ANNA UNIVERSITY, CHENNAI
UNDERGRADUATE CURRICULUM (UNIVERSITY DEPARTMENTS)

Campus: School of Architecture and Planning
Department: Architecture
Programme: U.G (B. Arch)
Regulations: 2023 (Revised 2024), with effect from the AY 2024 – 25 to all the students of UG Programme.

OVERVIEW OF CREDITS

Sem	PCC	PEC	SDC	BSC & AEC	ETC	OEC	PAEC	UC	IOC	Total
I	20		3	3				1		**27**
II	20			6				1		**27**
III	12			14				2		**28**
IV	12		4	10				1		**27**
V	13	3		10					1	**27**
VI	13	3		10						**26**
VII	17	3				3	3		1	**27**
VIII							26			**26**
IX	17	3					6		1	**27**
X	23				3			3		**29**
Total	**147**	**12**	**7**	**53**	**3**	**3**	**35**	**8**	**3**	**271**
% of Category	**54.24**	**4.42**	**2.58**	**19.55**	**1.10**	**1.10**	**12.91**	**2.95**	**1.10**	

CATEGORY OF COURSES

PCC – Professional Core Course
PEC – Professional Elective Course
SDC – Skill Development Courses
BSC & AEC – Building Sciences & Applied Engineering Courses
ETC – Emerging Technology Course
OEC – Open Elective Course
PAECC – Professional Ability Enhancement Courses
UC – University Course
SLC – Self Learning Course

SEMESTER I							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1.	AR23101	Introduction to Architecture	T	3-0-0	3	3	PCC
2.	AR23102	Introduction to Language and English Skills	T	3-0-0	3	3	**SDC**
3.	AR23103	Mathematics for Architects	T	3-0-0	3	3	BSC & AEC
4.	UC23H01	தமிழர்மரபு / Heritage of Tamils	T	1-0-0	1	*1*	UC
5.	AR23104	Geometrical Understanding and Representation	TS	1-0-3	4	4	PCC
6.	AR23105	Art as Cognition and Expression	TS	1-0-3	4	4	PCC
7.	UC23P01	NSS/NSO/YRC		0-0-2	2	*0*	UC
8.	AR23106	Foundational Design Studio	S	0-0-9	9	9	PCC
					Total Credits	**27**	

NOTE: NCC Credit Course level 1is offered for NCC students only.

*** TCP** **-** Total Contact Period(s)

TYPE OF COURSE

T - Theory
S - Studio
TS - Theory cum studio
IT - Internship Training

SEMESTER – II *(Prerequisite – Passing Foundational Design Studio)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1.	AR23201	World Architecture and Urbanism: Early Civilisations to Renaissance	T	3-0-0	3	3	PCC
2.	AR23202	Structural Mechanics	T	3-0-0	3	3	BSC & AEC
3.	AR23203	Environmental Science for Architecture	T	3-0-0	3	3	BSC & AEC
4.	_	Audit Course – I	T	2-0-0	2	2**	UC
5.	UC23H02	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	T	1-0-0	1	1	UC
6.	AR23204	Building Components and their Representation	TS	1-0-3	4	4	PCC
7.	AR23205	Thinking through Diagrams and Models	TS	1-0-3	4	4	PCC
8.	AR23206	Basic Space Design Studio	S	0-0-9	9	9	PCC
					Total Credits	**27**	

SEMESTER – III *(Prerequisite – Passing Basic Space Design Studio)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1.	AR23301	Architecture in India: Early Civilisations to Colonialism	T	3-0-0	3	03	PCC
2.	AR23302	Structural Systems and Analysis	T	3-0-0	3	3	BSC & AEC
3.	AR23303	Climate and Built Environment	T	3-0-0	3	3	BSC & AEC
4.	UC23U01	Universal Human Values	T	1-0-2	3	*2*	UC
5.	AR23304	Building Construction with Basic Materials	TS	1-0-3	4	4	BSC & AEC
6.	AR23305	Site Surveying and Planning	TS	1-0-3	4	4	BSC & AEC
7.	AR23306	Advanced Space Design Studio	S	0-0-9	9	9	PCC
					Total Credits	**28**	

SEMESTER – IV *(Prerequisite – Passing Advanced Space Design Studio)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23401	Regional and Vernacular Built Environments in India	T	3-0-0	3	3	PCC
2	AR23402	Structural Design of Masonry and Timber	T	3-0-0	3	3	BSC & AEC
3	AR23403	Water Supply and Sanitation in Buildings	T	3-0-0	3	3	BSC & AEC
4	AR23U01	Indian Standards	T	1-0-0	1	*1*	UC
5	AR23404	Wood in Building Construction	TS	1-0-3	4	4	BSC & AEC
6	AR23405	Digital Drawing, Visualisation and Representation	TS	1-0-3	4	4	**SDC**
7	-	NCC Credit Course Level 2		3-0-0	3	*3***	UC
8	AR23406	Rural Habitat Design Studio	S	0-0-9	9	9	PCC
					Total Credits	**27**	

NCC Credit Course level 2 is offered for NCC students only.

