 9Hrs

Ideas, works of Corbusier: Brasilia, of Gropius Unite- Works of later modernists: Louis Kahn, Paul Rudolph, Eero Saarinen

UNIT V COLONIAL ARCHITECTURE IN INDIA 9Hrs

Colonialism and its impact - early colonial architecture: forts, bungalows, cantonments- Stylistic transformations: Neo-classicism, Gothic Revival and Indo Saracenic -PWD and institutionalization of architecture - Building of New Delhi showcasing imperial power.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of modernity as a fundamental transformation in Western society that spread across the world and the resultant architectural production.
CO2: An insight into the development of modern architecture.
CO3: An understanding of architecture in India under influence of colonialism and colonial modernity.

TEXTBOOKS

1. Kenneth Frampton, 'Modern Architecture: A Critical History', Thames & Hudson, London, 2007.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Manfredo Tafuri, 'Modern Architecture', Harry N. Abrams Inc, 1980.
4. Leonardo Benevolo, 'History of Modern Architecture Vol 1 & 2', Reprint, MIT Press, 1977.
5. G. H. R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Change, and the Politics of Style since 1850', Yale University Press, 1989.
6. Miki Desai et. al., 'Architecture and Independence: The Search for Identity- India 1880 to 1980 ', Oxford University Press, 2000.

REFERENCES

1. Thomas Metcalf, 'An Imperial Vision', Oxford University Press, 2002.
2. Christian Norburg-Schulz., 'Meaning in Western Architecture', Rizzoli, Revised Edition, 1993.
3. Bill Risebero, 'Modern Architecture and Design: An Alternative History', MIT Press, 1985.
4. Norma Evenson, 'The Indian Metropolis: A View Toward the West', Yale University Press, 1989.
5. Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash, 'A Global History of Architecture', John Wiley & Sons, 2017.
6. K.R.Sitalakshmi, 'Architecture of Indian Modernity- The Case of Madras', Palaniappa Brothers, 2015.

25ARUT503	URBAN HOUSING	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To understand the basic elements, principles & various issues related to housing & National Housing Policy especially in the urban context.
- To expose the students about various agencies involved in the housing development & the institutional mechanism for housing.
- To understand the various factors (social, economic, etc.,) responsible for the design of plan & the various schemes under which they can be implemented.
- To update about the Indian norms, standards & guidelines.
- To understand about the various typologies of housing with case examples and the stages involved in the development of housing.

UNIT: I INTRODUCTION TO HOUSING AND HOUSING ISSUES - INDIAN CONTEXT 9Hrs

Housing and its importance in Architecture and its relationship with neighborhood and city planning. Housing demand and supply - National Housing Policy - Housing agencies and their role in housing development - impact of traditional life style - Rural Housing, Public, private sector housing.

UNIT: II SOCIO-ECONOMIC ASPECTS 9Hrs

Social & economic factors influencing housing affordability - Housing Finance - equity in housing development sites and services/- slum upgradation community participation - Indira Awas Yojana, Crime prevention, Health principles in Housing.

UNIT: III HOUSING STANDARDS 9Hrs

UDPFI - guide lines, standards and regulations - DCR - performance standards for housing.

UNIT: IV SITE PLANNING AND HOUSING DESIGN 9Hrs

Site Planning Selection of site for housing, consideration of physical characteristics of site, locational factors, orientation, climate, topography - Landscaping. B. Housing design Traditional housing, row housing, cluster housing - apartments and high-rise housing relating to Indian situations - case studies in India - integration all types of services, parking, incorporation of green sustainable practices - prefabrication in housing.

UNIT: V HOUSING PROCESS AND ISSUES IN HOUSING 9Hrs

Various stages and tasks in project development - Institutional Mechanism in housing - PPP and other models, housing management - Environmental aspects and national calamities and disaster mitigation, Innovative approach to solve India's Housing problem.
Green building and sustainable practices. Disaster resistance and mitigation. Prefabrication Community participation.

Total: 45 Periods / Hours

OUTCOMES:

CO1: Creates awareness about the need, demand and the supply of housing, the process and the issues related to it.

CO2: Imparts knowledge in students to find possible solutions.

CO3: Students get to know the basic elements; principles & various issues related to housing & National Housing Policy especially in the urban context.

CO4: Students are exposed to various agencies involved in the housing development & the institutional mechanism for housing.

CO5: Students understand the various factors (social, economic, etc.,) responsible for the design of plan, various schemes under which they can be implemented and are updated about the Indian norms, standards & guidelines.

REQUIRED READINGS:

1. Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980.
2. Jingmin Zhou - Urban Housing Forms - Architectural Press - 2005.
3. Joseph de Chiara & others "Time Saver Standards for Housing and Residential development", McGraw-Hill Co., New York, 1995.

REFERENCES:

1. Richard Untermanu & Robert Small, "Site Planning for Cluster Housing", Van Nostrand Reinhold Company, London/New York, 1977.
2. Forbes Davidson and Geoff Payne, "Urban Projects Manual",
3. Christopher Alexander, "A Pattern Language", Oxford University Press, New York 1977.
4. "Housing for the Low income", Sector Model, HUDCO Publications 5. www.hudcoindia.com 6. www.indiabuildnet.com/arch/sangath-8.htm

25ARUJ521	BUILDING MATERIALS & CONSTRUCTION IV	L	T	P/S	C	Total Marks
		1	0	3	4	100

OBJECTIVES

- To give an introduction to cement and concrete as materials for building construction.
- To help understand the principles, types, methods of construction and applications of concrete for structural and non-structural building components.
- To enable design and detail using concrete in buildings.

UNIT I INTRODUCTION TO CEMENT AND CONCRETE 12Hrs

Cement and concrete as building materials. Brief history of their use through examples. Composition, manufacture, properties, types and uses of cement. Tests for cement. Introduction to cement mortar and plastering and their composition. Concrete and its composition. Mix design. Nature of aggregates for mix including classification, sources, shape, size, grading, sampling and analysis. Proportioning, water-cement ratio, workability. Stages in concrete construction- formwork, mixing, placing, curing. Cement and concrete finishes including roughcast, dry dash, textured, stucco. Water proofing and damp proofing of concrete. Understanding of product literature. Site visits with documentation in the form of sketches/ photos.

UNIT II CAST IN-SITU CEMENT CONCRETE IN BUILDING CONSTRUCTION 12Hrs

Construction principles and procedures for building components using cast in situ cement concrete (plain and reinforced). Components to include different types of foundations, columns, beams, slabs, walls, lintels and sun shades, staircases, sump, water tank, flooring. Drawings/ models of the principles. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ photos.

UNIT III PRECAST CONCRETE PRODUCTS IN BUILDING CONSTRUCTION 12Hrs

Types and characteristics of simple precast concrete products. Construction principles and procedures for structural and non-structural building components using precast concrete. Components to include different types of blocks/ tiles for walls, floors and roof, jali, parapet, paving. Outline of manufacture, laying/constructing and finishing. Sketching/ drawing/ models of the principles. Understanding of product literature/ published work. Site visits with documentation in the form of sketches/ photos.

UNIT IV SPECIAL CONCRETES AND INNOVATIONS IN CONCRETE 12Hrs

Types of special concretes, to include lightweight concrete, aerated concrete, no-fines concrete, polymer concrete, pre-stressed concrete, fibre-reinforced concrete, ready-mixed concrete, ferrocement. Building materials and components developed by research organisations like CBRI, SERC, NBO, and BMTPC. Techniques for renovation and retrofitting. Basic principles for seismic design in concrete. Understanding of product literature/ published work. Site visits with documentation in the form of sketches/ photos.

UNIT V DESIGN AND DETAILING USING CONCRETE 12Hrs

Design and detailing exercise involving concrete as primary construction material in an appropriate typology involving a simple scale project. The project will integrate knowledge from all the previous units. Design and construction details in the form of drawings, sketches and models.

Total: 60 Periods / Hours

OUTCOME

CO1: Ability to use concrete as a versatile material in different contexts.

CO2: An understanding of the concepts of concrete as a building construction material.

CO3: Ability to design and detail specific components in concrete where there is scope for architectural design.

CO4: Ability to use concrete innovatively in simple projects

TEXTBOOKS

1. M.S.Shetty, 'Concrete Technology', S.Chand, 2005.
2. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
3. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
4. T.D Ahuja and G.S. Birdie, 'Fundamentals of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1996
5. S.P Arora and S.P Bindra, 'A Text Book of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd, 2010.
6. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

REFERENCES

1. Arthur Lyons, 'Materials for Architects and Builders - An Introduction', Arnold, London, 1997.
2. Don A.Watson, 'Construction Materials and Processes', McGraw Hill Co., 1986.
3. S.N Sinha, 'Reinforced Concrete Design', Tata-McGraw Hill, New Delhi, 2002
4. Howard Kent Preston, 'Prestressed Concrete for Architects and Engineers', McGraw Hill, New York, 1964.
5. Alan Blanc, 'Stairs, Steps and Ramps', Butterworth, Heinemann Ltd., 1999
6. R. Chudley et al**, '**Construction Technology', Heinemann, 2011.
7. 'Standards and Specifications for Cost Effective Innovative Building Materials and Techniques", BMPTC Publication, New Delhi.
8. Pamphlet and Manuals of SERC, BMPTC, HUDCO and other research organization

25ARUJ522	BUILDING SERVICES II	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES

- To inform about the principles and laws of electricity and wiring systems in buildings.
- To inform about the principles and laws of lighting systems in buildings.
- To inform about the principles and laws of acoustics in buildings.
- To give exposure to the design of electrical, lighting and acoustic systems in buildings of small scale.

UNIT I GENERATION OF ELECTRICITY AND DISTRIBUTION IN BUILDINGS 12Hrs

Generation of electricity. Ohms and Kirchoffs Laws. Units: watt, volt, amps. Distribution from grid to facilities. Two phase and three phase systems. Substation, transformers, generators. Wires and conduits, types and applications. Lightning conductors and earthing. Distribution boards, meters, switch boards, earthing. Energy efficient systems and renewable energy resources. Understanding of service drawings. Site visits with documentation in the form of sketches/ drawings/ photos. Design of electrical layout for buildings of small scale through drawings.

UNIT II INTRODUCTION TO LIGHTING 7Hrs

Electromagnetic spectrum. Sources of light. Laws and terminologies of lighting. Daylight. Considerations for designing with daylight - typology, room dimensions, openings. Daylight Factor. Light from artificial sources, quantity and quality. Types of lamps and luminaires. Applications and choice of luminaires. Energy efficient systems. Understanding of product literature/ service drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT III LIGHTING DESIGN FOR BUILDINGS 8Hrs

Lighting level for different uses in outdoor and indoor environment. Lighting calculations. Lighting simulation and performance analysis using software. Design exercise involving lighting design for appropriate projects of simple scale through choice, calculations, layout, drawings, simulations, physical models.

UNIT IV FUNDAMENTALS OF ACOUSTICS 9Hrs

Fundamentals – sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies. NC curves. Permissible noise limits. Material property - absorption, reflection, scattering, diffusion, transmission. Absorption co-efficient, NRC, Sound Transmission Class (STC), Impact Insulation Class (IIC). Understanding acoustic properties of materials/ products through study of product literature/ site visits.

UNIT V ENVIRONMENTAL ACOUSTICS 9Hrs

Environmental noise and its control. Structure borne and air borne noise control. Site selection. Sound in enclosed space: Reverberation time, optimum reverberation time, echo, early decay time. Architectural acoustics. Importance of shape volume, treatment for interior surfaces, etc. Basic principles in designing classroom, lecture and conference hall, offices, open air theatre, auditorium, concert hall, theatre, cinema, recording studio.

Understanding of drawings/ details related to real acoustic design projects. Site visits with documentation in the form of sketches/ drawings/ photos. Simple problems based on reverberation time and absorption coefficients. Acoustic design for simple and small projects

including planning, constructional measures and sound reinforcement systems through calculations, conceptual sketches, drawings, models.

Total: 45 Periods / Hours

OUTCOME

CO1: Knowledge of basics of electrical, lighting and acoustic systems in buildings.
CO2: Ability to design buildings satisfying electrical, lighting and acoustic principles.
CO3: Ability to design basic electrical, lighting and acoustic systems for buildings.

TEXTBOOKS

1. Phillips, 'Lighting in Architectural Design', McGraw Hill. New York, 1964.
2. David Egan, Victor Olgyay 'Architectural Lighting', McGraw-Hill, 2001.
3. Gary Gordon, 'Interior Lighting for Designers', 5th Edition, John Wiley & Sons Inc., New York, 2015.
4. David Egan, 'Architectural Acoustics', J.Ross Publishing, 2007.
5. David Lee Smith, 'Environmental Issues for Architecture', Wiley, 2011.
6. National Building Code - Bureau of Indian Standards.

REFERENCES

1. 'The Lighting Handbook', IES, 2011.
2. National Lighting Code 2010.
3. Descottes, Herve and Cecilia E. Ramos, 'Architectural Lighting: Designing with Light and Space', Princeton Architectural Press, Princeton, 2011.
4. A.K.Mittal, 'Electrical and Mechanical Services in High Rise Building: Design and Estimation Manual', CBS, 2009.

25ARUS551	ARCHITECTURAL DESIGN IV	L	T	P/S	C	Total Marks
		0	0	14	7	100

OBJECTIVES

- To introduce the challenges involved in the design of projects related to diverse needs and ways of contemporary urban life.
- To enable exploration of the above projects with perception, socio-cultural awareness and innovation.

CONTENT

Urban environment is synonymous with heterogeneity of populace and their diverse needs and lifestyles. Private and public spaces for varied programmes such as living, working and socio-cultural needs bring individuals and groups in intersection or proximity to each other. Further, current transformations in urban society have led to many changes in buildings. The challenge within the discipline of architecture is not only to create conducive spaces for contemporary ways of life within particular contexts, but also to identify issues and programmes and address them in innovative ways. These would include urban living, urban working, socio-cultural life, urban recreation, etc., Achieving comfort without sacrificing on density would also be a concern, along with exposure to building byelaws and barrier free environment. The approach and projects will be directed towards one or more of these aspects. The tools and techniques engaged for study and design can be those which are best suited to study the above, including mapping of urban patterns/ways of life and needs, demographics, socio-cultural aspects, densities, land use, etc., Projects will address specific situations/scenarios characteristic of urban life and context, either single or mixed use. They will be of medium to large scale, involving repetitive or unique spaces, low- or mid-rise buildings with passive/active energy. The number of projects is left to the discretion of the faculty based on scale and complexity.

Total: 150 Periods / Hours

OUTCOME

CO1: Ability to understand the nature, needs and ways of contemporary urban society as well as relate the existing built environment as a reflection of this.

CO2: Ability to draw from this understanding and identify issues/ challenges involving contemporary urban life and the built environment.

CO3: Ability to give appropriate/ innovative design solutions in the above context.

TEXTBOOKS

1. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2001.
2. 'Ernst Neuferts Architects Data', Blackwell ,2002.
3. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.
4. Wolfgang Preiser, Korydon H. Smith, 'Universal Design Handbook', 2nd Edition, McGraw-Hill, 2010.

REFERENCES

1. Rem Koolhaas et al, 'Project on the City II: The Harvard Guide to Shopping', Taschen, 2001.
2. Peter Coleman, 'Shopping Environments: Evolution, Planning and Design', Routledge, 2006.
3. LMVRDV, 'FARMAX- Excursions on Density', 010 Publishers, 2006.
4. Jos Boys, 'Disability, Space, Architecture: A Reader', Routledge, 2017.
5. Emily Talen, 'Design for Diversity', Routledge, 2012.

VI SEMESTER

25ARUT601	DESIGN OF STRUCTURES III	L	T	P/S	C	Total Marks
		2	2	0	3	100

OBJECTIVES:

- To enable use of limit state design for the analysis and design of columns.
- To enable the learning of design of structural elements like footings, retaining walls and masonry walls.
- To give understanding of the principle, methods, advantages and disadvantages of pre stressed concrete.

UNIT I LIMIT STATE DESIGN OF COLUMNS **9Hrs**

Types of columns. Analysis and design of short columns for axial, uniaxial and biaxial bending. Use of design aids.

UNIT II DESIGN OF FOOTINGS **9Hrs**

Types of footings. Design of wall footings. Design of axially loaded square & rectangular footings (pad and sloped).

UNIT III FLAT SLABS **9Hrs**

Design principles of flat slabs. Code provision. Simple design problems.

UNIT IV DESIGN OF MASONRY WALLS **9Hrs**

Analysis and design of masonry walls. Use of nomograms. Code requirements.

UNIT V INTRODUCTION TO PRESTRESSED CONCRETE **9Hrs**

Principle of prestressing. Methods of prestressing, advantages and disadvantages. Simple analysis problems.

Total: 45 Periods / Hours

OUTCOME

CO1: An understanding of the different concepts in designing footings and columns and masonry walls using LSD methods.

CO2: An understanding of the concepts and applications of prestressed concrete.

TEXTBOOKS

1. B.C. Punmia, 'Reinforced Concrete Structures- Vol. 1 & 2', Laxmi Publications, Delhi, 2004.
2. 'IS 456, Indian Standard, Plain and Reinforced Concrete, Code of Practice', Bureau of Indian Standards, 2000.
3. 'SP – 16, Design Aids for Reinforced Concrete to IS 456 National Building Code of India', 1983
4. 'IS 1905, Code of Practice for Structural Safety of Buildings', 1987.
5. Ashok K.Jain, 'Reinforced Concrete: Limit State Design', Nemchand, Bros Roorkee 1983.

REFERENCES

1. P. Dayaratnam, 'Design of Reinforced Concrete Structures', Oxford and IBH Publishing CO.,1983.
2. N.C.Sinha and S.K.Roy, 'Fundamentals of Reinforced Concrete', S.Chand and Co., New Delhi, 1983.
3. Krishna Raj, 'Prestressed Concrete Structures', 3rd Edition, Tata McGraw Hill, 2005.

25ARUT602	HISTORY OF CONTEMPORARY ARCHITECUTRE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce the large-scale changes from 1960s as context for new thought in architecture.
- To give exposure to the critiques of modern architecture.
- To study in detail the different postmodern directions in architecture.
- To give an outline of architectural approaches across the world from late 20th century.
- To give an understanding of the trajectory of post-independence architecture of India till the present.

UNIT I MODERN ARCHITECTURE – SPREAD AND LATER DIRECTIONS 8Hrs

Brutalism. Team X. Ideas, works and evolution of Philip Johnson, Louis Kahn, Paul Rudolph, Eero Saarinen, SOM, Eames, I.M.Pei. Modern architecture and postindependence India - national building, institutions and PWD architecture. Chandigarh. Outline of evolution of the architectural profession in India, influences on architects. Works of Kanvinde, Habib Rehman. Corbusier and Kahn in India. Evolution and early works of Raje, Correa and Doshi.

UNIT II AFTER MODERNISM I 7Hrs

Outline of changes in society after the 1960s characterized as condition of postmodernity, to include the realms of economics, technology, culture, society and environment. Critique of modernist cities by Jane Jacobs. Theories and works of Christopher Alexander. Aldo Rossi's ideas on the city. Neorationalism. Semiology and Postmodernism. Writings of Venturi. Works of Venturi Scott Brown, Graves and Moore.

UNIT II AFTER MODERNISM II & III 10Hrs

Urban ideas/works of Soleri, Archigram and Metabolism. High Tech architecture, works of Stirling, Rogers and Piano. Deconstructivism as new architectural movement. Ideas and works of Eisenmann, Hadid, Gehry, Libeskind, Tschumi. Critical Regionalism as a category of architecture. Ideas and works of Fathy, Ando, Bawa, Barragan, Siza. Outline of contextual approaches in Indian architecture after the 60s. Works of Raje, Doshi, Correa, Raj Rewal. Philosophy and works of Nari Gandhi, Laurie Baker.

UNIT IV CONTEMPORARY ARCHITECTURE 12Hrs

Overview of larger changes in society from late 20th century and their influence on architecture. Outline of architecture related to parametric design and digital processes, sustainability, globalisation, phenomenology, complexity. Ideas and works of ZHA, contemporary Dutch architecture, Bjarke Engels and BIG, OMA and Rem Koolhaas, Steven Holl, Mc Donough, Yeong, Zumthor, Pallasma, Murcutt. Outline of contemporary architecture in the non-Western world. Large scale changes in India from the 90s. Outline of post 1990s architecture of India.

UNIT V CONTEMPORARY TRENDS IN INDIA 8Hrs

Trends in Architecture in India after Independence. Influence of Le Corbusier and Louis.I.Khan. Studies of the ideas and works of B.V.Doshi, Charles Correa, Raj Rewal, J.A.Stein, Achyut Kanvinde, Anant Raje, Uttam Jain, Hasmukh Patel, Laurie Baker, Chandravarkar & Thacker, Hafeez Contractor, Nari Gandhi, ShirishBeri, Romi Khosla, Ranjit Sabiki, Anil Laul, Shashi Bhooshan, Jaisim, Bimal Pateletc.

Total: 45 Periods / Hours

OUTCOME

CO1: An awareness of the spread and varied later directions of modern architecture across the world.

CO2: An understanding of architectural production from the 1960s as driven by large scale changes across the world.

CO3: Familiarity with contemporary forces and directions in architecture across the world.

CO4: An understanding of postindependence architecture in India contemporaneous with the rest of the world, along with its own particular influences.

TEXTBOOKS

1. Kenneth Frampton, 'Modern Architecture: A Critical History', Thames & Hudson, London, 2007.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Diane Ghirardo , 'Architecture after Modernism', Thames & Hudson, London, 1990.
4. Elie G. Haddad, David Rifkind, 'A Critical History of Contemporary Architecture: 1960-2010', Routledge, 2016.
5. Bhatt and Scriver, 'Contemporary Indian Architecture- After the Masters', University of Washington Press, 1991
6. Bahga et al, 'Modern Architecture in India - Post Independence Perspective', Galgotia, 1993
7. Miki Desai et. al., 'Architecture and Independence', Oxford University Press, 2000.
8. Harrry Francis Malgrave and David Goodman, 'An Introduction to Architectural Theory 1968 to the Present', Wiley Blackwell, 2011.
9. Rahul Mehrotra, 'Architecture in India since 1990', Hatje Cantz, 2011.

REFERENCES

1. Jane Jacobs, 'Deaths and Life of Great American Cities', Vintage, 2003.
2. Christopher Alexander, ' A Pattern Language', Oxford University Press, Oxford, 1977.
3. Robert Venturi , 'Complexity and Contradiction in Architecture', 1977.
4. Kate Nesbitt, Ed, 'Theorising a New Agenda for Architecture', Princeton University Press, 1996.
5. Jagan Shah, 'Contemporary Indian Architecture', Lustre, 2008.
6. Francis D. K. Ching, Mark M. Jarzombek, Vikramaditya Prakash, 'A Global History of Architecture', John Wiley & Sons, 2017.
7. 'Architecture in India', Exhibition Catalogue, Electa Moniteur, 1985.
8. 'Vistara- The Architecture of India', Festival of India, 1986.
9. K.R.Sitalakshmi, 'Architecture of Indian Modernity- The Case of Madras', Palaniappa Brothers, 2015.
10. Bipin Chandra et al, 'India After Independence', Penguin, 1999.

25ARUT621	BUILDING MATERIALS & CONSTRUCTION V	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES

- To give an introduction to metals, predominantly iron and in building construction.
- To give an overview about glass and plastics, especially in building envelope/ roofing.
- To give detailed knowledge about the principles, methods of construction and applications ofsteel in building construction.
- To enable design and detail using steel, glass and plastic in buildings.

UNIT I GLASS 12Hrs

Glass as a building material. Brief history of its use through examples. Manufacture, properties and uses of glass. Types of glass - float glass, cast glass, glass blocks, foamed glass, decorative glass, solar control, toughened glass, wired glass, laminated glass, fire-resistant glass, glass blocks, structural glass. Glass and energy efficiency in buildings. Application of glass in building industry. Introduction to curtain wall glazing. Current innovations. Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ photos.

UNIT II PLASTICS 12Hrs

Plastic as a building material. Brief history of their use through examples. Manufacture. properties, types, uses and application of plastics in building industry. Different types of adhesives and sealants. Plastic joints. Specific materials such as polycarbonate sheet and teflon. Introduction to plastic based products in building construction such as such as doors, windows, ventilators, partitions, floors, walls, roofs, handrails. Current innovations. Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ photos.

UNIT III PROTECTIVE FINISHES AND DECORATIVE COATINGS 12Hrs

Paints - ingredients, types, applications, properties and uses in buildings - painting on different surfaces - defects of painting - special purpose paints - bituminous, luminous, fire retardant and resisting paints –properties. Uses and applications of varnishes, lacquers and wall putty-Current development and specifications - Introduction, different types, properties, uses and applications of shellac properties, uses and applications polyurethane, enamel, plastic acrylic emulsion.

Site visits with documentation in the form of sketches/ photos.

UNIT IV ADVANCED CONSTRUCTION TECHNIQUES AND MATERIALS 12Hrs

Advanced concrete building components and construction techniques. To include folded plates, shell structures, vaults, domes. Their composition, construction and finishing. Insulated concrete forms (ICF). Recent trends in roofing materials like corrugated GI Sheets, pre-coated metal sheets. Composite walls, pneumatic structures, tensile structures, corrugated hyparshells, single layer reticulated shells, tension hybrid membranes, sustainable steel (preco beams, cellular beams, composite slim floor beam). Drawings/ sketches/ models of the principles. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT V DESIGN USING ADVANCED CONSTRUCTION TECHNIQUES AND MATERIALS **12Hrs**

Design and detailing exercise involving advanced construction techniques and materials outlined in the previous unit. The emphasis would be on innovative ways to use their principles in an appropriate typology involving a simple scale project. Design and construction details in the form of sketches and models.

Total: 60 Periods / Hours

OUTCOME

CO1: Knowledge of glass, plastics, paints and finishes in building construction.
CO2: Familiarity with advanced materials and construction techniques.
CO3: Ability to use advanced materials and construction techniques in innovative ways.

TEXTBOOKS

1. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
2. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
3. S.P Arora and S.P Bindra, 'A Text Book of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd, 2010.
4. M.S.Shetty, 'Concrete Technology', S.Chand, 2005.
5. Arthur Lyons, 'Materials for Architects and Builders- An Introduction' Arnold, London, 1997.
6. Pamphlet and Manuals supplied or published by SERC, BMPTC, HUDCO and other research organisations.
7. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

REFERENCES

1. R.M. Davis, 'Plastics in Building Construction', Battersea College of Technology, Blackie, London, 1966
2. Ralph Monletta, 'Plastics in Architecture– A Guide to acrylic and Polycarbonate', Marcel Dekker Inc, New York, 1989
3. 'IS 7883. Code of Practice for the Use of Glass in Buildings ', Bureau of Indian Standards,2013.
4. Gorenc, Tinyou, Syam, 'Steel Designer’s Handbook', CBS Publishers and Distributors, New Delhi, Bangalore, 2005.
5. Alan Blanc, 'Architecture and Construction in Steel', E&FN Spon, London, 1993.
6. Billie Faircloth, 'Plastics Now: On Architecture’s Relationship to a Continuously Emerging Material', Routledge, 2015.

25ARUJ622	BUILDING SERVICES III	L	T	P/S	C	Total Marks
		2	0	1	3	100

OBJECTIVES

- To give exposure to the science behind air-conditioning systems, the different types and applications.
- To enable understanding of architectural aspects related to air-conditioning systems and take appropriate design decisions.
- To inform about fire protection, fire safety and fire fighting in buildings and how to plan for the same
- To inform about mechanical transportation systems for buildings and how to plan for the same.

UNIT I AIR CONDITIONING – PRINCIPLES AND SYSTEMS 9Hrs

Introduction to A/C conditions - basic of refrigeration systems - components of refrigeration system - compressor, condenser - control devices, evaporator- filters cooling tower - Vapour compression cycle - Concepts of cooling, transmission heat load - internal heat gain - concepts of zoning - room air distribution - types of outlets.

UNIT II DESIGN ASPECTS OF AIRCONDITIONING SYSTEMS 9Hrs

Configuring/ sizing of mechanical equipment, equipment and spaces for them. Exercise on the above through choice, calculations, layout, drawings.

a) Air conditioning system for small buildings - window types, evaporative cooler, packaged terminal units and through the wall units split system

b) Systems for large building - Chilled water plant - All Air system, variable air volume, all water system Configuring/ sizing of mechanical equipment, equipment spaces and sizes for chiller plant, cooling tower, Fan room, Circulation Pumps, Pipes, ducts.

UNIT III FIRE SAFETY: DESIGN AND GENERAL GUIDELINES 8Hrs

Principles of fire behavior, Fire safety design principles _ NBC Planning considerations in buildings - non-combustible materials, egress systems, Exit Access - Distance between exits, exterior corridors - Maximum travel distance, Doors, Smoke proof enclosures. General guidelines for egress design for Auditoriums, concert halls, theatres, other building types, window egress, accessibility for disabled- NBC guidelines - lifts lobbies, stairways, ramp design, fire escapes and A/C, electrical systems.

Heat smoke detectors - sprinkler systems, Firefighting pump and water requirements, storage - wet risers, Dry rises, Fire extinguishers & cabinets, Fire protection system - CO2 & Halon system, Fire alarm system, snorkel ladder.

UNIT IV MECHANICAL TRANSPORTATION SYSTEMS IN BUILDINGS 10Hrs

Lifts and escalators - types and applications. Round trip time for lifts. Design of lift lobby and vertical transportation core. Conveyors, travellators', dumb waiters. Standards for all. Latest technologies in vertical transport systems. Integration of lifts and escalators with building automation systems. Understanding all the above through product literature/ field visits. Design exercise on the above through choice, calculations, layout and drawings.

UNIT V ACOUSTICS 9Hrs

Fundamentals – Sound waves, frequency, intensity, wave length, measure of sound, Decibel scale, speech and music frequencies, Reverberation time. Acoustics and building design-site selection, shape volume, treatment for interior surfaces, basic principles in

designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls, schools, residences, office buildings including constructional measures and sound reinforcement systems for building types – case studies

Total: 45 Periods / Hours

OUTCOME

CO1: Familiarity with different air conditioning systems, their context of use and basics of planning involved.

CO2: An understanding of fire safety, firefighting, fire prevention and installations in buildings.

CO3: An understanding of mechanical transportation systems in a building.

CO4: Ability to integrate services in buildings.

TEXTBOOKS

1. William H. Severns and Julian R Fellows, 'Air conditioning and Refrigeration', John Wiley and Sons, London, 1988.
2. National Building Code - Bureau of Indian Standards.
3. 'ISHRAE Handbook for Refrigeration', 2015.
4. George R. Strakosch (Editor), Robert S. Caporale, 'The Vertical Transportation Handbook' 4th Edition, Wiley and Sons, 2010.
   David Lee Smith, 'Environmental Issues for Architecture', Wiley, 2011.

REFERENCES

1. A.F.C. Sherratt, 'Air Conditioning and Energy Conservation', The Architectural Press, London, 1980.
2. Andrew H Buchanan; 'Structural Design for Fire Safety', Wiley, 2001.
3. Swenson S. Don, 'Heating, Ventilating and Air Conditioning', American Technical Publishers, 1995.
4. ISHRAE, 'All about AHUs- Air Handling Units'.
5. CIBSE Guide D, 'Transportation Systems in Buildings',2010.
6. A.K.Mittal, 'Electrical and Mechanical Services in High Rise Building: Design and Estimation Manual', CBS, 2009

25ARUS651	ARCHITECTURAL DESIGN V	L	T	P/S	C	Total Marks
		0	5	10	15	100

OBJECTIVES

- To introduce buildings as consumers of resources for human needs and to enable responsible, creative addressing of this fact through design choices.
- To enable an understanding of architectural design as integrating diverse functional concerns in a building through analysis and innovation.
- To impart training in the resolving of spatial considerations with other physical aspects such as structures, services and climate.

CONTENT

Architecture is a man-made addition to the world and is resource intensive. The questions in this regard are how to simplify needs and means. Further, architecture today is also required to integrate several physical concerns in a building as human needs in built environment have become more complex with respect to intensity, distribution and interdependency of activities/ programmes. Here the challenge is to address complex needs in an efficient manner so as to conserve/ optimize resources without compromising on quality of life. The approach and projects will be directed towards one or more of these concerns. Appropriate tools and techniques related to the above can be used in study and design, especially in terms of technical aspects. The nature of projects can be either or both of these- 1) simple scale, ordinary or special use projects examining design through resources of different types 2) large, complex projects (multi storeyed buildings, office complexes, buildings for healthcare, performing art centre, etc.,) that need technical resolution and/or balance of various aspects. Aspects to be addressed can be urban land as resource, planning integration and detailing, sustainable building practices, green issues, alternative energy, intelligent building techniques and service integration, advanced building practices, appropriate materials and construction, sensitive and optimal use of resources. The number of projects is left to the discretion of the faculty based on scale and complexity.

Total: 150 Periods / Hours

OUTCOME

CO1: Ability to critically understand and address issue of resources.

CO2: Ability to balance diverse aspects/concerns of buildings by making informed choices and innovative design in the context of buildings with intense or complex programmes.

CO3: Ability to apply knowledge intensively in realms such as sustainable built environment, services.

TEXTBOOKS

1. Daniel Williams, 'Sustainable Design, Ecology, Architecture & Planning', John Wiley & Sons Inc, NJ, 2007.
2. Mili Mazumdar, 'Energy Efficient Buildings in India', TERI, New Delhi, 2012.
3. 'Sustainable Building Design Manuals I & II', TERI, 2004.
4. Derek Clements-Croome, 'Intelligent Buildings: An Introduction', Routledge, 2013.
5. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.

REFERENCES

1. Lara Menzel, 'Office - Architecture + Design', Braua Publishers, 2009.
2. Sheri Koones, 'Prefabulous+Sustainable, Building and Customizing an Affordable, Energy Efficient Home', ABRAMS, 2010.
3. Edward Ng, 'Designing High-density Cities for Social and Environmental Sustainability, Routledge, 2009.
4. Robin Guenther, Gail Vittori, 'Sustainable Healthcare Architecture', 2nd Edition, Wiley 2013.
5. Marian Keeler, Bill Burke, 'Fundamentals of Integrated Design for Sustainable Building', Wiley, John Wiley & Sons, 2009.

VII SEMESTER

25ARUT701	HUMAN SETTLEMENTS & PLANNING	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce the vocabulary, elements and classification of human settlements.
- To give exposure to planning concepts at different scales of settlements.
- To give an understanding of planning addressing current issues.
- To introduce planned cities as expressions of specific intent.
- To give exposure to changes in human settlements today.

UNIT I INTRODUCTION AND FORMS TO HUMAN SETTLEMENTS 9Hrs

Introduction to planning as a discipline and brief evolution of the profession. Elements of human settlements. Human beings and settlements. Nature, shells and networks- their functions and linkages. Anatomy and classification of human settlements- locational, resource based, population size and occupational structure. Structure and form of settlements - linear, non- linear and circular, combinations. Reasons for development. Advantages and disadvantages. Case studies.

UNIT II RURAL AND REGIONAL DEVELOPMENT IN INDIA 7Hrs

Factors influencing the growth and decay of human settlements.
Rural development plans, programmes and policies from case studies. Regional Plan. Area delineation, land utilisation plan, hierarchical system of settlements, their sizes and functions.

UNIT III URBAN PLANNING ANURBAN RENEWAL 9Hrs

Introduction to urban planning in India. Scope, content and limitations of master plan. Structure plan, DDP/ZDP, planned unit development. Development control rules. Urban renewal, redevelopment, rehabilitation and conservation. Urban development projects – case studies.

UNIT IV ASPECTS IN CONTEMPORARY URBAN PLANNING IN INDIA 12Hrs

Globalization and its impact on cities. Sustainable planning concepts. New forms of developments, to include self-sustained communities, SEZ, transit-oriented development (TOD), integrated townships, smart cities. Case studies.

UNIT V CITIES IN INDIA, MODERN AND POSTMODERN CITIES 8Hrs

Ancient town planning principles of India.Medieval Indian cities and factors that led to their Development. Colonial urbanism including presidency towns, hill towns and cantonments Contributions of Ebenezer Howard, Lewis Mumford, Patrick Geddes, C.A. Doxiadis. Visionary/ Utopian city concepts by Le Corbusier, Frank Lloyd Wright

Total: 45 Periods / Hours

OUTCOME

CO1: Ability to understand morphology of settlements and their generating forces and characteristics.
CO2: An understanding of the role of planning processes in making positive changes to settlements.
CO3: Awareness of planning interventions with respect to the current world.
CO4: Awareness of the nature and characteristics of human settlements.
CO5: Familiarity with current aspects of settlements.

TEXTBOOKS

- C.L.Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson, London, 1968.
- Thooyavan K R, 'Human Settlements- A Planning guide to Beginners', M.A.Publications, 2005.
- Ministry of Urban affairs and Employment, Government of India, New Delhi, 'Urban
- Development Plans: Formulation and Implementation-Guidelines', 1996.
- Andrew D Thomas, 'Housing and Urban Renewal', Harper Collins, 1986.
- Dutt B.B, 'Town Planning in Ancient India', Thacker Spink & Co., Calcutta, 1995.