SEMESTER V *(Prerequisite - Pass in Rural Habitat Design Studio)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23501	Architecture and Urbanism of Colonialism and Modernity	T	3-0-0	3	3	PCC
2	AR23502	Structural Design of Concrete	T	3-0-0	3	3	BSC & AEC
3	AR23503	Electricity, Lighting and Acoustics in Buildings	T	3-0-0	3	3	BSC & AEC
4	-	Industry Oriented Course - I	T	1-0-0	1	1	**IOC**
5	-	Professional Elective - I	T	X-X-X	3	3	PEC
6	AR23504	Concrete in Building Construction	TS	1-0-3	4	4	BSC & AEC
7	AR23505	Urban Architecture Design Studio	S	0-0-10	10	10	PCC
					Total Credits	**27**	

SEMESTER VI *(Prerequisite - Pass in Urban Architecture Design Studio)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23601	Specification, Estimation and Budgeting	T	3-0-0	3	3	PCC
2	AR23602	Structural Design of Steel	T	3-0-0	3	3	BSC & AEC
3	AR23603	Advanced Building Services	T	3-0-0	3	3	BSC & AEC
4	-	Professional Elective - II	T	X-X-X	3	3	PEC
5	-	Audit Course – II	T	2-0-0	2	*2***	UC
6	AR23604	Steel, Glass and Plastic in Building Construction	TS	1-0-3	4	4	BSC & AEC
7		NCC Credit Course Level 3		3-0-0	3	*3***	UC
8	AR23605	Environmental Design Studio	S	0-0-10	10	10	PCC
					Total Credits	**26**	

NCC Credit Course level 3 is offered for NCC students only.

SEMESTER VII *(Prerequisite - Pass in Environmental Design Studio)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23701	Contemporary Architecture: Theories and Practice	T	3-0-0	3	3	PCC
2	AR23702	Professional Practice of Architecture	T	3-0-0	3	3	PAEC
3	AR23703	Contemporary Housing	T	3-0-0	3	3	PCC
4	**-**	Industry Oriented Course - II	T	1-0-0	1	1	**IOC**
5	-	Professional Elective - III	T	X-X-X	3	3	PEC
6	**-**	Open Elective	T	X-X-X	3	*3*	OEC
7	AR23704	Critical Design Studio	S	0-0-11	11	11	PCC
					Total Credits	**27**	

SEMESTER VIII *(Prerequisite - Pass in Critical Design Studio of VII Semester)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23801	Practical Training**	IT	X-X-X	26	26	PAEC
					Total Credits	**26**	

SEMESTER IX *(Prerequisite- Pass in Practical Training of VIII Semester)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23901	Urban Design	T	3-0-0	3	3	PCC
2	AR23902	Landscape and Ecology	T	3-0-0	3	3	PCC
3	AR23903	Construction and Project Management	T	3-0-0	3	3	PAEC
4	-	Industry Oriented Course - III	T	1-0-0	1	1	**IOC**
5	**-**	Professional Elective - IV	T	X-X-X	3	***3***	PEC
6	AR23904	Dissertation	S	0-0-3	3	3	PAEC
7	AR23905	Urbanism and Architecture Design Studio	S	0-0-11	11	11	PCC
					Total Credits	**27**	

SEMESTER X *(Prerequisite - Pass in Urbanism and Architecture Design Studio of IX Semester)*							
S. No.	**Course Code**	**Course Name**	**Course Type#**	**Periods / Week**		**Credits**	**Category**
				L-T-P/S	**TCP***		
1	AR23X01	Thesis	**S**	0-0-23	23	23	PCC
2	AR23X02	Emerging Technology Course (Professional Elective - V)	T	X-X-X	3	3	ETC
3	UC23E01	Engineering Entrepreneurship Development	T	2-0-2	4	3	UC
					Total Credits	**29**	

PROFESSIONAL ELECTIVE COURSES (I to IV) : VERTICALS

Design Process and Practice	**Energy & Technology Buildings**	**Architectural Tectonics**	**Digital Design Process**	**Urban Studies**	**Allied – Art, Design and Writing**
Design Process and Thinking	Sustainable Design	Structure in Architecture	Contemporary Processes in Architectural Design	Human Behaviour and Built Environment	Techniques of Visual Art
					Interior Design
Design Detailing	Climatic Design Procedures	Earthquake Resistant Architecture	Parametric Modeling and Coding	Disaster Management	Art Appreciation
	Digital Tools for Building Modeling and Analysis and assessment				Critical Writing
Soft Skills	Green Building	Contemporary Building Materials	Digital Fabrication and Architecture	Chennai-Evolution and Architecture	Product Design
Design Communica-tion				History of Non-Western Architecture	
Professional Service Firm: Management and Excellence	Building Automation and Control Systems	Advanced Structures	Data Visualisation and Analysis	Heritage Conservation	Techniques of Digital Art
				Human Settlements Planning	Architectural Journalism and Photography

PROFESSIONAL ELECTIVE COURSE V (EMERGING TECHNOLOGY COURSE)

Advanced Construction Technology	Artificial Intelligence in Design Process	Smart Cities

PROFESSIONAL ELECTIVE COURSES (I to IV) : VERTICALS

VERTICAL 1: DESIGN PROCESS AND PRACTICE							
S. NO.	COURSE CODE	COURSE NAME	COURSE TYPE	PERIODS / WEEK		CREDITS	CATE GORY
				L-T-P	TCP		
1.	AR23001	Design Process and Thinking	T	3-0-0	3	3	PEC
2.	AR23002	Design Detailing	T	3-0-0	3	3	PEC
3.	AR23003	Soft Skills	T	3-0-0	3	3	PEC
4.	AR23004	Design Communication	T	3-0-0	3	3	PEC
5.	AR23005	Professional Service Firm: Management and Excellence	T	3-0-0	3	3	PEC