REFERENCES

- S. B. Golahit, 'Rural Development Programmes in India', Neha Publishers & Distributors, 2010.
- 'CMDA Second Master Plan for Chennai Metropolitan Area 2026: Vision, Strategies and Action Plans (Vol.I, II &III)', Chennai, India, 2008.
  Nath, 'Regional Development and Planning in India', Neha Publishers & Distributors, 2009.
- Government of India, 'Report of the National Commission on Urbanisation', 1988.
- Hansen N., 'Regional Policy and Regional Integration', Edward Elgar, UK, 1996.
- Simon Eisner, Arthur Gallion, Stanley Eisner, 'Urban Pattern', John Wiley & Son, 1999.
- Comhaire J, 'How Cities Grew', Florham Park Press, 1971.
- Kosambi D.D, 'The Culture and Civilisation of Ancient India in Historical Outline', Vikas,1997.

25ARUT702	PROFESSIONAL PRACTICE & ETHICS	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give an introduction to the architectural profession and the role of professional bodies and statutory bodies as well as ethics of the profession.
- To give familiarity with basic aspects of running an architectural practice.
- To give exposure to the processes involved in taking up and completing an architectural project.
- To inform about legal aspects and legislations associated with the profession.
- To give exposure to the larger implications of professional practice in the globalised world today.

UNIT I INTRODUCTION TO ARCHITECTURAL PROFESSION CODE OF CONDUCT AND ETHICS 9Hrs

Architectural profession and role of architects in society. Registration of architects. Role of the Indian Institute of Architects. Architects Act 1972- intent, objectives, provisions with regard to architectural practice. Council of Architecture- role and functions. Importance of ethics in professional practice. Code of conduct for architects. Punitive action for professional misconduct of an architect. Architecture as a professional service towards clients. Architect's office and its management - organisational structure, infrastructure requirement, skills required, elementary accounts, tax liabilities. Setting up architectural practice.

UNIT II ARCHITECT'S SERVICES, SCALE OF FEES & COMPETITIONS 9Hrs

Mode of engaging an architect. Comprehensive services, partial services and specialized services. Scope of work of an architect. Schedule of services. Scale of fees - Council of Architecture norms. Mode of payment. Terms and conditions of engagement. Letter of appointment. Importance of Architectural competitions. Types of competitions - open, limited, ideas competition, single and two stage competitions. Council of Architecture guidelines for conducting architectural competitions. National and international Competitions. Case studies.

UNIT III PROJECT MANAGEMENT - TENDER & CONTRACT 9Hrs

Tender - Definition. Types of Tenders - open and closed tenders. Conditions of tender. Tender notice. Tender documents. Concept of EMD. Submission of tender. Tender scrutiny. Tender analysis. Recommendations. Work order. E-tendering - advantages, procedure, conditions. Contract – definition. Contract agreement and its necessity. Contents - articles of agreement, terms and conditions, bills of quantities and specifications, appendix. Certification of contractors. Bills at different stages. New trends in project formulation and different types of execution - BOT, DBOT, BOLT, BOO, etc., Role of architect in project execution stage.

UNIT IV LEGAL ASPECTS 9Hrs

Arbitration - definition and advantages. Sole and joint arbitrators. Role of umpires, award. Arbitration clause in contract agreement -role of architect, excepted matters. Easement – meaning, types of easements. Copy rights and patenting – provisions of copy right acts in India, copy right in architectural profession. Consumer Protection Act - intent, architects' responsibility towards his clients.

UNIT V IMPORTANT LEGISLATIONS AND IMPLICATIONS OF GLOBALISATION IN ARCHITECTURAL PRACTICE 9Hrs

Planning parameters at various scales. DTCP rules. Second Master Plan CMDA as case study. Chennai Corporation Building Rules 1972. Panchayat Rules. Building rules in National Building Code. Factories Act. Persons with Disabilities Act. Barrier Free Environment. Coastal Regulation Zone. Heritage Act. Globalisation and its impact on architectural profession. Preparedness for international practice. Entry of foreign architects in India. Information technology and its impact on architectural practice. Emerging specializations in the field of architecture -architect as construction/ project manager, architectural journalism, architectural photography.

Total: 45 Periods / Hours

OUTCOME

CO1: Knowledge of the role of professional and statutory bodies.
CO2: An understanding of the provisions in Architects Act 1972.
CO3: An understanding of code of conduct.
CO4: Familiarity with the process and role of an architect in project execution.

TEXTBOOKS

1. Architects Act 1972.
2. Publications of Council of Architecture
3. Roshan Namavati, 'Professional Practice', Lakhani Book Depot, Mumbai, 2016.
4. Ar. V.S. Apte, 'Architectural Practice and Procedure', Mrs. Padmaja Bhide, 2008.
5. Madhav Deobhakta, 'Architectural Practice in India', COA, 2007.

REFERENCES

1. J.J.Scott, 'Architect's Practice', Butterworth, London 1985.
2. Development Regulations of Second Master Plan for Chennai Metropolitan Area-2026. (Second Master plan of CMA).
3. Chennai City Corporation Building Rules 1972.
4. T.N.D.M. Buildings rules, 1972.
5. Consumer Protection Act, 1986.
6. Arbitration Act, 1996.
7. Factories Act, 1948.
8. Persons with Disabilities Act, 1995.
9. Tamil Nadu Cinematography Act. DTCP Act.

25ARUJ721	SPECIFICATION, ESTIMATION AND VALUATION	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To enable understanding with respect to quality and quantity of materials, quantity and classes of skilled and unskilled labors, and tools and plants required for projects.
- To give an understanding of how to draw up specifications for the different items of a building project and also to prepare the schedule of programming of the project.
- To give knowledge on how to prepare approximate as well as detailed estimates and to have a clear picture of the project expenditure.
- To help calculate the exact quantities of items of work done for effecting payment especially when direct measurements are difficult and also to determine the quantities of different materials required for various items of work.
- To give understanding of how to prepare valuation report of real and landed property.
- To give exposure to budgeting in projects.

UNIT I SPECIFICATION AND SPECIFICATION WRITING 9Hrs

Necessity of specification, importance of specification. How to write specification. Types of Specification. Principles of Specification writing. Important aspects of the design of specification. Sources of information. Classification of Specification. Brief Specification for1st class, 2nd class, 3rd class building. Detailed specification for earthwork excavation, plain cement concrete, reinforced concrete, first class and second-class brickwork, damp proof course, ceramic tiles/marble flooring and dado, woodwork for doors, windows frames and shutters, cement plastering, painting & weathering course in terrace.

UNIT II ESTIMATION 9Hrs

Types & purpose. Approximate estimate of buildings. Bill of quality, factors to be considered. Principles of measurement and billing. Contingencies. Measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work. Abstract of an estimate. Costs associated with constructed facilities. Approaches to cost estimation. Type of construction cost estimates. Cost Indices. Applications of cost indices to estimating. Estimate based on engineer's list of quantities. Estimation of operating costs.

UNIT III DETAILED ESTIMATE 9Hrs

Deriving detailed quantity estimates for various items of work for a single storied building. To include earthwork excavation, brick work, plain cement concrete, reinforced cement concrete works, wood work, iron works, plastering, painting, flooring, weathering course.

UNIT IV VALUATION AND CURRENT TRENDS 9Hrs

Valuation. Explanation of terms. Types of values. Sinking fund. Years of purchase. Depreciation. Types of depreciation. Valuation of real properties. Types, methods and purpose of valuation.

Methods of contracting and its link to specification drafting - the Business Environment and the structure in practice– Case studies

UNIT V BUDGETING 9Hrs

Elements of cash flow. Time value of money. Capital investment decision. Types of business firms. Budget and Budgetary Control. Types of Budgets. Preparation of financial budget.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of the art of building construction through specification writing.

CO2: Ability to work out the approximate estimate and detailed estimate for small scale building projects and low-cost housing.

CO3: An understanding of valuation and budgeting.

TEXTBOOKS

1. Rangwala. S.C, 'Estimating, Costing and Valuation (Professional practice)', Charotar Publishing House,1984
2. M.Chakraborthi, 'Estimating, Costing, Specification and Valuation in Civil Engineering, Chakraborthi, 2010.
3. B.N. Dutta, 'Estimating and Costing' UBS Publishers and Distributors,2000.
4. S.Sanga Reddi and P.L.Meiyappan, 'Construction Management', Kumaran Publication, Coimbatore.
5. Gurcharan Singh and Jagdish Singh, 'Estimating Costing and Valuation', Standard Publishers Distributors, 2012.

REFERENCES

1. 'I.S.1200-1968 Methods of Measurements of Buildings and Civil Engineering works'.
2. Latest schedule of rates of P.W.D.
3. Latest Data book of P.W.D.
4. PWD Standard Specifications. Govt Publication.

25ARUJ722	ARCHITECTURAL DESIGN DETAILING	L	T	P/S	C	Total Marks
		1	0	4	3	100

OBJECTIVES

- To introduce various aspects involved in the construction of buildings through the understanding of different types of architectural and technical drawings.
- To enable the understanding of architectural design as integrating spatial and technical concerns.
- To enable development of an architectural design project into schematic drawings through integrating concerns of structure, construction and services.
- To create architectural drawings for construction and as a base for structures and services drawings.
- To design, incorporate and detail architectural and interior components of the architectural design project.

UNIT I UNDERSTANDING ARCHITECTURE THROUGH BUILDING DRAWINGS 12Hrs

Understanding architecture as a physical, workable product through study of comprehensive set of drawings for any live building project, interpreting them and presenting their characteristics through seminars/ assignments. The drawings to be studied should include architectural working drawings from macro to micro scale- site plan, building plans, staircase details, kitchen and toilet detail of joinery, etc., structural drawings and service drawings to include electrical, plumbing, mechanical and HVAC details.

UNIT II SCHEMATIC DESIGN INTEGRATING ARCHITECTURAL DESIGN WITH STRUCTURAL AND SERVICE CONSIDERATIONS 12Hrs

Evolving a conceptual design project into schematic design, balancing different technical considerations. Considerations to include appropriate structural, plumbing, electrical, mechanical and HVAC systems. Working out schemes to decide and finalise on the best possible design that integrates everything together. Scale of the project could be small to medium and include any typology, involving a newly created, quick, simple design or an older design from previous academic years.

UNIT II ARCHITECTURAL WORKING DRAWINGS 12Hrs

Preparation of architectural working drawings for the resolved schematic design. Drawings to include site plan, centre line drawings, building drawings, detailed drawings of specific areas like staircases and wall sections, dimensions explaining the various components, joinery schedule.

UNIT IV DETAILED DRAWINGS OF ROOMS AND ARCHITECTURAL COMPONENTS 12Hrs

Design and preparation of detailed drawings of joinery including doors, windows and ventilators. Design and preparation of layouts of service intensive rooms like kitchens and toilets. Design and detailing out of floor, wall and ceiling finishes/ construction/ laying.

UNIT V DETAILED DRAWINGS OF BUILT IN COMPONENTS 12Hrs

Design and preparation of detailed drawings of built in furniture and components based on the room/ typology to include counters, cabinets, wardrobes, storage, fittings and fixtures, display units, workstation.

Total: 60 Periods / Hours

OUTCOME

CO1: An understanding of all the aspects that go into the making of a building through study of drawings related to construction.

CO2: Ability to resolve spatial concerns with technical aspects of a building.

CO3: Ability to design and detail components within a building.

TEXTBOOKS

1. Joseph De Chiara, Michael Crosby, 'Time Saver Standards for Building Types', McGraw Hill Co, 2001.
2. Richardson Dietruck, 'Big Idea and Small Building', Thames and Hudson, 2002.
3. Edward D Mills, 'Planning–The Architect's Handbook, Butterworths, 1985.
4. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

REFERENCES

1. Susan Dawson, 'Architect’s Working Details -Volume 1-10', E- Map Construct, 2004.
2. Nelson L Burbank, 'House Carpentry Simplified', McGraw Hill, 1985.
3. David Sauter, 'Landscape Construction', Delmar Publishers, 2010.
4. Grant W. Reid ,'Landscape Graphics', Whitney Library of Design, 1987.
5. Francis. D. K. Ching, 'Building Construction Illustrated', John Wiley & Sons, 2011.

25ARUS751	ARCHITECTURAL DESIGN VI	L	T	P/S	C	Total Marks
		1	0	4	3	100

OBJECTIVES

- To enable an understanding of architecture as having the capacity to critically interpret and transform status quo in the built environment and society through the act of design.
- To guide in the taking of critical/ philosophical/ ideological positions relating to specific design situations in the current world and to explore architectural morphology as an expression of those positions.

CONTENT

Architecture as a discipline balances many concerns in the creation of buildings. However, it also represents ideas and production reacting to/ reinforcing/ anticipating/ transforming specific aspects of the existing world towards a more desirable future. This could spring from individual perspectives as well as through concerted efforts which then become movements. Architecture can thus seek to understand, reflect, strengthen, question, change status quo. The process of design can thus offer a possible, intended future. Projects/ design situations will be given in this regard which address issues/ programmes of current society with a larger impact in terms of scale or importance. Different realms/ aspects of contemporary life can be explored. Some possible projects/ area of inquiry are institutional campuses of significance, mixed use projects involving diverse user groups, culturally and socially important buildings, urban life, technological developments, culture, globalisation, place, meaning, identity, appropriate architecture, etc., Suitable processes can be engaged for critical and creative thinking which could include wide and interdisciplinary reading to take critical positions, contemporary processes such as mapping and diagramming, methods related to social, technical or empirical aspects, etc., The particular line of thought will be taken through to completion through the processes. It is preferable to have one major project with small exercises under it if required.

Total: 150 Periods / Hours

OUTCOMES

CO1: Ability to understand the wider implication of design decisions and their interdependency with larger processes of society.

CO2: Ability to take creative, critical and informed decisions in the context of significant projects that could shape society in positive ways.

TEXTBOOKS

1. Kate Nesbitt, 'Theorizing a New Agenda for Architecture', Princeton Architectural Press, 1996.
2. Neil Leach, 'Rethinking Architecture', Routledge, 2000.
3. Harry Francis Mallgrave and David Goodman, 'An Introduction to Architectural Theory- 1968 to the Present', Wiley Blackwell, 2011.
4. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.

REFERENCES

1. Mitchell WJ, 'Imagining MIT: Designing a campus for the 21st century', MIT Press, 2007.
2. Himanshu Burte, 'Space for Engagement', Seagull Books, 2008.
3. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
4. Bjarke Ingels, 'Yes is More', Taschen, 2009.

VIII SEMESTER

25ARUP811	PRACTICAL TRAINING	L	T	P/S	C	Total Marks
		0	1	13	14	100

OBJECTIVES

- To introduce the challenges of architectural practice.
- To enable overall understanding of different stages in real life architectural projects in practice.
- To create involvement in these stages as much as possible within the scope of a specific architectural practice - initiation of project, development of concepts into schematic drawings, approval process, presentations and working drawings, involvement in office discussions and client meetings, integrating structural and service concerns, estimation and tendering processes, site supervision and coordination in the construction process.

CONTENT

Practical Training will be done in offices/ firms in India, empanelled by the institution, in which the principal architect is registered with the Council of Architecture. The student will attempt to learn as much of aspects outlined in the objectives, either first hand or indirectly.

The progress of practical training will be assessed periodically internally through submission of log books along with work done by the students in terms of drawings, reports, etc., along with the regular progress report from the employers.

The students will be evaluated based on the criteria related to their contribution in the office some of which are given below.

- Understanding and involvement in the process of architectural practice as mentioned in the objectives within the scope of the specific office in which training is undertaken.
  Adherence to time schedule, overall responsibility and professional conduct.
- Ability to carry out the instructions on preparation of schematic drawings, presentation drawings, working drawings and skill in this regard.
- Ability to work as part of a team in an office and contribute to related activities.
- Ability to participate in client meetings and discussions.
- Involvement in supervision at project site.
- Involvement/ initiative/ participation in any other aspects during the course of the training.
- At the end of the Practical Training, a portfolio of work done during the period of internship along with certification from the office should be submitted for evaluation through a viva voce examination.

Total: 90 Working Days

OUTCOMES

CO1: An overall idea of the nuances of architectural practice.
CO2: An understanding about the total process that goes into the making of a building.
CO3: Maturity in using the experience gained from internship in the thesis project.

25ARUT901	URBAN DESIGN DEVELOPMENT	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To create an understanding of urbanism and urban morphology as rising from various forces through history.
- To introduce the components of the modern city and their interdependencies.
- To introduce the scope and nature of urban design as a discipline
- To introduce key theories associated with urbanism and cities.
- To create awareness of contemporary urban issues and how they are addressed.
- To give exposure to ways of perceiving, documenting and analyzing cities.

UNIT I: URBANISM IN HISTORY **9Hrs**

Outline of forces shaping urbanism. Urbanism of river valley civilizations. Morphology of pre-industrial European cities to include Greek and Roman cities, medieval European towns, Renaissance urbanism and ideal cities. Outline of historic cities of India. Temple town urbanism of Tamil Nadu. Mughal city form. Medieval cities of India. Colonial urbanism in India.

UNIT II: MODERN URBANISM **8Hrs**

Industrialization and impact on urbanism. American grid iron planning. Theories, ideas and practice of good urban planning/cities/urbanism in early 20th century. Outline of modernist cities and urbanism across the world. Morphology of Indian modernist cities of Chandigarh, Bhuvaneshwar and Gandhi Nagar.

UNIT III: UNDERTANDING OF THE CONCEPT OF URBAN DESIGN THROUGH TEXTS AND THEORIES **9Hrs**

Introduction to and discussion of key texts and theories of cities and urbanism - Need for urban design – different realms attached to urban design

Imageability and Lynch, Townscape and Cullen, Genius Loci and Schulz, historic city and Rossi, social aspects of urbanism and the works of Jane Jacobs, William Whyte and Jan Gehl, Collage City and Colin Rowe, current theories and texts.

UNIT IV: ELEMENTS AND APPROCHES OFURBAN DESIGN **7Hrs**

Urban scale, Mass and Space; Understanding components of urban fabric; Making a Visual survey; Understanding the various urban spaces in the city and their hierarchy. Special focus on streets; Expressive quality of built forms, spaces in public domain

UNIT V: URBAN LANDSCAPING OF FUNCTIONAL AREAS **12Hrs**

Organization of spaces – circulation, built form and open spaces, site planning and micro climate, site planning for neighborhood parks, children's play area and campus development. Urban open spaces and principle of urban landscape; Street landscaping, Landscape design for waterfront areas and functional areas in urban centers; green roofs and walls – case studies at National and International levels

Total: 45 Periods / Hours

OUTCOMES

CO1: Awareness of the evolution and characteristics of urban forms, their components and interdependencies.

CO2: Understanding of urbanism through theories, aspects, issues and solutions.

CO3: Knowledge of ways to look at and interpret urbanism today.

CO4: Have a comprehensive knowledge on the evolution of urban planning and its relation

today.

CO5: Be equipped to handle the urban design studio project at a town/city, region level from the studies, analysis, and interpretation and design in accordance to the juries' prudence.

TEXTBOOKS

1. A.E.J. Morris, 'History of Urban Form before the Industrial Revolution', Prentice Hall, 1996.
2. Edmund Bacon, 'Design of Cities', Penguin, 1976.
3. Gordon Cullen, 'The Concise Townscape', The Architectural Press, 1978.
4. Michelle Provoost et al., 'Dutchtown', NAI Publishers, Rotterdam, 1999.
5. 'Time Saver Standards for Urban Design', Donald Natson, McGraw Hill, 2003.
6. Kevin Lynch, 'The Image of the City' MIT Press, 1960.
7. Rithchie. A, 'Sustainable Urban Design: An Environmental Approach', Taylor & Francis, 2000.
8. Tridib Banerjee, Anastasia Loukaitou-Sideris, Editors, 'Companion to Urban Design', Routledge, 2014.
9. Kevin Lynch, "Image of the city"

REFERENCES

1. Jonathan Barnett, 'An Introduction to Urban Design', Harper Row, 1982.
2. Lawrence Halprin, 'Cities', Reinhold Publishing Corporation, New York, 1964.
3. Gosling and Maitland, 'Concepts of Urban Design', St. Martin's Press, 1984.
4. Malcolm Moor, 'Urban Design Futures', Routledge, 2006.
5. Geoffrey Broadbent, 'Emerging Concepts in Urban Space Design', Taylor & Francis, 2003.
6. Anuradha Mathu, 'Deccan Traverses', Rupa, 2006.
7. Rangwala, "Town Planning", Charotar publishing house

25ARUS951	ARCHITECTURAL DESIGN VII	L	T	P/S	C	Total Marks
		0	5	10	15	100

OBJECTIVES

- To enable an understanding of urbanism as a continuous experience involving the interrelated disciplines of architecture, urban design and town planning.
- To understand architecture as influenced by and influencing the dynamics of cities.
- To facilitate the taking of architectural design decisions in the context of the urban environment.

CONTENT

Urbanism is a dynamic phenomenon involving many aspects - urban growth, landuse distribution and change, urban form, demographics including gender and class, cultural aspects such as place and heritage, physical infrastructure such as roads and transportation nodes, public spaces, etc., Architecture is an integral and large part of urbanism, shaping and being shaped by it. It can serve to include/ gather society and enrich the urban environment in a seamless manner. Understanding of this aspect of architecture will be achieved by architectural projects involving interdependencies between architecture and the city. Some of the issues and areas that could be addressed are- transportation nodes, heritage areas, adaptive reuse, suburban sprawl, place making, identity, collective memory, mixed use programming, large scale urban interventions, revitalisation and renewal of urban fragments, urban waterfront development, urban nodes, multiuse urban complexes. The tools and techniques can include contemporary ways/ tools of perceiving, gathering and
analysing data, inclusive, collaborative and participatory approaches, etc., It is preferable to have one major project with small exercises under it if required.

Total: 135 Periods / Hours

OUTCOMES

CO1: Ability to perceive and design buildings as contributing to/ transforming the urban fabric.

CO2: Ability to bring inclusivity into the architectural design process.

TEXTBOOKS

1. Jonathan Barnett, 'An Introduction to Urban Design', Harper and Row; 1982
2. Cavallo, R. et al, 'New Urban Configurations', IOS Press, 2014.
3. Henriette Steiner & Maximilian Sternberg, 'Phenomenologies of the City: Studies in the History and Philosophy of Architecture', Routledge 2015.
4. Jan Gehl, 'Life between Buildings- Using Public Space', Arkitektens Forleg 1987.
5. 'Time Savers Standard for Urban Design', Donald Watson, McGraw Hill, 2005.
6. Malcolm Moore & Jon Rowland Eds, 'Urban Design Futures', Routledge, 2006.

REFERENCES

1. Michelle Provoost et al., 'Dutchtown', NAI Publishers, Rotterdam, 1999.
2. Lawrence Halprin, 'Cities', Reinhold Publishing Corporation, New York, 1964.
3. Gosling and Maitland, 'Urban Design', St. Martin’s Press, 1984.
4. Kevin Lynch, 'Site Planning', MIT Press, Cambridge 1967.
5. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.

25ARUP911	DISSERTATION	L	T	P/S	C	Total Marks
		0	1	5	6	100

OBJECTIVES

- To inculcate the spirit of research in architecture.
- To enable the acquisition of in-depth knowledge in a specific aspect/ issue in the discipline of architecture as well as develop perspectives on the same through reading, study, analysis and thought.
- To facilitate the development of a coherent line of thinking and express it through clear writing.
- To serve as prelude to Thesis.

CONTENT

Design studio emphasis on explaining and understanding architecture primarily through the mode of making. However, architecture as a field itself is driven by explicitly stated or implicitly understood ideas/ points of view of particular society and individuals. Dissertation offers an opportunity to look at architecture, history and design through ideas, texts and intent behind works. It involves process of observation, reflection and abstraction. Students are encouraged to choose any topic of their interest. Topics may range from analysing the works of an architect, history, typological changes, writing, design process and many more. They could involve research based on primary sources in terms of doing actual field studies and/or secondary sources through reading. The dissertation proposal in about 1500 words stating the topic, issues to be explored and the scope must be submitted for approval. Work on the approved topic should start from the beginning of the semester and would be periodically reviewed. At the end of the semester, a well written report of a minimum 10,000 words should be submitted in the prescribed format, if any, provided by the University. The suggested structure for the report can be - outline/ background of the area of study, statement of objectives or research questions within the area of study, outline of methodology/ way to achieve the objectives or answer the questions of research, core section with necessary content such as documentation, analysis, arguments, etc., final conclusion. The report will be presented in the viva-voce exam and defended.

Total: 135 Periods / Hours

OUTCOMES

CO1: A dissertation report which is based on accepted norms of technical writing.

CO2: Ability to research deeply into a subject and develop a coherent line of thought based on point of view, observation, analysis and study.

CO3: Ability to look at architecture from an informed, analyzed and well thought out critically perspective which would help strengthen the thesis process.

TEXTBOOKS

1. Iain Borden and Kaaterina Ruedi; 'The Dissertation: An Architecture Student's Handbook', Architectural Press, 2000.
2. Linda Grant and David Wang, 'Architectural Research Methods', John Wiley Sons, 2001.

REFERENCES

1. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Research', 2nd Edition, University of Chicago Press, 2008.
2. Ranjith Kumar, 'Research Methodology- A Step-by-Step Guide for Beginners', Sage Publications, 2005.
3. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2002.

X SEMESTER

25ARUS1051	THESIS	L	T	P/S	C	Total Marks
		0	7	10	17	100

OBJECTIVES

- To ensure consolidation and application of the knowledge gained in preceding years of the programme in the context of a design project of the student's choice.
- To enable addressing of specific projects through key, identified issues inherent in the project or to enable development of thought processes in specific areas/aspects into a project.
- To facilitate development of ability to complete and handle projects independently as a precursor to professional life.

CONTENT

Students should choose a topic of their choice in terms of design potential and/ or idea exploration to be taken up for completion. The topic could be project based with specific areas of study/ approach or study/ approach based leading to a project. If the latter, care should be taken to choose topics that can lead to sufficient architectural design component.

Students should submit the topic for approval with a rough outline of the nature of the project, area of interest, study and design scope, challenges, possible case studies, methodology and outcome. The areas of study/research/design can include any of the broad areas of the discipline – contemporary needs of society, history, theory, sustainability, structural or service-oriented design, projects that involve complex planning and integration of several aspects, appropriate architecture, urban design, contemporary processes, social housing, urban oriented architectural design, conservation oriented architectural design, etc. The progress of work will be reviewed periodically throughout the semester. At the end of the semester, students should submit the final thesis project for the viva voce exam. The final submission will comprise of study sheets, optional study models, design approach sheets, optional design process models, design presentation sheets, final model, detailed drawings of an important part of the project, project report summarizing the entire thesis work and soft copy of all the work.

Total: 345 Periods / Hours

OUTCOMES

CO1: Skill, knowledge and expertise in the domain of architectural design.

CO2: Ability to handle a major architectural project independently through all stages.

TEXTBOOKS

1. Linda Grant and David Wang, 'Architectural Research Methods', John Wiley & Sons, 2002.
2. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2001.

REFERENCES

1. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.
2. Igor Marjanović, Katerina Rüedi Ray,Lesley Naa Norle Lokko, 'The Portfolio.

PROFESSIONAL ELECTIVE II (III YEAR VI SEM)

25ARUT631	THEORY OF DESIGN	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give understanding of design as a broader field and the changing role of designer in society.
- To give exposure to methodologies, theories and models of the design process.
- To give deeper understanding of the process of creativity as well as to introduce techniques which will enable creative thinking.
- To help understand creativity with respect to the discipline of architecture.
- To introduce participatory approach to design.

UNIT I INTRODUCTION TO DESIGN **9Hrs**

Definition and understanding of design. History of design process from earliest times through Renaissance, Beaux Arts, Bauhaus. Different classifications of design according to scale, process, mode of production, etc., - self-conscious / unselfconscious, design through drawing/ design through craft, pragmatic/ iconic/ analogic/ canonic or syntactic, handmade/ machine made, product design to city design, functional/ aesthetic, nature vernacular/ technological.

UNIT II DESIGN METHODOLOGY MOVEMENT **9Hrs**

Context for the rise of the design methodology movement from the 1950s with the critique of modernism. Theories of the first generation and the second-generation design methodologists. Design as wicked problem. Escalation and regression in design. Summary by Johnson of various models of the design process - parametric or analysis/ synthesis/ evaluation, conjecture-refutation, paradigmatic, hermeneutical.

UNIT III CREATIVE THINKING **9Hrs**

Understanding the term creativity. Theories on thinking - left brain/ right brain, convergent/ divergent thinking, lateral/ vertical thinking. Broadbent's idea of the design spectrum - from the logical to chance. Blocks in creative thinking. Techniques to generate creativity as put forth by Broadbent, Bono.

UNIT IV ARCHITECTURAL CREATIVITY **9Hrs**

Types of architectural concepts - programmatic, analogic, metaphor, essence, etc., Channels to creativity in architecture as put forth by Antoniades. Personal philosophies and strategies of individual designers.

UNIT V PROCESS AND DESIGN **9Hrs**

People and design process- concept of pattern language by Christopher Alexander, participatory approach to design, design as process involving time and people. Introduction to contemporary processes in design including diagramming, mapping, parametric exploration, etc.,

Total: 45 Periods / Hours

OUTCOMES

CO1: Ability to think about architecture as one of the many fields under the broader ambit of design as a fundamental human activity.

CO2: Self-awareness with respect to the creative process.

CO3: Ability to engage different processes to give creative output.

TEXTBOOKS

1. Geoffrey Broadbent, 'Design in Architecture - Architecture and the Human Sciences', John Wiley & Sons, New York, 1981.
2. Bryan Lawson, 'How Designers Think', Architectural Press, 2005.
3. Anthony Antoniades, 'Poetics of Architecture- Theory of Design', VNR,1992.
4. Edward De Bono, 'Lateral Thinking- Textbook of Creativity', Penguin Books, 1990.
5. Christopher Alexander, 'A Pattern Language', Oxford University Press, 1977.
6. James C. Snyder, Anthony J. Catanese, Timothy L. McGinty, 'Introduction to Architecture', McGraw Hill, 1979.
7. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
8. C. Thomas Mitchell, 'Redefining Designing: From Form to Experience', Van Nostrand Reinhold, 1992.

REFERENCES

1. Victor Papanek, 'Design for the Real world, Human Ecology and Social Change', Chicago Review Press, 2005.
2. Paul Alan Johnson, 'Theory of Architecture- Concepts, Themes, Practices', VNR; 1994.
3. Christopher Jones, 'Design Methods', John Wiley and Sons; 1980.
4. Tom Heath, 'Method in Architecture', John Wiley & Sons, New York, 1984.
5. Nigel Cross, 'Developments in Design Methodology', John Wiley & Sons, 1984.
6. James L. Adams, 'Conceptual Blockbusting', Basic Books, 2001.
7. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.

25ARUT632	VERNACULAR ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce the study of vernacular architecture as a process and not a product.
- To provide an overview of the different approaches and concepts to the study of vernacular architecture.
- To study the various vernacular architecture forms in the different regions of the country.
- To look at the impact of colonial rule on the vernacular architecture of India.

UNIT I INTRODUCTION TO VERNACULAR ARCHITECTURE 9Hrs

Definition and classification of vernacular architecture. Vernacular architecture as a process. Methodology for survey and study of vernacular architecture. Overview of cultural and contextual responsiveness of vernacular architecture.

UNIT II APPROACHES AND CONCEPTS 9Hrs

Overview of different approaches and concepts to the study of vernacular architecture. Aesthetic, architectural and anthropological studies in detail.

UNIT III VERNACULAR ARCHITECTURE OF THE WESTERN AND NORTHERN REGIONS OF INDIA 9Hrs

Forms, spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the deserts of Kutch and Rajasthan (including havelis of Rajasthan), rural and urban Gujarat (including wooden mansions/ havelis in general and that of the Bohra Muslims) and geographical regions of Kashmir (including house boats).

UNIT IV VERNACULAR ARCHITECTURE OF KERALA AND TAMILNADU 9Hrs

Wooden houses, palaces and theatres in Kerala. Nair houses of Kerala - Nallukettu house - Padmanabapuram palace, Thackalai. Koothambalam, Introduction to Boat houses in Kerala Tribal Architecture in Tamil Nadu-Irula, Kurumba, Todas. Introduction to Chettinad Architecture, Architectural significance of Chettinad houses and palaces in Chettinad regions. Agraharams of Tamil Nadu-settlement Planning and materials and construction details.

UNIT V VERNACULAR ARCHITECTURE OF COLONIAL INDIA 9Hrs

Colonial influences on the Traditional House, Goa, change from Bangla & Bungalow, Bengal and Victorian Villas - Planning Principles, materials & methods of construction House Typologies, settlement planning in Pondicherry & Cochin.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of Indian vernacular architecture as a process and to also provide an overview of various approaches and concepts towards its study.

CO2: Knowledge of vernacular architectural forms in different regions.

CO3: An understanding of the impact of colonial rule on vernacular architecture in India.

TEXTBOOKS

1. Paul Oliver, 'Encyclopedia of Vernacular Architecture of the World', Cambridge University Press,1997.
2. Amos Rapoport, 'House, Form & Culture', Prentice Hall Inc. 1969.
3. R W Brunskill, 'Illustrated Handbook on Vernacular Architecture', Faber & Faber; 1970.

REFERENCES

1. V.S. Pramar, 'Haveli – Wooden Houses and Mansions of Gujarat', Mapin, 1989.
2. Kulbushanshan Jain and Minakshi Jain, 'Mud Architecture of the Indian Desert', Aadi Centre, Ahmadabad, 1992.
3. G.H.R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Controversy, Change since 1850', Oxford University Press, Delhi, 1989.
4. Carmen Kagal, 'Vistara- The Architecture of India', The Festival of India, 1986.
5. S. Muthiah et al, 'The Chettiar Heritage', Chettiar Heritage 2000.
6. Weber.W & Yannas.S, 'Lessons from Vernacular Architecture', Routledge, 2014.
7. Bernard Rudofsky, 'Architecture without Architects', MoMA, 1964.

25ARUT633	VISUAL COMMUNICATION AND ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To introduce design communication as an important part of an architect's work.
- To give knowledge about different modes and media for design communication/ presentation.
- To give exposure to the current trends in architectural design communication.
- To provide opportunities for experimentation through study and implementation.

UNIT - 1 INTRODUCTION TO DESIGN COMMUNICATION 10 Hrs

Introduction to design communication as an integral part of the architectural design process. Outlineof attributes of architecture that can be communicated and the modes of communication- text, visuals, drawings etc., Brief overview of how design has been communicated across history throughpopular diagrams and drawings of notable architecture/ architects' works. Design Communication by contemporary architects/ visualizers — Diagrams by BIG, Models by Richard Meier, Visualizations by Squint/Opera, Presentations by Heatherwick Studio, social media by Malone Maxwell Borson Architects. Analysis of award-winning competition drawings and media. Understanding of popular modes of design communication through exercises based on case studiesof architects' work through first hand study, websites, other collected data, etc.,

UNIT - 2 COMMUNICATING STUDY, SITE ANALYSIS AND CONCEPT 12 Hrs

Exercises in design communication involving presenting of study, requirements, site analysis and concept. Exercises can be based on a studio project completed in the previous semester by studentsthemselves or other students' work. Discussion and dialogue on the various attributes to becommunicated and finalizing best way to communicate. Use of various modes and media- Software/plug-ins like Modelur, climate consultant etc., Storyboarding and hand drawn art, Combination of hand -drawn and digital techniques of design context and site models. Montage techniques. Concept visualisation sketches, Sketch animation, 2D and 3D Zoning, Form evolution using Rhino, Sketch-up. Block models — Manual, Laser cutting and 3D Printing.

UNIT - 3 COMMUNICATING DESIGN INTENT IN THE DESIGN PRODUCT 13 Hrs

Exercises in design communication involving bringing out the design intent inherent in the design product. Exercises can be based on a studio project completed in the previous semester by studentsthemselves or other students' work. Discussion and dialogue on the various attributes to becommunicated and finalising best way to communicate. Sheet sizing, scale and composition. Manualsketching and rendering. 2D & 3D Digital Drawings Revit, Sectional Perspective, Exploded Axonometry, Hybrid Visualisation, Interactive 3D rendering, Immersive 3D, Presentations in Videos, GIFS, Visualisation overlays on Videos. Projection mapping and interactive 3D printed models, VR Animation, Augmented Reality and Immersive Experiences - exploring design studio projects using any of the tools like Unity 3D, Maya, 3DS Max. Autodesk Live, Fuzor, Shapespark, Unreal Engine, Autodesk Stingray, Steam Unigine, Arki.

UNIT - 4 DESIGN NARRATIVE AND WRITING 10 Hrs

Exercises in design communication involving descriptive writing about a studio project. Exercises can be based on a studio project completed in the previous semester by students themselves or other students' work. Discussion and dialogue on the various attributes to be communicated and finalising best way to communicate. Communicating Design with the help of relevant vocabulary - Design Narratives, Project Description, salient points, key design ideas. Narrative to mix visual and verbal in a composite manner. Putting together everything in different modes- social media, paper, digital, etc.,

Total: 45 Periods / Hours

OUTCOMES:

CO1: Awareness of the importance of design communication as a necessary part of architect's work.