VERTICAL 2: ENERGY & TECHNOLOGY IN BUILDINGS							
S. NO.	COURSE CODE	COURSE NAME	COURSE TYPE	PERIODS / WEEK		CREDITS	CATE GORY
				L-T-P	TCP		
1.	AR23006	Sustainable Design	T	3-0-0	3	3	PEC
2.	AR23007	Climatic Design Procedures	T	3-0-0	3	3	PEC
3.	AR23008	Digital Tools for Building Modeling and Analysis	T	3-0-0	3	3	PEC
4.	AR23009	Green Building	T	3-0-0	3	3	PEC
5.	AR23010	Building Automation and Control Systems	T	3-0-0	3	3	PEC

VERTICAL 3: ARCHITECTURAL TECTONICS							
S. NO.	COURSE CODE	COURSE NAME	COURSE TYPE	PERIODS / WEEK		CREDITS	CATE GORY
				L-T-P	TCP		
1.	AR23011	Structure in Architecture	T	3-0-0	3	3	PEC
2.	AR23012	Earthquake Resistant Architecture	T	3-0-0	3	3	PEC
3.	AR23013	Contemporary Building Materials	T	3-0-0	3	3	PEC
4.	AR23014	Advanced Structures	T	3-0-0	3	3	PEC

VERTICAL 4: DIGITAL DESIGN PROCESS							
S. NO.	COURSE CODE	COURSE NAME	COURSE TYPE	PERIODS / WEEK		CREDITS	CATE GORY
				L-T-P	TCP		
1.	AR23015	Contemporary Processes in Architectural Design	T	3-0-0	3	3	PEC
2.	AR23016	Parametric Modeling and Coding	T	3-0-0	3	3	PEC
3.	AR23017	Digital Fabrication and Architecture	T	3-0-0	3	3	PEC
4.	AR23018	Data Visualisation and Analysis	T	3-0-0	3	3	PEC

VERTICAL 5: URBAN STUDIES							
S. NO.	COURSE CODE	COURSE NAME	COURSE TYPE	PERIODS / WEEK		CREDITS	CATE GORY
				L-T-P	TCP		
1.	AR23019	Human Behaviour and Built Environment	T	3-0-0	3	3	PEC
2.	AR23020	Disaster Management	T	3-0-0	3	3	PEC
3.	AR23021	Chennai Evolution and Architecture	T	3-0-0	3	3	PEC
4.	AR23022	History of Non-Western Architecture	T	3-0-0	3	3	PEC
5.	AR23023	Heritage Conservation	T	3-0-0	3	3	PEC
6.	AR23024	Human Settlements Planning	T	3-0-0	3	3	PEC

VERTICAL 6: ALLIED – ART, DESIGN AND WRITING							
S. NO.	**COURSE CODE**	**COURSE NAME**	**COURSE TYPE**	**PERIODS / WEEK**		**CREDITS**	**CATEGORY**
				L-T-P	**TCP**		
1.	AR23025	Techniques of Visual Art	T	3-0-0	3	3	PEC
2.	AR23026	Interior Design	T	3-0-0	3	3	PEC
3.	AR23027	Art Appreciation	T	3-0-0	3	3	PEC
4.	AR23028	Critical Writing	T	3-0-0	3	3	PEC
5.	AR23029	Product Design	T	3-0-0	3	3	PEC
6.	AR23030	Techniques of Digital Art	T	3-0-0	3	3	PEC
7.	AR23031	Architectural Journalism and Photography	T	3-0-0	3	3	PEC

PROFESSIONAL ELECTIVE COURSE V (EMERGING TECHNOLOGY COURSE)

S. NO.	**COURSE CODE**	**COURSE NAME**	**COURSE TYPE**	**PERIODS / WEEK**		**CREDITS**	**CATEGORY**
				L-T-P	**TCP**		
1.	AR23E01	Advanced Construction Technology	T	3-0-0	3	3	PEC
2.	AR23E02	Artificial Intelligence in Design Process	T	3-0-0	3	3	PEC
3.	AR23E03	Smart Cities	T	3-0-0	3	3	PEC

AR23101 INTRODUCTION TO ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To give understanding of architecture as an outcome of the act of design by human society across history and region.
- To give an introduction to the discipline of architecture and its various facets.
- To introduce importance of form and its relation to design through study of nature and manmade environment.
- To introduce the vocabulary of form and space in terms of elements, principles, attributes and organisation as giving cognitive experience in the realm of architecture.

UNIT I INTRODUCTION TO ARCHITECTURE 9

Origin and definitions of architecture as need based, cultural, environmental, social, psychological response of human society. Architecture as phenomenological mediation of nature. Components of architecture: use, means, site, shelter, relation to nature, structure, skin, materials, services, circulation, typology, aesthetics, expression, character, symbolism, experience, etc., History and types of design in architecture- unself-conscious/ self-conscious design, design through craft/ design through drawing, pragmatic/ iconic/ canonic/ analogic design.

UNIT II FORM IN NATURE AND MANMADE ENVIRONMENT 9

Understanding form in all its attributes as the basis of creating architecture. Characteristics of form and its relationship with use/function/evolution as manifested in first hand examples from nature and everyday manmade environment including artefacts, objects buildings, cityscapes. Human body and sensory environment. Cognitive experience of form- ideas of Gestalt, visual perception, proxemics. Tactile, auditory, olfactory senses and human environment.

UNIT III FORM AS GEOMETRIC ELEMENTS AND THEIR EFFECTS 9

Form as embodied in and/or constituted by geometric elements such as point, line, plane, volumes. Attributes, generation and interrelationships among elements. Perceptual effects and use of specific manifestations of the elements- planes as shapes and volumes as geometric forms/space such as sphere, cube, pyramid, cylinder, cone and their sections/ derivatives. Architectural use of elements. Exercises and architectural case studies.