CO2: Knowledge about current trends in design presentation and communication.

CO3: Ability to employ latest technology in expressing design intent and programs.

CO4: Exposure to allied fields that are associated with architectural design communication.

TEXTBOOKS:

- Visual Communication for Architects and Designers - Constructing the Persuasive Presentationby Margaret Fletcher, First Edition, 2020 by Routledge
- Graphic Design for Architects: A Manual for Visual Communication, Karen Lewis, Routledge,2015
- Hybrid Drawing Techniques by Contemporary Architects and Designers by M. Saleh Uddin, Wiley & Sons, Incorporated, John, 1999

25ARUT634	ROAD SAFETY AND CIVIC SENSE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce the concepts, principles, tools and aids of Road Safety and Civic Sense to the students of B.Arch.
- To acquaint them with the design and safety standards for roads. Also inculcate the practice of safe road behavior and civic sense among them.

UNIT I INTRODUCTION TO ROAD SAFETY 9Hrs

Road as an active space, Types of Users, User Behavior, Sensory Factors like Vision and Hearing in User Behavior.Types of Vehicles: Heavy Vehicles, Light Motor Vehicle, Two Wheelers, Auto-Rickshaw, Bicycles and Cycle Rickshaw, Non-Motorized Vehicles. Vehicle Characteristics: Dimensions, Weight, Turning Radii, Braking Distance, Lighting System, Tiers, etc. Type of Hazards: Conflicts and Accidents.

UNIT II TYPOLOGY OF ROADS: COMPONENTS AND DESIGN AND INTERSECTIONS 9Hrs

Road Classification; Urban Road Classification: Speed Limits of the Road types. Design of Roads; Spatial Standards for the Cross-Section Design. Relationship between Road Design and Road Safety. Types of Road Intersections: Grade Separated Junctions (with or without interchange): Three-Leg, Four-Leg, Multi-Leg, etc.Design of Intersections: Design and Spatial Standards for Traffic slands. Turns, Turning Radii, Directional Lanes, Pedestrian Crossings, Median Openings, Traffic Calming Components like Speed Breakers and Table-Top Crossings etc. Design Considerations for Diverging, Merging, and Weaving Traffic. Location and Design for Traffic Signals.

UNIT III PEDESTRIAN CIRCULATION AND BARRIER FREE DESIGN 9 Hrs

Requirement of Pedestrian Infrastructure: Sidewalks and Footpaths, Recommended Sidewalk Widths, Pedestrian Crossings, Pedestrian Bridges, Subways, Cycle Tracks, etc.
Barrier Free Design: Location and Design Standards for Ramps for Wheel Chair Access, Other Provisions like Tactile for Visually Challenged etc.
Safety Provisions: Pedestrian Railings, Anti-skid Flooring, Pedestrian Signal, Walk Button, etc.

UNIT IV TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS AND TRAFFIC CONTROL AIDS 9Hrs

Type for Traffic Signs: Location, Height and Maintenance of Traffic Signs. Types of Road Markings Material, Color and Typography of the Markings. Traffic Signals: Introduction, Advantages, and Disadvantages.
Traffic Control Aids: Roadway Delineators (Curved and Straight Sections), Hazard Markers, Object Markers, Speed Breakers, Table Top Crossings, Rumble Strips, Guard Rails, Crash Barriers etc. Street Lighting: Need for Street Lighting, Type of Lighting, Illumination Standard, Location and Intermediate Distance.

UNIT V ROAD SAFETY AND CIVICSENSE 9Hrs

Need for Road Safety, Category of Road Users and Road Safety Suggestions. Traffic Management Measures and their influence in Accident Prevention.
Precautions for Driving in Difficult Conditions Types of Break downs and Mechanical Failures. Accident Sign Warning Light, Warning Triangle, etc. Introduction to Concept of Civic Sense and its relationship to Road Safety: Importance of Civic Sense, Road Etiquette

sand Road User Behavior, Rules of Road, Right of the Way. Providing Assistance to Accident Victim. Sensitization against Road Rage.

OUTCOMES:

CO1: The students after completion of this course will have an indepth knowledge in Traffic Engineering, Transport Planning, Highway Design and Construction, Sustainable Urban and Transport Development and will be efficient enough to take up projects in the field.

CO2: As the students have an hands on experience in working with the Software, live projects, field visits to various organizations and training sessions during the course of study, they will be full-fledged Transport and Highway Planner.

TEXTBOOKS:

1. Introduction to Traffic Engineering, R Srinivasa Kumar
2. Traffic Engineering and Transport Planning, L R Kadiyali
3. Bookon Road Safety Signage and Signs,Ministry of Road Transport and Highways, Government of India
4. MORT&HPocketbookforHighwayEngineers,2019 (Third Revision)
5. Publications by UTTIPEC namely, Street Design Guidelines, UTTIPEC Guideline for Road Markings, UTTIPEC Guideline and Specification for Crash Barriers, Pedestrian Railing and dividers, UTTIPEC Standard Typical Crossing Design
6. Street Design Standards as provided in Times Savers, Neuferts etc.
7. PublicationsbyIndianRoadCongress.

25ARUT635	EARTHQUAKE RESISTANT ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To enable an understanding of the fundamentals of earthquake and the basic terminologies.
- To give basic knowledge of earthquake resistant design concepts.
- To provide familiarity with design codes and building configuration
- To enable understanding of the different types of construction details to be adopted in aseismic prone area.
- To give knowledge for applying earthquake resistant principles in an architectural designproject.

UNIT - 1 FUNDAMENTALS OF EARTHQUAKES 7Hrs

Earth's structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India.Predictability, intensity and measurement of earthquake. Basic terms- fault line, focus, epicenter, focal depth etc.

UNIT - 2 SITE PLANNING PERFORMANCE OF GROUND AND BUILDINGS 10Hrs

Historical experience, site selection and development. Earthquake effects on ground, soil rupture, liquefaction, landslides. Behaviour of different types of building structures, equipments, lifelines, collapse patterns. Behaviour of non-structural elements like services, fixtures in earthquake-prone zones

UNIT - 3 SEISMIC DESIGN CODES AND BUILDING CONFIGURATION 10Hrs

Seismic design code provisions. Introduction to Indian codes. Building configuration - scale of building, size, horizontal and vertical plane, building proportions, symmetry of building - torsion, re- entrant corners, irregularities in buildings like short storeys, short columns, etc.

UNIT - 4 DIFFERENT TYPES OF CONSTRUCTION DETAILS 11Hrs

Seismic design and detailing of masonry structures, wood structures, earthen structures. Seismic design and detailing of RC and steel buildings. Design of non-structural elements - architectural elements, water supply, drainage, electrical and mechanical components.

UNIT - 5 URBAN PLANNING AND ARCHITECTURAL DESIGN 7Hrs

Vulnerability of existing buildings, facilities planning, fires after earthquake, socio-economic impact after earthquakes. Conceptual design for earthquake resistance involving institutional masonry building with horizontal spread and height restriction, multistoried RC framed apartment/commercial building.

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1: Ability to understand the formation and causes of earthquakes

CO2: An understanding of the factors to be considered in the design of buildings and services resist earthquakes.

TEXTBOOKS:

- 'Guidelines for earthquake resistant non-engineered construction', National Information centre of earthquake engineering (NICEE, IIT Kanpur, India), 2004.
- C.V.R Murthy, Andrew Charlson, 'Earthquake Design Concepts', NICEE, IIT Kanpur, 2006.
- Agarwal.P, 'Earthquake Resistant Design', Prentice Hall of India, 2006.

REFERENCES:

- Ian Davis, 'Safe Shelter within Unsafe Cities: Disaster Vulnerability and Rapid Urbanization', Open House International, UK, 1987
- 'Socio-economic developmental record'- Vol.12, No.1, 2005.
- Mary C. Comerio, Luigia Binda, 'Learning from Practice- A Review of Architectural Design and Construction Experience after Recent Earthquakes', Joint USA-Italy workshop, Oct.18-23, 1992, Orvieto, Italy.

25ARUT636	INDUSTRIAL SAFETY	L	T	P/S	C	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- To Understand the Introduction and basic Terminologies safety.
- To enable the students to learn about the Important Statutory Regulations and standards.
- To enable students to Conduct and participate the various Safety activities in the industry.
- To have knowledge about Workplace Exposures and Hazards.
- To assess the various Hazards and consequences through various Risk Assessment Techniques.

UNIT - 1 SAFETY TERMINOLOGIES 7 Hrs

Hazard-Types of Hazards- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold Limit Value (TLV) - Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects- Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS

UNIT - 2 STANDARDS AND REGULATIONS 10 Hrs

Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006

UNIT - 3 SAFETY ACTIVITIES 10 Hrs

Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment.

UNIT - 4 WORKPLACE HEALTH AND SAFETY 11 Hrs

Noise hazard- Particulate matter- musculoskeletal disorder improper sitting poster and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxicgas Release.

UNIT - 5 HAZARD IDENTIFICATION TECHNIQUES 7 Hrs

Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment-Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment

Total: 45 Periods / Hours

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1: Understand the basic concept of safety.
CO2: Obtain knowledge of Statutory Regulations and standards.
CO3: Know about the safety Activities of the Working Place.
CO4: Analyze on the impact of Occupational Exposures and their Remedies
CO5: Obtain knowledge of Risk Assessment Techniques.

TEXTBOOKS:

- R.K. Jain and Prof. Sunil S. Rao Industrial Safety, Health and Environment Management Systems KHANNA PUBLISHER
- L. M. Deshmukh Industrial Safety Management: Hazard Identification and Risk Control McGraw-Hill Education.

REFERENCES:

- Frank Lees (2012) 'Lees' Loss Prevention in Process Industries. Butterworth-Heinemann publications, UK, 4th Edition.
- John Ridley & John Channing (2008) Safety at Work: Routledge, 7th Edition.
- Dan Petersen (2003) Techniques of Safety Management: A System Approach.
- Alan Waring. (1996). Safety management system: Chapman &Hall,England
- Society of Safety Engineers, USA

25ARUT731	INTERIOR DESIGN	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To provide familiarity with the characteristics of interior spaces and furniture across history.
- To introduce the profession of interior design and bring out its role.
- To inform about the various components of interior space and give an understanding of the design aspects involved in each.

UNIT I INTERIOR SPACES AND FURNITURE ACROSS HISTORY 9Hrs

Outline of the characteristics of representative/ exemplary interior spaces, interior decoration and furniture in the Western world from the beginnings to twentieth century. Outline of characteristics of representative/ exemplary interior spaces, interior decoration and furniture in India across the ages, including living folk traditions.

UNIT II THEORY TO INTERIOR DESIGN 9Hrs

1. INTERIOR SPACE - Definition of Geometric elements, transition of architectural & interior elements, shaping by structural / enclosure / environmental systems, Spatial forms & element relationships- floors, walls, ceiling, windows/ doors, stairs & ramps.
2. DESIGN PROCESS - Programming - analyze, Concept development-synthesis, Design decisions- evaluate, Implementation. Design Criteria-Function, economy, style & image. Human factors- Functional dimensions & personal space. Activity relationships- plan arrangements & strategies. Graphic representations.
3. DESIGN VOCABULARY - Perception of Form, Shape, Color, Texture, Light, Proportion, Scale, Balance, Harmony, Unity & variety, Rhythm, Emphasis; relate to visual characteristics of objects & aesthetic quality of visual environments.

UNIT III INTERIOR BUILDING ELEMENTS AND SYSTEM 9Hrs

Selection & manipulation of elements like Floors, Walls- forms/ articulation/ texture/ color, Ceilings- height/ scale/ forms/ lighting / acoustics, Windows-operation/ views/ day-lighting / natural ventilation / space planning, Doors-operations / space planning, Stairs & ramps. Design & integration of MEP systems with interior building spaces & elements - Mechanical systems like AC & fire suppression systems, Electrical lighting & switches, plumbing fittings & fixtures, furniture & interior landscaping

UNIT IV COMPONENTS OF INTERIOR SPACE - I 9Hrs

Role of interior treatment and finishes in the experience of interior spaces. Outline of the design of components such as floors, ceilings, walls, partitions, window treatments and accessories based on parameters such as context, function, ambience, materials, properties, methods of construction, colour, texture. Study of representative examples.

UNIT V COMPONENTS OF INTERIOR SPACE – II 9Hrs

Role of lighting in the experience of interior spaces. Outline of different types of interior lighting systems and fixtures based on their effects and suitability in different contexts. Study of representative examples. Role of landscaping in the experience of interior space. Outline of interior landscaping elements such as rocks, plants, water, flowers, fountains, paving, artefacts. Their physical properties and effects on spaces. Study of representative examples.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of interior design as an integral part of architecture and as an interdisciplinary and allied field related to architecture.

CO2: An overall exposure to the ways in which interior spaces can be enriched through the design of specific interior components.

TEXTBOOKS

1. Francis D.K.Ching, 'Interior Design Illustrated', John Wiley & Sons, 2012.
2. Joseph DeChiara, Julius Panero, Martin Zelnik, 'Time Saver's Standards for Interior Design', McGraw-Hill Professional, 2001.
3. John F. Pile, 'Interior Design', Pearson Prentice Hall, 2007.
4. Jan Pieper, George Michell, 'The Impulse to Adorn- Studies in Traditional Indian Architecture', Marg Publications, 1982.
5. Aronson J, 'The Encyclopaedia of Furniture', Potter Style, 1965.
6. Pat Kirkham, Susan Weber, Editors, 'History of Design: Decorative Arts and Material Culture, 1400-2000', Yale University Press, 2013.
7. John F.Pile, Judith Gura, 'A History of Interior Design', Wiley, 2013.

REFERENCES

1. Helen Marie Evans, 'An Invitation to Design', Macmillan Pub Co, 1982.
2. Julius Penero and Martin Zelnik, 'Human Dimensions and Interior Space', Whitney Library of Design, 1979.
3. Kathryn B. Hiesinger and George H. Marcus, 'Landmarks of Twentieth Century Design; Abbey Ville Press, 1995.
4. Susanne Slesin and Stafford Cliff, 'Indian Style', Thames and Hudson,1990.
5. Rosemary Kilmer, W. Otie Kilmer, 'Construction Drawings and Details for Interiors: Basic Skills', John Wiley & Sons, 2009.

25ARUT732	STRUCTURE AND ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To outline the evolution of structural systems through history.
- To introduce concepts of structural design through works of architects/ engineers.
- To create understanding about the relationship between architectural expression/ form and structure.

UNIT I STRUCTURAL DESIGN IN THE PRE-INDUSTRIAL ERA 9Hrs

Development of monolithic and rock cut structures. Trabeated construction, arcuate construction, vaults and flying buttresses. Tents and masted structures. Bridges through ancient and medieval history.

UNIT II STRUCTURAL DESIGN IN THE POST-INDUSTRIAL PERIOD 9Hrs

Post Industrial modular construction of large span and suspension structures in steel and concrete - projects of Pier Nuigi Nervi, Maillart, Candella, Buckminster Fuller and Eero Saarinen. Structure in Deconstructivism – Structure and aesthetics. Parametric/ digital processes and structure.

UNIT III CONTEMPORARY STRUCTURAL EXPRESSION THROUGH CASE STUDIES - I 9Hrs

The select case studies would include KCR Terminal at Hung Hom, Hong Kong, B3 Offices in Stockley Park, Sainsbury Centre for Visual Art, Renault Centre and Swindon UK by Norman Foster and Standsted Airport Terminal, London, UK by Fosters/Arup British Pavilion EXPO1992, Seville, Spain and Waterloo International Terminal by Nicholas Grimshaw.

UNIT IV CONTEMPORARY STRUCTURAL EXPRESSION THROUGH CASE STUDIES – II 9Hrs

The select case studies would include Inmos Microchip Factory, Centre Commercial St. Herbtain, PA Technology, Princeton and Fleetguard, Quimper UK by Richard Rogers Athens Olympic Stadium and Village, Bridges and Public Bus Stop in St. Gallen , Railway Station, Lyon, France and Stadelhofen Railway station, Zurich Schweiz by Santiago Calatrava Kansai International Airport, UNESCO Workshop, the Jean-Marie Tjibaou Cultural Center, Menil Museum, Thomson Optronics Factory, IBM Traveling Exhibition Pavilion, Columbus International Exposition, Genoa Italy and Lowara Officers, Montecchio Maggiore Italia by Renzo Piano Building Workshop. Contemporary examples with respect to parametric/ digital processes and innovative new materials.

UNIT V SEMINAR 9Hrs

Seminar to present a study of architectural form and structural expression through select cases which will aid understanding of structural philosophy and analysis, building envelope and services and construction sequence.

Total: 45 Periods / Hours

OUTCOMES

CO1: Familiarity with concepts of structural design and its influence on the functional and aesthetic domains of architectural design relating to historic and contemporary periods.

CO2: Understanding of architectural expression and its relation to form, structure and changing technology.

TEXTBOOKS

1. Shigeru Ban, McQuaid, Matilda, 'Engineering and Architecture: Building the Japan Pavilion', Phaidon Press Ltd, UK, 2008.
2. 'Cox Architects'(The Millennium Series), Images Publishing Group, 2001.
3. James B Harris, Kevin Li, 'Masted Structures in Architecture', Routledge,2012

REFERENCES

1. Patrizio Bertelli et al, 'Herzog & De Meuron: Prada Aoyama Tokyo', Fondazione Prada, 2004
2. Christopher Beorkrem, 'Material Strategies in Digital Fabrication', Routledge, 2012
3. Angus J. Macdonald, Structure and Architecture, Architectural Press, 2001.

25ARUT733	ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce general skills necessary for the practice of professional journalism.
- To introduce the fundamentals of writing, explain different strategies and their criticism.
- To give particular exposure to architectural journalism.
- To introduce photojournalism, bring out importance/ contributions of photography in the architectural profession and to help develop proficiency in modern photography techniques.

UNIT I INTRODUCTION **9Hrs**

Introduction to journalism, key concepts and objectives of journalism. Specialized journalism with emphasis on architectural journalism. Journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism. Issues such as copyright, public art policy, the arts and urban redevelopment. Introduction to local culture scene.

UNIT II TECHNOLOGIES IN JOURNALS **9Hrs**

Environment, social change, persuasion. Interviewing techniques, argument and debate as a technique in the investigation of social problems. Evidence, proof, refutation, persuasion. Training in argumentative speaking. Introduction to software needed in journalism and photography, video coverage, walk-through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television.

UNIT III CONTEMPORARY ARCHITECTURAL JOURNALISM **9Hrs**

Role of the editor. Editing of articles, features and other stories. Editing for online newspaper and magazines. Text preparation, mode of presentation, standards and guidelines for documentation. Code of ethics. Basic knowledge on press laws, Press Council of India. Multimedia/ online journalism and digital developments.

UNIT IV DISCUSSIONS AND ISSUES **9Hrs**

Regional, national and international discussion forums. Changes in contemporary and historical design practices. Discussions on topics needed in an architectural journal and current issues. Types of journals. Works of key architectural journalists. Public discourse on the internet. Mass media and public opinion. Critique on selected pieces of journalism.

UNIT V ARCHITECTURAL PHOTOGRAPHY **9Hrs**

Introduction to architectural photography and role of the photographic image in the global world. Equipment - cameras and lenses. Techniques- film speed, exposure measurement, gray scale, photofinishing and editing digital images. Perspectives- single point, two- point, three-point and methods of correcting distortions. Lighting - external and interior.

Total: 45 Periods / Hours

OUTCOMES

CO1: An ability to critically think and analyze about the effects of architecture on society as well as the tools to enable recording of the same.

TEXTBOOKS

- Edward Jay Friedlander and John Lee, 'Feature Writing for Newspapers and Magazines', 4th edition, Longman, 2000.
- David Fuller & Patricia Waugh, eds., 'The Arts and Sciences of Criticism', Oxford: Oxford University Press, 1999.
- James Foust, 'Online Journalism Principles and Practices of News for the Web', Holcomb Hathaway Publishers, Scottsdale, AZ, 2005.
- M. Harris, 'Professional Architectural Photography', Focal Press, 2001.
- M. Harris, 'Professional Interior Photography', Focal Press, 2002

REFERENCES

- Martin Huckerby, 'The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries'. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
- S. J. A.Ward, 'Philosophical Foundations of Global Journalism Ethics', Journal of Mass Media Ethics, Vol. 20, No. 1, 3-21, 2005.
- M. Heinrich, 'Basics Architectural Photography', Bikhauser Verlag AG, 2008.
- Gerry Kopelow, 'Architectural Photography: The Professional Way', Princeton Architectural Press, 2007.

25ARUT734	CHENNAI – EVOLUTION AND ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give an overview of the historic evolution of Chennai city.
- To introduce its different and distinguishing characteristics including geography, topography, hydrology, ecology, demographics, economics, culture, politics, art, etc.,
- To give knowledge of the evolution of the architecture and urbanism of Chennai in the context of its history.
- To outline the current issues and characteristics of Chennai.

UNIT - 1 PRE-COLONIAL CHENNAI REGION 9Hrs

Natural history and geography of Chennai region including its ecology, topography, rivers, coastal ecosystems, sea, estuary, wetlands, indigenous forests, lakes, tanks, flora and fauna. Pre-colonial history of Chennai region — Tamilzhagam, fishing hamlets, urban settlements, rural areas. Pallava architecture. Historic settlements such as Mylapore, Triplicane, West Mambalam.

UNIT - 2 COLONIAL CHENNAI 9Hrs

Advent of colonial rule in Chennai and its politics. Trade, commerce, economics and education in the context of colonial rule. Colonialism and its modernity- urbanism, building typologies- educationalinstitutions, stations, buildings for justice, law and civics, houses and housing. Architectural styles and their intent- Classical, Indo-Saracenic, indigenous, hybrid. Impact of colonialism on culture andcultural modernity.

UNIT - 3 MODERN CHENNAI 9Hrs

Urbanization in Chennai from late 19th century. Political and economic changes from late 19th century/ early 20th century in Chennai. City planning in early 20th century Chennai. Modernity in architecture- office buildings, concrete, Art Deco. Independence and city planning- Gandhi Nagar, Anna Nagar, etc., Modern architecture in Chennai. Urbanization and Master plans in the 1970s. Newtypologies such as shopping and office complexes, apartment buildings, etc., The local and the global in late 20th century Chennai. Corresponding architecture of regionalism, postmodernism, material changes in buildings, etc.,

UNIT - 4 URBAN CULTURE 9Hrs

Overview of demographics of Chennai today. Diversity and distinctness of Chennai's culture and corresponding expressions- art, religious festivals, literature, cuisine, dance, theatre, cinema, politics, geographic differences in culture within Chennai.

UNIT - 5 URBAN ISSUES AND SOLUTIONS 9Hrs

Changes in 21st century Chennai- urbanization, migration, globalization, growth of IT, new industriesand economic opportunities. Corresponding issues- urban poor and housing scenario, traffic issues,encroachment of water bodies and marshlands, waste management issues, etc., Solutions- mass transit, housing schemes, ecological restoration measures, etc.,

Total: 45 Periods / Hours

OUTCOMES:

On completion of the course, the student is expected to be able to

CO1: An understanding of the overview of the historic evolution of Chennai city and its urbanism.

CO2: Knowledge about different and distinguishing characteristics.

CO3: An overall exposure to the current issues and characteristics of Chennai.

REQUIRED READINGS:

- S. Muthiah, 'Madras Rediscovered', Westland Ltd, 2014.
- K. Kalpana and Frank Schiffer, 'Madras- The Architectural Heritage -An INTACH Guide', INTACH Publication, 2003.
- A.R.Venkatachalapathy, 'Chennai- Not Madras- Perspectives on the City', Marg Publications, 2006.
- K.R.Sitalakshmi, 'Architecture of Indian Modernity, The Case of Madras', Palaniappa Brothers, 2015.
- Nandhitha Krishna and TishaniDoshi,' Madras Then- Chennai Now', Roli Books, 2013.
- KV Raman, 'The Early History of Madras Region', Published C.P.Ramaswami Aiyar Foundation, Chennai, 2008.
- P. Rajaraman, 'Chennai Through the Ages', Poompozhil Publishers, 1997.

REFERENCES:

- S. Muthiah, 'Madras Miscellany – People, Places and Potpourri' , East West Press Pvt Ltd, 2011.
- Nandhitha Krishna, 'Madras- Chennai- Its History and Environment', C.P.RamaswamiAiyerFoundation 2009.
- David Waltner et al, 'The Ecosystem Approach: Complexity, Uncertainty, and Managing forSustainability', Columbia University Press, 2008.
- C.S. Srinivasachari, 'History of the City of Madras', Varadachary, 1939.

PROFESSIONAL ELECTIVE III (V YEAR IX SEM)

25ARUT930	CONTEMPORARY BUILDING MATERIALS	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce current materials and products in architecture that are eco-friendly, composite, durable, advanced, smart.
- To inform about innovations in materials and practices in building industry.
- To focus on materials and systems, their properties and connections, intrinsic relationship with structural systems and environmental performance.

UNIT I INTRODUCTION **9Hrs**

Introduction and need for ultra-performance materials in building design as a substitute to conventional materials. Newer application for special performance, thermal/ sound/ moisture protection, fitting, equipment and furnishing. Properties of contemporary materials – multidimensional, repurposed, recombinant, intelligent, interfacial, transformant, etc.

UNIT II ADVANCED CONCRETE AND COMPOSITE REINFORCEMENT **9Hrs**

Types of advanced concrete and its applications. Workability and mechanical properties, durability and reliability of advanced concrete materials. Manufacturing and application in buildings. Bendable concrete, light transmitting concrete, translucent concrete, pervious concrete, eco-cement, etc., Introduction to manufacture, types, properties and performance of new reinforcement materials in concrete - Aramid fibres, bio-steel, carbon (Graphite) Fibres and fibre glass etc.

UNIT III COMPOSITE MATERIALS **9Hrs**

Types, terminology and classification of composite materials based on particle reinforced, fiber reinforced, structural and composite benefit in building construction. Composite materials manufacturing process. Use of composite materials namely Polymer Matrix Composites (PMCs) and Fibre- Reinforced Polymers (FRPs) along with cement, steel, aluminium, wood, glass, etc., for thermal insulation, fire protection, coating, painting and structural monitoring, etc.

UNIT IV NANO-MATERIALS AND NANO-COMPOSITES **9Hrs**

Definition, manufacture and types of nano materials. Properties, performance of nano materials in building construction, types and application of nano-materials like carbon, nanotubes etc., Nano composite used with cement, steel, aluminium, wood, glass for thermal insulation, fire protection, coating and painting and structural monitoring etc.. Nano technologies in building and construction.

UNIT V DIGITAL AND TENSILE MATERIALS **9Hrs**

Types of materials and its constitution, manufacturing and construction technology requirement for 3D printed building's structure and Extraterrestrial printed structures. Tensile fabric structure by digital printing. Translucent fabric, thin-film photovoltaics, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and PTFE (poly tetra fluro ethlene) (teflon) coated glass cloth.

Total: 45 Periods / Hours

OUTCOMES

CO1: Exposure to the need and use of various contemporary materials in creating innovation and ultra-performance in building design.

CO2: An understanding of characteristics and performance of the newer materials in terms of detailing and application to the context.

TEXTBOOKS

1. Christiane Sauer, 'Made of...New Materials Sourcebook for Architecture and Design', Prestel Pub, 2010.
2. Mel Schwart, 'Encyclopaedia of Smart Materials -Vol 1,2', Wiley-Interscience, 2001.
3. Senem Özgönül Şensan, 'Smart Materials and Sustainability: Application of Smart Materials in Sustainable Architecture', LAP Lambert Academic Publishing, 2010.
4. Axel Ritter, 'Smart Materials in Architecture, Interior Architecture and Design', Birkhäuser Architecture, 2002.

REFERENCES

1. Michelle Addington, & Daniel LSchodek, 'Smart Materials and New Technologies: for the Architecture and Design Professions, Architectural Press, 2005.
2. Michael. F. Ashby, Paulo Ferreira, Daniel L. Schodek, 'Nanomaterials, Nanotechnologies And Design: An Introduction for Engineers and Architects', Butterworth- Heinemann, 2009.
3. Blaine Brownell, 'Transmaterial 2', Princeton Architectural Press, 2008.
4. John Fernandez, 'Material Architecture: Emergent Materials for Innovative Buildings and Ecological Construction', Taylor & Francis, 2006.

25ARUT931	GLASS ARCHITECTURE AND DESIGN	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce latest advances in the field of glass in architecture.
- To enable right selection and usage of right glass for appropriate purposes.
- To give understanding of use of glass in contemporary architecture as well as its role in green design and improving building performance.

UNIT I GLASS AS BUILDING MATERIAL **9Hrs**

Evolution & importance of glass in modern architecture. Applications of glass in buildings (façade/ interior applications). Understanding the production & properties of glass. Value additions including coating technology (importance & necessity) and processing (tempering, heat strengthening, DGU, laminated, ceramic fritting). Types of Glass- mirror, lacquered, fire resistant. Modern glass with different applications. Glass for hospitals, green homes, airports, offices, other buildings. Glass and human safety compliances. Role of glass in fire safety considerations - Class E, EI & EW. Role of glass in acoustics. International standards & codal provisions.

UNIT II GLASS AND GREEN ARCHITECTURE **9Hrs**

Building Physics. Theory of electromagnetic radiation. Understanding of internal and external reflections. Day-lighting in Buildings - introduction and basic concepts (VLT). Solar Control and thermal insulation (SF, UV, SHGC). Need for green Buildings. Energy efficient buildings. Achieving energy efficiency using glass. Factors of energy efficient material selection. Performance parameters. Energy codes and green ratings - ECBC, IGBC, GRIHA. Approaches of energy efficiency - prescriptive method, trade off method. Accommodating passive architecture. Whole Building Simulation.

UNIT III CASE STUDY **9Hrs**

Case study of green building designed predominantly with energy efficient materials. Calculations involving basic factors in glass design. Optimization of Glass - for wastage reduction and standardization of Design. Construction site/ green building visit report**.**

UNIT IV DESIGN WORKSHOPS I **9Hrs**

Analyzing and creating building using interactive modelling. Analyzing of sun path, solar exposure building orientation, daylight, acoustics, site shadow analysis.

UNIT V DESIGN WORKSHOPS II **9Hrs**

Analysis of thickness for safety, consideration of aesthetics, economy, optimization and wastage, air conditioning load calculations and payback analysis.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of glass and its potential in contemporary usage

CO2: An understanding of tools and software currently in practice with respect to the use of glass in buildings.

TEXTBOOKS

1. Christian Schittich, 'Glass Construction Manual', Birkhauser Basel, 2007.
2. 'Architectural Glass Guide', Federation of Safety Glass, 2013.

REFERENCES

1. 'LEED 2011 For India - Green Building Rating System', Indian Green Building Council, 2011
2. 'Energy Conservation Building Code. User Guide', Bureau of Energy Efficiency, 2009. 80
3. 'IS 875 (Part -3) Reaffirmed 1997. Code of Practice for Design loads', Bureau of Indian Standards,1998.
4. 'IS 7883. Code of Practice for the Use of Glass in Buildings', Bureau of Indian Standards, 2013.
5. Training Manuals & E- Learning, Glass Academy.

25ARUT932	STEEL ARCHITECTURE AND DESIGN	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce the design potential of steel as a material in building construction and its inherent structural benefits.
- To inform about the various components of steel as structural and aesthetic design through case studies.
- To provide familiarity with the best practices of steel as a construction material.

UNIT I INTRODUCTION TO STEEL AS BUILDING MATERIAL 9Hrs

Materiality of steel, structural properties of steel, advantages of steel in construction. History of metal in construction – Iron to Steel. Steel and tension. Industrialization and mass fabrication of steel. Casting of steel in historic and contemporary examples. Invention of hollow structural sections. Hot rolled steel shapes, various hollow structural sections.

UNIT II STEEL IN HIGH TECH MOVEMENT, CONTEMPORARY ARCHITECTURE 9 Hrs

Introduction to High Tech movement. Understanding of various typologies of high-tech movement – Extruded, Grid/Bay, Diagrids, arched/ curved structures, tensile. Advantages of diagrids over standard frames. Curved steel – creating curves in steel buildings, limitations in curving steel. Evolution of AESS (architecturally exposed structural steel) through High Tech movement.

UNIT III STRUCTURAL EXPRESSION OF STEEL 9Hrs

Introduction to AESS (architecturally exposed structural steel), standard structural steel versus AESS. Factors that define AESS. Characteristics and categories of AESS. Connection types for AESS – bolted, welded and cast connections. Member types for AESS – Tubular and standard sections. Various steel frame design, basic connection strategies, basic understanding of steel floor systems, truss systems and braced systems.

UNIT IV SUSTAINABILITY, STEEL AND OTHER MATERIALS 9Hrs

Introduction to steel as a sustainable material. Recycled, reuse and adaptive reuse of steel. Steel and glazing systems, support systems for glazing. Technical aspects of combining steel with glass. Various steel and glass envelope systems - curtain wall system, wind braced support systems, cablenet walls, spider steel connections with structural glass, simple and complex cable systems. Handling curves and lattice shell construction. Advanced framing system – Steel and Timber. Low carbon design strategies.

UNIT V FABRICATIONS, ERECTION AND IMPLICATIONS ON DESIGN 9Hrs

Study on transformation of architectural design into fabricated elements. Study of process profile through case studies. Role of physical and digital models in fabrication. Steel in temporary/ exhibit buildings. Need for corrosion and fire protection. Various finishes and coating systems of steel. Detailed study on corrosion protection and fire protection systems. Transportation, site issues and erection on site. Erection of beams and columns. Effects of climate and weather on erections. Other issues relating to practical implication of design on site.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of steel as a structural, functional and aesthetic material in design and construction practice.

TEXTBOOKS

1. Terrimeyer Buake, 'Architectural Design in Steel', SPON, 2004.
2. Peter Silver et al, 'Structural Engineering for Architects', Laurence King, 2013.

REFERENCES

1. Victoria Ballard Bell & Patrick J Rand; 'Materials for Architectural Design', Lawrence King, 2006.
2. Ettinger J. Van et all(Editors), 'Modern Steel Construction in Europe', Elsevier,1963.
3. Leonardo Benevolo, 'History of Modern Architecture Vol 1 & 2', Reprint, MIT Press, 1977.
4. 'Handbook of Steel Construction', Canadian Institute of Steel Construction, 2010.
5. John Leckie, 'Steel and Other Materials', Canadian Institute of Steel Construction, 2007.
6. INSDAG Publications and Brochures.

25ARUT933	CONSTRUCTION TECHNOLOGY	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To inform about the technology involved in the construction of buildings, especially situations requiring advanced construction.
- To give familiarity about advanced construction technology in concrete and steel.
- To inform about the construction practices and equipment in different situations.
- To give an overview of construction planning and scheduling.

UNIT I SOIL AND FOUNDATIONS 7Hrs

Soil investigations including geo-technical information. Soil / ground improvement techniques. Deepexcavations. Outline of foundation systems for special conditions and situations. Foundations for multi-storeyed, tall and super tall buildings. Basement construction and water proofing.

UNIT II ADVANCED CONSTRUCTION TECHNOLOGY 11Hrs

Advanced construction techniques for concrete, to include pre-stressed and pre-cast concrete construction. Fabrication and erection of steel structures. Re-bar technologies and structural steel materials and jointing. Pre-engineered buildings. Pre-fabricated systems, Off-site technologies. Modular coordination.Design and detailing of joints. Quality assurance in jointing.

UNIT III CONSTRUCTION PRACTICE 11Hrs

Modern Construction Materials. Manufacture, storage, transportation and erection of precast component forms. Types of moulds and scaffoldings in construction. Safety in erection and dismantling of constructions. Formwork systems (including slip-form), temporary works and enablingworks. Insitu / field tests for materials.

UNIT IV CONSTRUCTION METHODS & EQUIPMENT 9Hrs

Choice and use of equipment for different situations and materials. Tractors, bulldozers, shovels draglines, cableways and belt conveyors, batching plants, transit mixers and agitator trucks for readymix concrete, guniting equipment, air compressors, welding equipment, cranes and other lifting devices.

UNIT V CONSTRUCTION PLANNING & SCHEDULING 7Hrs

Planning and scheduling for high rise building. Simulation. Typical floor construction cycle. Appropriate working schedule. Planning and scheduling for pre-engineered buildings. Resource allocation.

Total: 45 Periods / Hours

OUTCOMES

CO1: Familiarity with advanced construction technology and systems.
CO2: Knowledge about construction practices and equipment.
CO3: Familiarity with construction management, planning and scheduling processes.

TEXTBOOKS

- R. Chudley, 'Construction Technology', Heinemann, England, 2011.
- R. Barry, 'The Construction of Buildings', The English Language Book Society and Crosby Lockwood, Staples, London, 1999.