UNIT IV ATTRIBUTES AND PRINCIPLES OF FORM 9

Form as manifesting attributes such as pattern, light, colour, surface, texture. Effects of these attributes. Form in its basic state, in combinations, composite organisations and configurations as manifesting characteristics such as proportion, scale, balance, symmetry, asymmetry, rhythm, axis, hierarchy, datum, unity, harmony, dominance, climax, focus. Characteristics acting as principles to generate architectural design. Exercises and architectural case studies.

UNIT V ORGANISATION OF FORM AND SPACE 9

Cognitive experience of form and space in architecture –enclosure, internal and external spaces, continuous spaces, hierarchy of spaces, spatial organisation (centralised, linear, radial, clustered, grid), built form- open space relationships. Relationship of movement/ circulation/ path with reference to architectural form and space. Haptic experience. Exercises and architectural case studies.

TOTAL:45 PERIODS

COURSE OUTCOMES:

CO1: Ability to recognise different facets of architecture.
CO2: Basic understanding of form and design in all aspects and scales.
CO3: Ability to discern the relationship between manifestations of form and its effects on humans.

REQUIRED READING

- Geoffrey Broadbent, 'Design in Architecture - Architecture and the Human Sciences',

D.Fulton, 1988.
- Francis D.K. Ching, ‘Architecture-Form, Space and Order’, Van Nostrand Reinhold Company, New York, 2007.
- Simon Unwin, ‘Analysing Architecture’, Routledge, London, 2003.
- V.S. Pramar, ‘Design Fundamentals in Architecture’, Somaiya Publications Private Ltd., NewDelhi, 1973.
- Yatin Pandya, ‘Elements of Space Making’, Mapin, 2008.
- Francis D.K. Ching, James F. Eckler, ‘Introduction to Architecture’, Wiley, 2012.
- Robert McCarter, JuhaniPallasmaa, ‘Understanding Architecture’, Phaidon 2012.
- Anthony C. Antoniades, ‘Poetics of Architecture: Theory of Design’, John Wiley and Sons,1992.

REFERENCES

1. Pierre von Meiss, ‘Elements of Architecture: From Form to Place’, Routledge, 1990.
2. Rudolf Arnheim, ‘The Dynamics of Architectural Form’, University of California Press 2009.
3. NeilsPrak, ‘The Language of Architecture’, De Gruyter Mouton, 2017.
4. Leland M.Roth, ‘Understanding Architecture, its Experience, History and Meaning’, Routledge, 2018.
5. Hazel Conway, ‘Understanding Architecture: An Introduction to Architecture and Architectural History’, Routledge, 2005.
6. Paul Alan Johnson, ‘The Theory of Architecture – Concepts and Themes’, Van Nostrand Reinhold Co., New York, 1994.
7. Kumar Vyas, ‘Design and Environment- A Primer’, National Institute of Design, 2009.

CO-PO Mapping

CO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	3	2	2	-	-	-	-	-	-	-	-
2	1	3	2	2	-	-	-	-	-	-	-	-
3	1	3	2	2	-	-	-	-	-	-	-	-
4	1	3	2	2	-	-	-	-	-	-	-	-
Avg.	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23102 INTRODUCTION TO LANGUAGE AND ENGLISH SKILLS L T P/S C
3 0 0 3

OBJECTIVES

- To give an introduction to the concepts and evolution of language in human society including its various expressions and functions
- To give basic skills of English language in everyday situations involving speaking, listening, reading, writing, presenting.
- To enable the use of language to think, express experience and communicate larger meaning.

UNIT I INTRODUCTION TO LANGUAGE AND LINGUISTICS 9

Communication in humans and animals. Language in humans– definition, function and hypotheses of evolution. Some concepts of language- Phonetics, Phonology, Morphology, Syntax, Semantics, Pragmatics.

UNIT II ENGLISH- SPEAKING AND LISTENING 9

Everyday communication and human interaction through language. Speaking and listening. Simple class exercises.

UNIT III ENGLISH- READING, WRITING, PRESENTING 9

Reading and writing. Language comprehension skills through reading and writing. Presenting information and ideas. Simple exercises.

UNIT IV LANGUAGE AS EXPRESSION AND COGNITION 9

Language as expression – poetry, prose, literature, etc., Cognitive function of language. Cognitive role of language in constructing reality, abstracting, projecting the future. Simple exercises.

UNIT V LANGUAGE AS DISCOURSE 9

Thinking, talking and writing about ideas and situations within a social context and conveying broader meaning and abstraction. Discourse, dialectic. Simple class exercises.

TOTAL: 45 PERIODS

COURSE OUTCOMES

CO1: An understanding of basic role of language in humans.
CO2: Skill and confidence in everyday requirements of the English language.
CO3: Ability to express experience, explore meaning and construct reality through language.