REFERENCES

- Frank R. Dagostino, 'Materials of Construction', Reston Publishing Company, 1982.
- M. Mohsin, 'Project Planning and Control', Vikas Publishers, New Delhi, 1983.
- National Building Code of India, 1983.
- http://www.tn.gov.in/tcp/acts_rules.htm
- http://www.cmdachennai.gov.in

25ARUT934	SMART CITIES	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give exposure to the concept of smart cities.
- To give familiarity to different realms in which smart cities concepts operate in practice.
- To give knowledge about case studies relating to smart cities.

UNIT I INTRODUCTION TO SMART CITIES 9Hrs

Origin of the term smart cities. Different interpretations of smart cities. Evolution of the term till today.Overview of smart cities as integrating physical planning effectively with other parameters - economy, infrastructure of various types, energy, climate change, urban governance, social aspects,mobility, quality of life, etc., ICT, GIS and remote sensing as tools to enable smart cities.

UNIT II URBAN PHYSICAL INFRASTRUCTURE AND SMART CITIES 9Hrs

Different types of urban infrastructure – sewage, water, electricity and lighting, mobility of people andgoods, parking. Case studies for each as well as for integrated approach.

UNIT III ECONOMIC, SOCIAL AND CULTURAL ASPECTS AND SMART CITIES 9Hrs

Smart city concepts and city economy. Urban governance and smart city. Smart city concepts in slum area development. Historic core regeneration/ preservation and smart city. Case studies foreach.

UNIT IV ECOLOGY, ENERGY AND SMART CITY 9Hrs

Geography of the city. Ecological aspects. Climate change. Flooding patterns. Energy and Sustainability in cities. Incorporating smart concepts to enhance and mitigate positive and negative effects with respect to these areas. Case studies.

UNIT V SMART CITIES MISSION INDIA 9Hrs

Smart cities in the context of India. Urban projects in India- JNNURM, Smart city mission. Detailedcase studies with focus on technology as enabling mechanism.

Total: 45 Periods / Hours

OUTCOMES

CO1: Familiarity with the concepts of smart cities.
CO2: Knowledge about different domains/ areas in which smart cities can be realized.
CO3: Exposure to smart city practices.

TEXTBOOKS

- Rajeswari Ray, GIS for Smart Cities, Ane Books 2017
- Binti Singh and Manoj Parmar, Smart City in India, Routledge 2020
- Mike Barlow and Cornelia Levy-Bencheton, Smart Cities Smart Future, Wiley 2019
- Charanjit Singh Shah, Redefining Indian Smart and Sustainable Cities, I K International Publishing House 2017
- Antoine Picon, Smart Cities: A Spatialised Intelligence, Wiley 2015

REFERENCES

- Mohammad S. Obaidat and Petros Nicopolitidis, Smart Cities and Homes, Morgan Kaufmann 2016.
- Poonam Sharma, Swati Rajput, Sustainable Smart Cities in India, Springer 2019
- Ricardo Armentano, Parag Chatterjee et al, The Internet of Things, CRC Press, Taylor and Francis 2018

25ARUT935	ARCHITECTURAL CRITICISM	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To develop the ability to analyze existing architectural practices, identify their strengths and limitations, and propose positive transformations.
- To instill awareness of inclusive design practices and sustainable development principles, ensuring that buildings are not only functional but also socially responsible and environmentally conscious.
- To gain an appreciation for the interconnectedness of various disciplines, including social sciences, humanities, and environmental sciences, as they relate to architecture.
- To emphasize the ethical obligations of architects, including considering the needs of diverse communities, respecting cultural heritage, and promoting social justice

UNIT - 1 ARCHITECTURAL THEORY AND PHILOSOPHY 7Hrs

Exploring various architectural theories and philosophies, including modernist, postmodernist, and contemporary approaches.

UNIT - 2 HISTORY OF ARCHITECTURE 10Hrs

Studying the evolution of architectural styles, movements, and influential figures to gain a broader understanding of the discipline's context.

UNIT - 3 CRITICAL ANALYSIS OF ARCHITECTURE 10Hrs

Developing skills to critically analyze architectural works, considering their social, cultural, and environmental impact.

UNIT - 4 SOCIAL AND CULTURAL CONTEXT OF ARCHITECTURE 11Hrs

Examining the role of architecture in shaping and reflecting social and cultural values, including issues of representation, power, and inequality.

UNIT - 5 TECHNOLOGICAL AND CONSTRUCTIONAL ASPECTS 7Hrs

Analyzing the technological and constructional aspects of buildings, including material choice, structural design, and building performance.

Total: 45 Periods / Hours

OUTCOMES:

On completion of the course, the student is expected to be able to

CO1: Students learn to analyze architectural projects of various scales, considering factors like context, culture, and client needs. They develop the ability to design projects in a competent and innovative manner.

CO2: Students learn to represent, analyze, and understand different architectural forms through various mediums, including manual, graphic, and digital techniques.

CO3: Students develop the ability to express their ideas and understand situations through different modes of communication, including writing, drawing, and speaking.

CO4: Students gain a deep understanding of the historical, social, and cultural contexts of architecture and develop the ability to make informed design decisions that are sensitive to the surrounding environment.

CO5: Students develop the ability to critically evaluate existing situations and create innovative solutions for the future.

TEXTBOOKS:

- "The Design of the World" by Peter Sloterdijk.
- “Architecture and Culture" by Douglas Davies.
- "The Critical City" by John Urry.
- "The Production of Space" by Henri Lefebvre.

PROFESSIONAL ELECTIVE IV (V YEAR IX SEM)

25ARUT936	CONTEMPORARY PROCESS IN ARCHITECTURAL DESIGN	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce theories of media and its influence on the perception of space.
- To enable study of the various aspects of digital architecture and its exploration through emerging phenomena that relies on abstraction of ideas.
- To give understanding of the works of contemporary architects who have illustrated the influence of the digital media in architecture.

UNIT I INTRODUCTION **7Hrs**

Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and art. Technology and architecture. Digital technology and architecture.

UNIT II ASPECT OF DIGITAL ARCHITECTURE **10Hrs**

Aspects of digital architecture. Design and computation. Difference between digital process and nondigital process. Architecture and cyberspace. Qualities of the new space. Issues of aesthetics and authorship of design. Increased Automatism and its influence.

UNIT III CONTEMPORARY PROCESS **10Hrs**

Emerging phenomena such as increasing formal and functional abstractions. Diagrams, diagrammatic reasoning, diagrams and design process. Animation and design. Digital hybrid.

UNIT IV GEOMETRIES AND SURFACES **7Hrs**

Fractal geometry. Shape grammar. Hyper surface. Liquid architecture. Responsive architecture.

UNIT V CONTEMPORARY PROCESS AND ARCHITECTURAL WORKS **11Hrs**

Ideas and works of architects related to contemporary processes. The architects to include Greg Lynn, Reiser + Umemotto, Lars Spuybroek / NOX Architects, UN studio, Diller Scofidio, Dominique Perrault, Decoi, Marcos Novak, Foreign Office Architects, Asymptote, Herzog and de Meuron, Neil Denari, Serie Architects, BIG Architects. Study to be undertaken in the form of assignments/discussions/seminars/presentations.

OUTCOME

CO1: An understanding of the effect of contemporary theories of media on contemporary architectural design.

CO2: Insight into contemporary design process/theories and their relation to computation.

CO3: Ability to understand specific aspects of contemporary processes appropriate to a design situation.

CO4: Familiarity with architectural works derived from contemporary processes.

Total: 45 Periods / Hours

TEXTBOOKS

1. Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction', in Illuminations, Schocken Books, New York, 1969
2. Ignaci de Sola Morales,'Differences: Topographies of Contemporary Architecture', MIT Press,1997.
3. William J Mitchell, 'The Logic of Architecture: Design, Computation and Cognition', MIT Press, 1995.
4. Ali Rahim, 'Contemporary Process in Architecture', John Wiley & Sons, 2000.
5. Ali Rahim (Ed), 'Contemporary Techniques in Architecture', Halsted Press, 2002.
6. Peter Eisenmann; Diagram Diaries, Universe,1999.
7. Grey Lynn, 'The Folded, The Pliant and The Supple, Animate form', Princeton Arch. Press,1999.

REFERENCES

1. Gillian Hunt, 'Architecture in the Cyberspace II', John Wiley & Sons, 2001.
2. L. Convey et al, 'Virtual Architecture', Batsford, 1995.
3. Rob Shields (ed.), 'Cultures of the internet: Virtual Spaces, Real Histories, Living bodies', Sage, London, 1996.
4. John Beckman, 'The Virtual Dimension, Architecture, Representation and Crash Culture', Princeton Architecture Press, 1998.
5. William J Mitchell, City of Bits: Space, Place and the Infobahn',MIT Press, Cambridge, 1995.
6. Marcos Novak, 'Invisible Architecture: An Installation for the Greek Pavilion', Venice Biennale, 2000.

25ARUT937	ENERGY EFFICIENT ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To inform about the need to use alternative sources of energy in view of the depleting resources and climate change.
- To provide familiarity with simple and passive design considerations.
- To inform about the importance of day lighting and natural ventilation in building design.
- To create awareness of future trends in the design of sustainable built environment.

UNIT I PASSIVE DESIGN **9Hrs**

Significance of energy efficiency in the contemporary context. Simple passive design considerations involving site conditions, building orientation, plan form and building envelope. Heat transfer and thermal performance of walls and roofs.

UNIT II PASSIVE HEATING **9Hrs**

Direct gain. Thermal storage of wall and roof. Roof radiation trap. Solarium. Isolated gain.

UNIT III PASSIVE COOLING **9Hrs**

Evaporative cooling. Nocturnal radiation cooling. Passive desiccant cooling. Induced ventilation. Earth sheltering. Wind tower. Earth air tunnels.

UNIT IV DAY LIGHTING AND NATURAL VENTILATION **9Hrs**

Daylight factor. Daylight analysis. Daylight and shading devices. Types of ventilation. Ventilation and building design. SITE PLANNING AND DEVELOPMENTS - Land form - vegetation type and pattern - water bodies - open spaces and built spaces - urbanscape - design strategies.

UNIT V CONTEMPORARY AND FUTURE TRENDS **9Hrs**

Areas for innovation in improving energy efficiency such as photo voltaic cells, battery technology, thermal energy storage, recycled and reusable building materials, nanotechnology, smart materials, energy conservation building code – New Indian way for affordable and sustainable homes – Eco Niwas Samhita 2018.

Total: 45 Periods / Hours

OUTCOME

CO1: Knowledge of alternative sources of energy and passive design considerations.
CO2: An understanding of day lighting and natural ventilation in design.
CO3: Familiarity with future trends in creating sustainable built environment.

TEXTBOOKS

1. 'Manual on Solar Passive Architecture', IIT Mumbai and Mines New Delhi, 1999.
2. Arvind Krishnan et al, 'Climate Responsive Architecture A Design Handbook for Energy Efficient Buildings', Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
3. Majumdar M, 'Energy-efficient Building in India', TERI Press, 2000.
4. Givoni .B, 'Passive and Low Energy Cooling of Buildings', Van Nostrand Reinhold, New York, 1994.

REFERENCES

1. Fuller Moore, 'Environmental Control Systems', McGraw Hill Inc, New Delhi,1993.
2. Sophia and Stefan Behling, 'Solpower the Evolution of Solar Architecture', Prestel, New York, 1996.
3. Patrick Waterfield, 'The Energy Efficient Home: A Complete Guide', Crowood pressLtd, 2011.
4. Dean Hawkes, 'Energy Efficient Buildings: Architecture, Engineering and Environment', W.W. Norton & Company, 2002.
5. David Johnson and Scott Gibson, 'Green from the Ground Up: Sustainable, Healthy and Energy Efficient Home Construction', Taunton Press, 2008.

25ARUT938	ARCHITECTURAL CONSERVATION	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To introduce to student the meaning, types of conservation and distinguish between preservation and Adaptive re-use.
- To sensitize about the role of International Agencies involved in conservation and practices adopted in other developed countries.
- To introduce to students about the procedures documentation and measures adopted for historic building and precincts.
- To carry-out surveys, case-studies. With reference to specific historic buildings and precincts in India and the make students aware of the various planning tools

UNIT: I INTRODUCTION TO CONSERVATION 9Hrs

Understanding Heritage. Type of Heritage. Heritage conservation - Need, Debate and purpose. Defining Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. International agencies like ICCROM, UNESCO and their role in Conservation.

UNIT: II CONSERVATION IN INDIA 10Hrs

Museum conservation - monument conservation and the role of Archeological Survey of India - role of INTACH - Central and state government policies and legislations - inventories and projects - select case studies - craft Issues of conservation - conservation project management.

UNIT: III CONSERVATION PRACTICE 12Hrs

Listing of monuments - documentation of historic structures - assessing architectural character - historic structure report - guidelines for preservation, rehabilitation and adaptive re-use of historic structures - seismic retrofit and disabled access / services additions to historic buildings - heritage site management.

UNIT: IV URBAN CONSERVATION 14Hrs

Over view urban history of India and Tamil Nadu - Understanding the character and issues of historic cities - select case studies of towns like Shajahanobad, Alahabad, Bhuvaneswar, Hydrabad, Mysore, Thanjavur, Kancheepuram etc., - Historic districts and heritage precincts - conservation as a planning tool - financial incentives and planning tools such as TDR, transferable development right - Urban conservation and heritage tourism.

Total: 45 Periods / Hours

OUTCOMES:

CO1: Create an awareness about the historic legacy and architectural heritage of India.
CO2: Students learn the appropriate methodologies and tools for recording, documentation and inventorying of heritage structures.
CO3: To acquire skills for documentation photography, surveys, research etc.
CO4: Critically evaluates and make assessment of heritage components.
CO5: Sensitize about the role of International Agencies involved in conservation and practices adopted in other developed countries.
CO6: Student's gets awareness on the various planning tools involved.

TEXTBOOKS:

1. Donald Appleyard, The Conservation of European Cities, M.I.T. Press, Massachusetts.
2. James M.Fitch, Historic Preservation: Curatorial Management of the Built World by University Press of Virginia; Reprint edition (April 1, 1990)
3. A Richer Heritage: Historic Preservation in the Twenty - First Century by Rober E. Stipe.
4. Conservation Manual, Bernard Fielden.
5. Laker, Conservation and Cities.

REFERENCES:

1. B.K. Singh, State and culture, Oxford, New Delhi.
2. A.G.K. Memon Ed, Conservation of Immovable Sites, INTACH Publication, N. Delhi.
3. Seminar Issue on Urban Conservation.

25ARUT939	LANDSCAPE ARCHITECTURE	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVE

- To introduce the different ways in which humans have shaped and designed landscapes acrosshistory and region in terms of need, culture and experience.
- To give an overview of ecological balance and impacts of human activities today and stress onthe role and scope of landscape design in sustainability and environmental conservation.
- To provide familiarity with the various elements and principles of landscape design and itscontribution to human built environment.
- To introduce analytical, artistic and technical aspects involved in site planning, open space andoutdoor design.

UNIT - 1 LANDSCAPES IN HISTORY 10Hrs

Human civilizations and attitude to nature and landscapes across history and cultures. Outline of Japanese, Italian Renaissance and English gardens. Outline of landscape and garden design in Indian history. Gardens depicted in Sanskrit literature, Nandavanams and residential gardens of South India. Moghul gardens. Public parks and residential gardens of the colonial period. Contemporary public landscape projects. Study of notable examples. Spatial development in landscape design.

UNIT - 2 BASICS OF ECOLOGY 7Hrs

Introduction to landscape architecture as a discipline and field. Basic concepts of ecology and the impact of human activities on them. Bio, Geo, chemical cycles including water cycle, carrying capacity of an ecosystem. Environmental impact assessment. Reclamation and restoration of derelict lands

UNIT - 3 ELEMENTS IN LANDSCAPE DESIGN 10Hrs

Introduction to hard and soft landscape elements. Different types of hard landscape elements. Plantmaterials, water and landform - classification, characteristics, use and application in landscape design.

UNIT - 4 SITE PLANNING 10Hrs

Organization of spaces in the outdoor environment. Role of circulation and built form in shaping theenvironment. Role of landscape design in design of neighborhood parks, children's play area and campus development.

UNIT - 5 LANDSCAPING AND FUNCTIONAL AREAS 8Hrs

Urban open spaces and principle of urban landscape. Street landscaping, landscape design for waterfront areas and functional areas in urban centres. Green infrastructure including green roofs and walls.

Total: 45 Periods / Hours

OUTCOMES:

On completion of the course, the student is expected to be able to

CO1: An understanding of reasons for evolution of landscapes across time and context.

CO2: Ability to discern the role of natural and human actions with respect to macro scale of sustainability and ecology as well as in the micro scale of shaping of outdoor environments

CO3: Knowledge about the elements of landscape design and their scope.

CO4: An understanding of landscape design with respect to site planning and different functionaltypologies of spaces.

TEXTBOOKS:

- Motloch, J.L., 'An Introduction to Landscape Design', John Wiley and Sons,2001
- Michael Laurie, 'Introduction to Landscape Architecture', Elsevier, 1986.
- Sauter D; 'Landscape Construction', Cengage Learning, Third edition, 2010.
- Geoffrey And Susan Jellico, 'The Landscape of Man', Thames And Hudson, 1985.

REFERENCES:

- Time Saver Standards for Landscape Architecture', McGraw Hill, Inc, 1997
- Grant W Reid, 'From Concept to Form in Landscape Design', Wiley, 2007.
- Albert J. Rutledge, 'Anatomy of a Park', McGraw-Hill Book Company, 1971.
- Richard P. Dober, 'Campus Landscape', John Wiley and Sons; 2000.
- Strom Steven, 'Site Engineering for Landscape Architects', John Wiley and Sons, 2013.
- Brian Hacket, 'Planting Design', Mc Graw Hill Inc, 1976.
- T.K. Bose and Chowdhury, 'Tropical Garden Plants in Colour', NayaUdyog, 2011.
- Rahoul B Singh, 'Gardens of Delight- Indian Gardens through the Ages', Lustre Press, RoliBooks, 2008.

PROFESSIONAL ELECTIVE V (V YEAR IX SEM)

25ARUT9310	ADVANCED STRUCTURES	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give an understanding of the loss of pre- stress and design requirements for determinate beams.
- To provide familiarity with the concept of industrial structures and high-rise structures.
- To enable the study of concepts of tensile structures, domes, shells and folded plates.

UNIT I PRESTRESSED CONCRETE **7Hrs**

Losses of Prestress. Design requirements. Design of determinate beams.

UNIT II INDUSTRIAL STRUCTURES **11Hrs**

Classification, planning and layout requirements, functional requirements. Types of industrial structures- power plants, bunkers and silos, cooling towers, containment structures, chimneys. Merits.

UNIT III HIGH–RISE BUILDINGS **10Hrs**

Introduction. Load action in high rise buildings. Various structural systems. Waffle slab. Approximate analysis of frames for gravity and horizontal loadings.

UNIT IV TENSILE STRUCTURES **10Hrs**

Concept, development, laws of formation, merits and demerits of pneumatic structures. Basic principles, forms, merits and demerits of cable structures.

UNIT V SHELLS, DOMES AND FOLDED PLATES **7Hrs**

Shells of translation. Shells of revolution. Classification of shells and different forms. Domes. Types of folded plates. Space frames.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of concepts and applications of pre-stressed concrete.
CO2: An understanding of concepts and application of industrial structures and sky scrapers.
CO3: Familiarity with the theory and applications of tensile structures, grids, domes, shells and folded plates.

REQUIRED READING:

1. B.C. Punmia, 'Reinforced Concrete Structures, Vol. 1 & 2', Laxmi Publications, New Delhi, 1994.
2. N. Subramanian, 'Principles of Space Structures', Wheeler, 1998.
3. Thandavamoorthy T.S, 'Advanced Structures of Architecture', Eswar Press, 2008.
4. Council on Tall Buildings and Urban Habitat, 'Structural System for Tall Buildings', McGraw Hill,
   1995.
5. Milo.S.Ketchum and Mark.A. Ketchum, 'Types and Forms of Shell Structures, 1997.

REFERENCES

1. P. Dayaratnam, P.Sarah, 'Prestressed Concrete Structures', Medtech, 2017.
2. Wolfgang Schueller, 'High Rise Building Structures', John Wiley & Sons,1976.
3. Frei Otto, 'Tensile Structures Volume 1 & 2' The MIT Press, 1973.
4. Bryan Stafford Smith, Alex Coull, 'Tall Building Structures - Analysis & Design', John Wiley, 1991.
5. Thomas Herzog, 'Pneumatic Structures', Crosby Lockwood Staples, London, 1977.
6. Bandyopadhyay J.N, 'Thin Shell Structures: Classical and Modern Analysis', New Age International, 2007.Ramaswamy G.S, 'Design and Construction of Concrete Shell Roofs', CBS, 2005.

25ARUT9311	SUSTAINABLE ARCHITECTURE AND PLANNING	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give an understanding of the concept of sustainability and sustainable development.
- To inform about issues like climate change, ecological footprint, etc.
- To provide familiarity with low impact construction practices, life cycle costs and alternative energy resources.
- To give exposure to the different rating systems for building practices with case studies.
- To enable understanding of the concept of sustainable communities and associated socioeconomic dimensions through case studies.

UNIT I INTRODUCTION TO SUSTAINABILITY 9Hrs

Concept of sustainability. Carrying capacity, sustainable development. Bruntland report. Ethics and visions of sustainability. Circles of sustainability. Sustainable economy and use. eco systems, food chain and natural cycles or cradle to cradle concept.

UNIT II CLIMATE CHANGE AND SUSTAINABILITY 9Hrs

Overview of climate change and its impact on a global and regional scale. Principles of energy systems. Energy crisis and global environment. Study on vernacular techniques and technological advancements in climate control in different climatic zones.

UNIT III SITE AND SUSTAINABILITY 9Hrs

Sustainable site selection and development. Introduction to Green building concepts. TERI, LEED, GIRHA and BREEAM. Ecology and sustainability. Different sources of energy, recyclable products and embodied energy.

UNIT IV SUSTAINABLE MATERIALS 9Hrs

Selection of materials Eco building materials and construction. Low impact construction – bio mimicry, zero energy buildings, nano technology and smart materials.

UNIT V SUSTAINABLE CITIES 9Hrs

Dimensions of sustainable community- social, cultural and economic factors. Urban ecology, urban heat island effects, smog etc. Case studies of eco city or communities.

Total: 45 Periods / Hours

OUTCOMES

CO1: An understanding of the concepts of ecosystem, carrying capacity, ecological footprint, sustainability and sustainable development.

CO2: Awareness of emerging vulnerabilities of global warming and climate change and an understanding of the contribution of building industry towards the same.

CO3: Familiarity with approaches to achieving sustainable buildings and communities.

CO4: Knowledge of incentives and evaluation systems for green buildings.

TEXTBOOKS

1. Dominique Gauzin–Muller, 'Sustainable Architecture and Urbanism: Concepts, Technologies and Examples', Birkhauser, 2002.
2. Catherine Slessor, 'Eco-Tech: Sustainable Architecture and High Technology', Thames and Hudson 1997.
3. Ken Yeang, 'Ecodesign- A Manual for Ecological Design', Wiley Academy, 2006.

REFERENCES

1. Arian Mostaedi, 'Sustainable Architecture: Low Tech Houses', Carles Broto, 2002.
2. Sandra F. Mendler & William Odell, 'HOK Guidebook to Sustainable Design', John Wiley and Sons, 2000.
3. Richard Hyder, 'Environmental Brief: Pathways for Green Design', Taylor and Francis, 2007.
4. Brenda Vale and Robert Vale, 'Green Architecture: Design for a Sustainable Future', Thames and Hudson, 1996

25ARUT9312	ARTIFICIAL INTELLIGENCE IN DESIGN PROCESS	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To give knowledge and understanding about the discipline of Artificial Intelligence as a totality and its potential in Architectural Design.
- To give understanding about the relationship between architecture and computing within methodological design process.

UNIT INTRODUCTION TO AI **9Hrs**

Introduction to Artificial Intelligence; Introduction to Internet of Things (IoT), Big Data, MachineLearning (MI), Block Chain, Etc.,

UNIT II CYBERNETICS & MACHINES **9Hrs**

Definition of Cybernetics; Cybernetic architecture; Cyberspace; Virtual-Reality; The ArchitecturalRelevance of Cybernetics;

UNIT III DESIGN INTELLIGENCE SYSTEM **9Hrs**

Algorithm in Architecture; Data driven/informed process; Multi-Agent Design System; Automation inDesign; Swarm Intelligence, Neural Networks, Morphogenetic, Self-Organising, Behavioural; Evolutionary and cognitive aspects;

UNIT IV CONSTRUCTION INTELLIGENCE SYSTEM **9Hrs**

Robotic construction, 4d Printer, Real-time Fabrication, Virtual/Augmented Reality, Flying Robots;Human-free construction process.

UNIT V STUDENT SEMINAR **9Hrs**

Application of AI in Architectural Projects/by Architects: Zaha Hadid Architects (ZHA), Foster + Partners, Buro Happold, Arup Group, Matias Del Campo, Sidewalk Labs/Delve, Regen Villages,Phil Bernstein, etc.,

Total: 45 Periods / Hours

OUTCOMES

CO1: Knowledge about artificial intelligence as a domain.
CO2: Familiarity with artificial intelligence in architectural design process.
CO3: Exposure to various intelligence design processes and new trans-disciplinary design methodologies.

TEXTBOOKS:

- Architecture in the Age of Artificial Intelligence: An Introduction to AI for Architects, NeilLeach, Bloomsbury Visual Arts.
- The Routledge Companion to Artificial Intelligence in Architecture, Imdat As, Prithwish Basu,Routledge;
- Artificial Intelligence and Architecture, From Research to Practice, Stanislas Chaillou, Birkhäuser.

REFERENCES

- Johnston, John, 'Cybernetics and the New Complexity of Machines', pp.27-62 in The Allure of the Machinic Life: Cybernetics, Artificial Life, and the New A.I, The MIT Press, 2008.
- Nicholas Negroponte, 'Soft Architecture Machines', MIT Press 1975. Pp.6-49.
- Michael Speaks, 'Design Intelligence', in Latent Utopias: Experiments within Contemporary Architecture (Graz, 2002), pp.73-76.
- Frazer J.H., 'The Cybernetics of Architecture: A Tribute to the Contribution of Gordon Pask', Kybernetes, Vol.20, No.5/6 2001, pp 641-651.
- Frazer J.H., 'The Architectural Relevance of Cybernetics', Systems Research, Vol 10, No.3, 1993, pp.43-48.
- Johnston, John, 'The New AI: Behaviour-based Robotics, Autonomous Agents, and Artificial Evolution, pp.27-64 in The Allure of the Machinic Life: Cybernetics, Artificial Life, and the New A.I., The MIT Press, 2008.

25ARUT9313	PARAMETRIC ARCHITECTURE	L	T	P/S	C	Total Marks
		1	0	2	3	100

OBJECTIVES:

- To introduce parametric platform, various tools and its potentials.
- To impart training in parametric tools by 2D and 3D modelling through projects.
- To enable the use of parametric platform to develop a design from the initial stages to thefinal outcome.

UNIT I INTRODUCTION TO PARAMETRIC MODELLING 12Hrs

Introduction to Parametric Modelling: Difference between Parametric and Non-Parametric Modelling;Advantages of Parametric Modelling; Introduction of Software tools like Rhino/Grasshopper, and itsinterface; Etc.,

UNIT II INTRODUCTION TO CODING 11Hrs

Exercises in Processing (java) /Phython to understand Input/Output; Variable, Integers, Array, Operations, Object, Data Structure, List and Sort, Series/Range, Class, Function, Etc.,

UNIT III DIGITAL FORMATION 11Hrs

Construct Curve, Surface, Solid, Mesh Etc., in parametric setup difference between Polygon & Nurbsmodelling, Poly-surfaces, b-reps and meshes, Field, Operations, Modifiers, Manipulations, Etc.,

UNIT IV GENERATIVE & PERFORMATIVE MODELS 11Hrs

(Grasshopper/ Processing/Phython, Etc.),
Computational Geometry: Voronoi, Delaunay Triangle, Etc;Rule-based System: L-System (LS), Fractals, Etc., Performative: Simulation, Analysis, Evaluation, Etc.,

Total: 45 Periods / Hours

OUTCOMES

CO1: Familiarity with digital tools and techniques in the realm of contemporary design processes;
CO2: Ability to use parametric software to generate design variants;
CO3: Understanding of emergent possibilities in digital design, analysis and fabrication;

TEXTBOOKS:

- Form+Code by Casey Reas, Chandler McWilliams, Lust, Princeton Architectural Press/New York;
- The Nature of Code: Simulating Natural Systems with Processing by Daniel Shiffman;
- Elements of Parametric Design by Robert Woodbur, Bentley Institute Press & Routledge;
- From Control to Design Paperback by Tomoko Sakamoto, Actar;
- The Alphabet and the Algorithm by Mario Carpo, The MIT Press;
- AAD Algorithms-Aided Design by Arturo Tedeschi, Le Penseur;

REFERENCES:

- Patrick Schumaker, 'Parametricism as Epochal Style n, Antoine. 'Digital culture in Architecture'
- Stavric, Milena & Marina, Ognen. (2011). Parametric modeling for advanced architecture. International Journal of Applied Mathematics and Informatics. 5. 9-16.
- Janssen, Patrick & Stouffs, Rudi. (2015). Types of Parametric Modelling. 10.52842/conf.caadria.2015.157.
- Pitts, Greg and Datta, Sambit 2009, Parametric modelling of architectural surfaces, in CAADRIA 2009: Between man and machine-integration, intuition, intelligence: Proceedings of the 14th International Conference on Computer Aided Architectural Design Research in Asia, National Yunlin University of Science and Technology, Yunlin, Taiwan, pp. 635-644.

25ARUT1031	CONSTRUCTION AND PROJECT MANAGEMENT	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES

- To introduce different management techniques suitable for planning and construction projects.
- To enable understanding of management systems for accomplishing the task efficiently in terms of quality, time and cost.

UNIT I INTRODUCTION TO PROJECT MANAGEMENT 9Hrs

Project management concepts. Objectives, planning, scheduling. Controlling and role of decision. In project management. Traditional management system. Gantt's approach. Load chart. Progress chart. Development of bar chart, merits and demerits. CPM networks, merits and demerits. PERT network. Introduction to the theory of probability and statistics.

UNIT II PROJECT PROGRAMMING AND CRITICAL PATH METHOD 9Hrs

Project network. Events activity. Dummy. Network rules. Graphical guidelines for Network. Numbering the events. Cycles. Development of network-planning for network construction. Models of network construction. Steps in development of network. Work breaks down structure. Hierarchies. Critical path method - process, activity time estimate, earliest event time, latest allowable occurrence time, start and finish time of activity, float, critical activity and critical path problems.

UNIT III RESOURCE PLANNING 9Hrs

Cost model- project cost, direct cost, indirect cost, slope curve, total project cost. Optimum duration contracting the network for cost optimization. Steps in cost optimization, updating, resource allocation, resource smoothing, resource leveling.

UNIT IV COMPUTERIZED PROJECT MANAGEMENT 9Hrs

Creating a new project, building task. Creating resources and assessing costs, refining project. Project tracking, recording actual. Reporting on progress. Analyzing financial progress. Introduction to BIM.

UNIT V CONCEPT TO COMMISSIONING 9Hrs

Project feasibility study. Real estate & regulatory strategies. Facility programming and planning. Design management. EPC. testing & commissioning.

OUTCOMES

CO1: Ability to understand a project from concept to commissioning, feasibility study & facility programme, design, construction to commissioning.

CO2: Ability to apply project management techniques in achieving objectives of a project like client needs, quality, time & cost.

CO3: An understanding of principles of management, construction scheduling, scope definition and team roles.

TEXTBOOKS

1. Dr. B.C. Punmia and K.K. Khandelwal, 'Project Planning and Control with PERT and CPM', Laxmi Publications, 2018.
2. Elaine Marmel, 'Microsoft Project 2010 Bible', Wiley, 2010.
3. Sam Kubba, 'Green Construction Project Management and Cost Oversight', Elsevier, 2010.

REFERENCES

1. Jerome D. Wiest and Ferdinand K. Levy, 'A Management Guide to PERT/CPM', Prentice Hall of India, 1982.
2. Bert Bielefeld, 'Basics Project Management Architecture', Birkhauser, 2013.

25ARUT1032	DISASTER MANAGEMENT	L	T	P/S	C	Total Marks
		3	0	0	3	100

OBJECTIVES:

- To understand the causes and effects of natural calamities.
- To familiarize with the factors causing disaster.
- To create an overall understanding of Disaster prevention and mitigation.
- To outline the concepts of disaster resistant construction.
- To expose the students to Case studies of Natural disasters in India.

UNIT- 1 NATURAL HAZARDS AND DISASTER MANAGEMENT 9Hrs

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity –Disaster and Development, Disaster management and Disaster Management cycle Understanding the Causes and effects of natural calamities - floods, tropical cyclones, landslides, heatwaves & Tsunami. Institutional and Financial Mechanism National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter-Governmental Agencies

UNIT- 2 ELEMENTARY SEISMOLOGY 9Hrs

Major Historic Earthquakes in the World, earthquake hazard map of India, Causes of Earthquakes: Elastic Rebound theory, Continental Drift and Plate Tectonics, Types of Plate Boundaries, types of faults, seismic waves – classification of body waves and surface waves, magnitude, intensity, epicenter and energy release, Terminologies and Definitions and types of earthquake based on location, size and focal depth characteristics of strong earthquake ground motions, Flexibility of long & short period structures; concepts of response spectrum, Seismological Instruments: Seismograph and Accelerograph, Introduction to Seismic zones, Need for Seismic Zonation, Types of Zonation and Seismic zonation scales

UNIT- 3 LESSONS LEARNT FROM PAST EARTHQUAKES & SEISMIC DESIGN PRINCIPLES 9Hrs

Earthquake Effects: - On ground, soil rupture, liquefaction and landslides, Behaviors of various types of buildings, lifelines and collapse patterns, Behaviour of Non-Structural Elements like services, fixtures, mountings etc., Social & Economic Consequences of earthquakes
Concept of seismic design, stiffness, strength, period, ductility, damping, hysteric energy dissipation,center of mass, center of rigidity, torsion, design eccentricities, Seismic effects related to building configuration. Plan & vertical irregularities, Special Aspects: - Torsion, appendages, staircases,adjacency, pounding. Ductility based design: Design of energy absorbing devices, Seismic base isolation and seismic active control.

UNIT- 4 STRUCTURAL DETAILING & EARTHQUAKE RESISTANT CONSTRUCTION DETAILS 9Hrs

IS Code provisions for the buildings: - IS:1893-2002, IS:4326-1993 Horiz. & vert.seismic co-efficients, valuation of base shear, distribution of shear forces in multistorey buildings.
Seismic Detailing of Masonry buildings (IS: 4326), Seismic Designs & Detailing of RC & Steel Buildings: IS: 1893 - 2002; IS: 13920 - 1993; IS: 456 - 2000; IS: 800 - 2004.
Special reinforcing and connection details in structural drawings.Various Types and construction details of Foundations, soil stabilization, retaining walls, plinth fill, flooring, walls, openings, roofs, terraces, parapets, boundary walls, underground and overhead tanks, staircases and isolation of structures. Local practices: traditional regional responses.

UNIT- 5 CASE STUDIES AND DESIGN GUIDELINES 9Hrs

Earthquakes at Bhuj, Lattur, etc., Cyclones in coastal Andhra pradesh & Orissa, Landslides in Nilgiris, Himachal etc, Floods in Bangladesh, and Droughts in Rajasthan & Tsunami in Tamil Nadu. Design guidelines for disaster resistant construction at appropriate situations - Engineering, architectural, landscape & planning solutions for floods, tropical cyclones & Tsunami.

OUTCOMES

CO1: To create awareness about natural disasters and factors that causes them to foster knowledge about strategies for disaster management and mitigation.

CO2: Understanding the design guidelines in disaster resistant construction. To familiarize the students with Case studies of natural disasters in India.

REFERENCES:

1. Agarwal Pankaj, Shrikhande Manish, Earthquake Resistant Design of Structures, Prentice-Hall of India, New Delhi, 2006
2. S. K. Duggal, Earthquake Resistant Design of Structures, Oxford University Press, 2007
3. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
4. Guidelines For Reconstruction of Houses Affected by Tsunami, UNDP India, & Government of Tamil Nadu, 2004
5. Coppola D P, 2007. Introduction to International Disaster Management, Elsevier Science (B/H), London.
6. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
7. Disaster Management Act 2005, Publisher by Govt. of India
8. SERC Guidelines for Design and Construction of buildings and structures in cyclone-prone areas, SERC, CSIR, Government of India, 1998,
9. IS 1893(Part 1):2002 ‘Criteria for Earthquake Resistant Design of Structures: Part 1 General provisions and Buildings’
10. IS 13739:1993 ‘Guidelines for estimation of flood damages’
11. IS 15498:2004 ‘Guidelines for improving the cyclonic resistance of low-rise houses and other buildings/structures’
12. IS 14680:1999 Guidelines for Landslide Control

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