REQUIRED READING

- Sharon Hendenreich, ‘English for Architects and Civil Engineers’, Springer, 2014
- www.cambridgescholars.com
- www.robertdwatkins.com/Englishworkbook.pdf
- N. Chomsky, ‘Reflections on Language’, Fontana, 1975.
- Steve Pinker, ‘The Language Instinct’, Penguin, 2015.
- R.L. Trask, ‘Language and Linguistics: The Key Concepts’, Routledge, 2007.
- R.L. Trask, ‘Language: The Basics’, Routledge 1999

REFERENCES

1. Chris Mounsey, ‘Essays and Dissertation’, Oxford University Press, 2005.
2. Sidney Greenbaum, ‘The Oxford English Grammar’, Oxford University Press, 2005.
3. Krishna Mohan and Meera Banerji, ‘Developing Communication Skills’, 2nd edition, Laxmi
   Publications, 2009.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	3	-	2	-	-	-	-	-	-	-
2	-	-	2	-	3	-	-	-	-	-	-	2
3	-	-	3	-	3	-	-	-	-	-	-	2
Avg.	**-**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23103 **MATHEMATICS FOR ARCHITECTS** **L T P/S C**
3 0 0 3

OBJECTIVES

- To help derive solutions involving trigonometric and exponential functions in practical problems.
- To inform about three dimensional analytical geometry.
- To enable understanding of functions of more than one variable.
- To give information to solve differential equation of certain type.
- To enable data analysis and interpretation of results using statistical tools.

UNIT I TRIGONOMETRY AND MENSURATION 9

Trigonometric (sine, cosine and tan functions) and exponential functions. De- Moiver's theorem. Area of plane figures. Computation of volume of solid figures.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY 9

Direction cosines and ratios. 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 III INTEGRATION AND FUNCTIONS OF TWO VARIABLES 9

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 IV ORDINARY DIFFERENTIAL EQUATIONS 9

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.

UNIT V BASIC STATISTICS AND PROBABILITY 9

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

COURSE OUTCOME

CO1: Ability to understand the mathematical properties of geometric figures and objects.
CO2: Skill in solving mathematical problems that would be useful for the field of architecture.
CO3: Ability to analyse and interpret data.

REQUIRED READING

- Grewal B.S., 'Higher Engineering Mathematics', Khanna Publishers, New Delhi, 44th Edition, 2011.

REFERENCES

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

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	3	-	-	-	2	-	-	-	2	-	-
2	-	3	-	-	-	2	-	-	-	2	-	-
3	-	3	-	-	-	3	-	-	-	3	-	-
Avg.	**-**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

UC23H01 **தமிழர் மரபு** **L T P C**
1 0 0 1

அலகு I **மொழி மற்றும் இலக்கியம்**: **3**

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II **மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**: **3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III **நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**: **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV **தமிழர்களின் திணைக் கோட்பாடுகள்**: **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V **இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: **3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by:

International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

UC23H01 **HERITAGE OF TAMILS** **L T P C**
1 0 0 1

UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

AR23104 GEOMETRICAL UNDERSTANDING AND REPRESENTATION L T P/S C
1 0 3 4

OBJECTIVES

- To introduce geometrical understanding as one of the bases of architecture.
- To give an understanding of basic and derived geometry of form in terms of their generation and attributes.
- To give skills of representation of forms in terms of technical drawing and projections.

UNIT I **10**

Relation between geometry and form. Introduction to point, line, plane, solid. Definition of geometrical drawing. Drawing lines and angles. Drawing shapes/ planar surfaces - triangle, square, rhombus, rectangle, polygon, hexagon, etc). Drawing of circles, tangents, curves, conic sections (hyperbola, parabola, ellipse).

Construction of physical planar models of all the above. Viewing the physical planar models from different angles and sketching them with light and shade, shadow as a prelude to understanding the concepts of different types of projections and sciography. Introduction and explanation of terminologies - orthographic, isometric, axonometric, perspective projections and sciography.

UNIT II **20**

Drawing problems on orthographic, isometric and axonometric projections of lines and planes of different types in different positions. Sciography for the same.

Types of perspective projections- one point, two point, three point. Terminologies- picture plane, stationary point, vanishing point, cone of vision, eye level, etc., Methods of constructing perspectives.

Drawing perspective projections of simple planar surfaces/ shapes. Sciography for the same.

UNIT III **20**

Introduction to geometric solids- cube, prism, pyramids, cones, cylinders. Generation of geometric solids through construction of physical models from lines and planar surfaces (including concept of development). Construction of block models of solids. Viewing the models from different angles and sketching them with light and shade, shadow in order to understand them in different types of projections.

Drawing problems on orthographic, isometric and axonometric projection of solids of different types in different positions. Sciography for the same.

Perspective projection of simple solids. Sciography for the same.

UNIT IV **10**

Understanding sections of solid and true shape of sections through cutting of block models, viewing them from different angles and sketching them. Understanding simple intersection of solids and composite forms through making block models and viewing them from different angles and sketching them.

Simple drawing problems on orthographic, isometric and axonometric projection of the above.

TOTAL: 60 PERIODS

COURSE OUTCOME

CO1: Ability to understand the relationship between geometry and architectural form.

CO2: Understanding of various attributes of geometric forms and skill in their creation and dissection.

CO3: Ability to represent geometric forms through technical drawings.

REQUIRED READING

- Morris I.H., 'Geometrical Drawing for Art Students', Orient Longman, Madras, 2004.
- Francis D. K. Ching, 'Architectural Graphics', John Wiley and Sons, 2012.
- Natarajan K.V, 'A Textbook of Engineering Graphics', Dhanalakshmi Publishers, Chennai, 2006

REFERENCES

1. Leslie Martin C, 'Architectural Graphics', The Macmillan Company, New York, 1978.
2. Fraser Reekie, 'Reekie's Architectural Drawing", Viva Books Private Limited, 1999.
3. Roger Burrows, '3D Thinking in Design and Architecture', Thames and Hudson, 2018.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	3	1	-	-	1	-	-	-	2	-	-
2	-	3	2	-	-	2	-	-	-	2	-	-
3	-	3	3	-	-	3	-	-	-	3	-	-
Avg.	**-**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23105 ART AS COGNITION AND EXPRESSION L T P/S C
1 0 3 4

OBJECTIVES

- To give understanding of the role and importance of art as a means of understanding the world.
- To give skills in techniques and media of art.
- To enable expression of ideas, thoughts and experience through various visual modes both in terms of realism and abstraction.

UNIT I INTRODUCTION TO ART 10

Origin and evolution of art as human cognition, representation, expression. Role of art. Understanding representation in art - naturalistic, realistic, symbolic, stylistic, abstract, non-objective art, etc., through study of important works across history from different cultures of the world. Simple studio exercises in basic modes of representation through observation or thought.

UNIT II ART AS OBSERVATION AND RECORDINGOF HUMAN EXPERIENCE 20

Properties and uniqueness of different media for art. Studio exercises to observe and record the nature of simple indoor and outdoor subjects through techniques of line, colour, light and shade, texture, etc., using different media- drawing, sketching, painting, sculpture, watercolour, tempera, oil, acrylic, pencils, pastels, crayons, paper, canvas, brush, airbrush, pen and ink, mixed media, clay, Plaster of Paris, wire, papiermache.

UNIT III ART AS HEIGHTENED REPRESENTATION OF REALITY 15

Understanding role of art in heightening reality through accentuation of line, colour, light and shade, texture, emphasis, contrast, balance, etc., by the study of examples from world of art. Studio exercises to understand and bring out the essential characteristics of landscapes, people, places, built environment, situations and objects by heightened reality through appropriate ideas/ tools/techniques.

UNIT IV ART AS ABSTRACTION OF REALITY 15

The power and role of abstraction as a way of expressing experience and reality through understanding exemplary artists' works and art movements. Studio exercises in abstract expression of real environment, thoughts and emotions through any appropriate media and technique.

TOTAL: 60 PERIODS

COURSE OUTCOME

CO1: Sensitivity and knowledge of art as basic human endeavour.

CO2: Ability and skill to record experience through art.
CO3: Ability to abstract thought, observation and experience through art.

REQUIRED READING

- E.H. Gombrich, 'Art and Illusion', Phaidon, 2002.
- E.H. Gombrich, 'The Story of Art', Phaidon, 2002.
- ParthaMitter, 'Indian Art', Oxford University Press, 2001.
- Nathan Cabot Hale, ‘Abstraction in Art and Nature’, Dover, 2003.
- Robert L. Solso, ‘Cognition and the Visual Arts’, MIT Press, 1994.
- Webb, Frank, ‘The Artist Guide to Composition’, David and Charles, U.K., 1997.
- Francis Ching, ‘Drawing a Creative Process’, Van Nostrand Reinhold, New York,1990.
- Lucy Watson, ‘Complete Painting and Drawing Handbook’, DK Adult, 2009.
- JuhaniPallasma, ‘The Thinking Hand’, John Wiley, 2009.

REFERENCES

1. Bernard S. Myers, 'Understanding the Arts', Holt Rinehart and Winston Inc, 1964.
2. Fred, S. Kleiner, 'Gardener’s Art through Ages', Wadsworth Publishing, 2012.
3. John Dewey, ‘Art as Experience’, Penguin, 2005.
4. Wassily Kandinsky, Point and Line to Plane, Dover, 2013.
5. Alan Swann, Graphic Design School, Harper Collins, 1997.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	3	-	-	-	-	-	-	-	-	-
2	-	-	3	-	-	-	-	-	-	-	-	-
3	-	-	3	-	-	-	-	-	-	-	-	-
Avg.	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

NCC Credit Course Level 1*

UC23P01	(ARMY WING) NCC Credit Course Level - I	L	T	P	C
		2	0	0	2

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour 'Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL : 30 PERIODS

NCC Credit Course Level 1*

UC23P02	**(NAVAL WING) NCC Credit Course Level – I**	**L T P C** **2 0 0 2**
NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL : 30 PERIODS

NCC Credit Course Level 1*

UC23P03	**(AIR FORCE WING) NCC Credit Course Level – I**	**L T P C** **2 0 0 2**

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL : 30 PERIODS

AR23106 **FOUNDATIONAL DESIGN STUDIO** **L T P/S C**
0 0 9 9

OBJECTIVES

- To give an understanding of design as creating form towards a purpose at various scales.
- To enable exploration of the universal visual, experiential and cognitive aspects of design through engaging elements and principles of form.
- To give an insight into the ways in which form/ morphology and use/effect can come together.

CONTENT

Architecture as a discipline starts with morphology as the answer to questions and needs of human society. While the needs are multifarious, including shelter and comfort, social and psychological wellbeing, culture and meaning, expression of time and context, etc., the means are negotiated through the fundamentals of form in its various attributes. In the foundational studio, the exploration would be on understanding these fundamentals as universals as well as in terms of particular manifestations in specific cultural and temporal contexts. The word form here means all physical manifested aspects.

The explorations in the foundational studio would be of two types. One would be to understand and break down form to its component elements and principles in order to get insight into the most important aspects that give a totality of cognitive effect(perceptive, behavioural, cultural etc.,) or use (anthropometrics, activities, scale, etc.,).Design exploration would continue after this to create a form for use/effect. Another would be to explore component elements like point, line, planes, volume, shape, colour, texture light, pattern, etc., using principles such as balance, unity, dominance, transparency, proportion, scale, solid, void, fluidity, movement, fractal, order, chaos, gestalt, etc., This exploration could be an end in itself or could lead to the creation of a higher level of or composite form/design through using elements and principles in conjunction towards human need/ use (perceptive, behavioural, cultural, anthropometrics, activities, scale, etc.,).

The whole studio would be conducted through a series of related design exercises with multiple stages as well as standalone independent exercises. Observational/ analytical study and design exploration could go hand in hand or one could precede the other, based on the specific project. The exercises would be mediated through situations and contexts, historic and contemporary references, local or global character, aesthetics, basics of human response and behaviour, etc., Different media would be explored in 2D and 3D. The final exercise(s) would be focussed towards small product/ furniture/ architectural design/ component design in urban context, etc.,

TOTAL: 135 PERIODS

COURSE OUTCOME

CO1: Awareness of the totality and components of form in the creation of design.
CO2: Ability to explore the visual/ cognitive language and grammar of the universal elements and principles of design.
CO3: Ability to understand needs as encompassing functional, behavioural, cultural, experiential, etc.,
CO4: Ability to engage awareness towards creating a morphology that fulfils stated intents and needs.

REQUIRED READING

- Kumar Vyas, 'Design and Environment- A Primer', National Institute of Design, 2009.
- Pierre von Meiss, 'Elements of Architecture: From Form to Place', Routledge, 2014.
- James F. Eckler,' Language of Space and Form: Generative Terms for Architecture', Wiley, 2012.
- Owen Cappleman and Michael Jack Jordon, 'Foundations in Architecture: An Annotated Anthology of Beginning Design Project', Van Nostrand Reinhold New York, 1993.
- Charles Wallschlacgerm and Cynthia Busic-Snyder, 'Basic Visual Concepts and Principles for Artists, Architects and Designers', McGraw Hill, New York 1992.

- Victor Papanek, 'Design for the Real world, Human Ecology and Social Change', Chicago Review Press, 2005.

REFERENCES

1. Taiji Miyasaka, ‘Seeing and Making in Architecture: Design Exercises’, Routledge, 2013.
2. V.S. Pramar, ‘Design Fundamentals in Architecture’, Somaiya Publications, New Delhi, 1997.
3. Francis D. K. Ching, ‘Architecture: Form Space and Order’, Van Nostrand Reinhold Co., (Canada), 1979.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	2	2	3	-	-	-	-	-	-	1
2	3	3	2	2	3	-	-	-	-	-	-	1
3	3	3	2	2	3	-	-	-	-	-	-	1
Avg.	**3**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

SEMESTER II

AR23201 WORLD ARCHITECTURE AND URBANISM: EARLY CIVILISATIONS TO RENAISSANCE

L	T	P/S	C
3	0	0	3

OBJECTIVES

- To introduce the timeline and geography of evolution of human society in order to set the context for the study of architecture and urbanism across the ages.
- To give knowledge about early civilisations and their productions.
- To enable an understanding of the contributions of Classical Greece and Rome.
- To enable understanding of the intersecting forces in Europe such as religion, trade, technology, etc from the decline of Roman empire to the Medieval period and the resultant architecture and urbanism.
- To create awareness of the emergence of Renaissance and humanism in Europe and the resultant architecture and urbanism.

UNIT I PREHISTORY TO RIVER VALLEY CIVILISATIONS 6

Different ages of human history. Time line and geography of human civilisations. Elements and determinants of human settlements. Prehistoric habitats and art. River Valley civilisations of Nile, Indus, Tigris/Euphrates and Yellow river; their geographical context; their political, social, religious, cultural and economic systems; settlement patterns, dwellings and other buildings.

UNIT II PERSIA, GREECE AND ROME 10

Early Persian empire, its cities and architecture.

Origin of Greek civilisation. Nature of settlements and dwellings. Political, social, religious, cultural and economic systems. Greek philosophy. Greek polis and democracy. Evolution of the Greek temple and the building of the Acropolis. Public architecture - Theatre and Agora. Other building types. Optical illusions in architecture

Origin of Roman civilisation. Nature of settlements and dwellings. Political, social, religious, cultural and economic systems. Republic and Empire. Urban planning. Domestic architecture. Architecture as imperial propaganda. Forums and basilicas. Other building types. Structural forms: materials and techniques of construction spanning large spaces.

Political empires of Persia, Greece and Rome and their larger effects.

UNIT III JUDAISM, CHRISTIANITY AND ISLAM 9

Judaism and Christianity- Birth and geographic spread. Transformation of the Roman Empire. Early Christian worship and burial. Church planning-Basilican concept. Byzantine empire. Centralised plan concept in churches. Birth and spread of Islam in the first millennium. Outline of building types of Islam. Commonality in forms and ideas across Southern/ Eastern Europe and Western/ Central Asia.

UNIT IV MEDIEVAL EUROPE 10

Outline history of medieval Europe- Population explosion, feudalism and rural manorial life, development of trade/ commerce and medieval cities, rise of nation states and technology of warfare, religious aspects- papacy, monasticism and crusades. Art and architecture in Medieval Europe. Craft and merchant guilds. Domestic Architecture. Romanesque and Gothic architecture including development of vaulting. Late medieval Europe and its problems.

UNIT V RENAISSANCE IN EUROPE 10

Renaissance and Humanism in Europe, its causes and its various facets in society. Trade and exploration. Protestant Reformation. Cities and their transformation. Character and building types of Early Renaissance, High Renaissance, Mannerism, Baroque and Rococo. Renaissance in different nations. Works of Brunelleschi, Michelangelo, Christopher Wren, Andrea Palladio, Inigo Jones.

TOTAL: 45 PERIODS

COURSE OUTCOME

CO1: An overall understanding of the timelines and early history of civilisations and their contributions across the world.

CO2: Knowledge about the contributions of Greece and Rome to architecture and urbanism.

CO3: Familiarity with the intersecting forces in Europe from decline of Roman empire to Medieval times and their manifestation in cities and architecture.

CO4: An understanding of Renaissance and humanism and the resultant architecture and urbanism.

REQUIRED READING

- Ching, F. D. K., Jarzombek, M. and Prakash, V, 'A Global History of Architecture', 2nd Ed. John Wiley and Sons, 2010.
- Sir Banister Fletcher, 'A History of Architecture', CBS Publications (Indian Edition),1999.
- Spiro Kostof, 'A History of Architecture – Setting and Rituals', 2nd Ed, Oxford University Press, 1995.
- Leland M Roth, 'Understanding Architecture: Its Elements, History and Meaning', Westview Press, 2013.

REFERENCES

1. David Watkin, 'A History of Western Architecture', Laurence King Publishing, 2015.
2. Pier Luigi Nervi, General Editor, 'History of World Architecture Series', Harry N. Abrams, New York, 1972.
3. S. Lloyd and H.W. Muller, 'History of World Architecture – Series', Faber and Faber, London,1986.
4. Gosta, E. Samdstrom, 'Man the Builder', McGraw Hill Book Company, New York, 1975.
5. Vincent Scully, 'Architecture – The Natural and the Man Made', Harper Collins, 1991.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	-	-	-	-	-
2	-	2	-	3	2	1	-	1	-	-	-	-
3	-	2	-	3	2	1	-	1	-	-	-	-
4	-	2	-	3	2	1	-	1	-	-	-	-
Avg.	**-**	**1.5**	**-**	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23202	STRUCTURAL MECHANICS	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To understand principles of statics and analyze force systems using various theorems.
2. To determine reactions for simply supported beams under different loading conditions.
3. To calculate the properties of structural sections, including the center of gravity and moment of inertia.
4. To understand stress, strain, and the relationships between different elastic constants.
5. To analyze principal stresses and strains using numerical and graphical methods.

UNIT I FORCE SYSTEM 9

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.

UNIT II SUPPORTS AND REACTIONS 6

Types of loads on beams, Types of supports and reactions - Determination of reactions for simply supported beams subjected to point loads and uniformly loaded loads.

UNIT III SECTIONAL PROPERTIES 12

Properties of section – Centre of gravity, Moment of Inertia for various structural shapes. Radius of gyration. Theorem of the perpendicular axis. Theorem of parallel axis.

UNIT IV ELASTIC PROPERTIES AND CONSTANTS 12

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. Elastic constants. Elastic Modulus. Shear Modulus. Bulk Modulus. Poisson's ratio. Relation between elastic constants.

UNIT V COMPLEX STRESSES 6

Principal stresses and principal strains. Analysis by Numerical method and Mohr's diagram graphical method.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Apply principles of statics to solve for resultants and moments in force systems.
2. Determine reactions for simply supported beams under point and uniform loads.
3. Calculate the center of gravity and moment of inertia for various structural shapes.
4. Understand stress, strain, and calculate different elastic constants.
5. Analyze principal stresses and strains using Mohr's diagram and numerical methods.

REQUIRED READING

1. R.K. Bansal, 'A Text book on Engineering Mechanics', Lakshmi Publications, Delhi,2008.
2. R.K. Bansal, 'A textbook on Strength of Materials', Lakshmi Publications, Delhi 2010.
3. Paul W. McMullin, 'Jonathan S. Price, 'Introduction to Structures', Routledge, 2016.

REFERENCES

1. P.C. Punmia, ‘Strength of Materials and Theory of Structures; Vol. I’, Lakshmi Publications, Delhi 2018.
2. S. Ramamrutham, ‘Strength of Materials’,Dhanpatrai and Sons, Delhi, 2014.
3. W.A. Nash, ‘Strength of Materials’, Schaums Series, McGraw Hill Book Company,1989.
4. R.K. Rajput, ‘Strength of Materials’, S.K. Kataria and Sons, New Delhi , 2017.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	-	-	-	-	2	-	-	-	-	-	-
2	1	-	-	-	-	3	-	1	-	-	-	-
3	2	-	-	-	-	3	-	1	-	-	-	-
4	2	-	-	-	-	3	-	1	-	-	-	-
5	1	-	-	-	-	3	-	-	-	-	-	-
Avg.	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**1**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23203 ENVIRONMENTAL SCIENCE FOR ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasise on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarise about influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

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, 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: 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.

Introduction to the design of built environment with consideration of environment, ecosystems and biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 8

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.

Built environment and its relation to environmental pollution, both as a cause and as a response.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – 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 47 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.

The use of natural resources in architecture and the built environment through principles and case studies.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- 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.

Socially and environmentally sensitive design of built environment through case studies.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies. Architectural design and density.

TOTAL: 45 PERIODS

COURSE OUTCOME

CO1: Understanding of the functions of environment, ecosystems and biodiversity and their conservation.

CO2: Ability to identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society.

CO3: Understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

CO4: Familiarity with different forms of energy and apply them for suitable applications in for technological advancement and societal development.

CO5: Knowledge of societal activity on the long and short term environmental issues and abide by the legal provisions, National and International laws and conventions in professional and personal activities and to identify and analyse effect of population dynamics on human value education, consumerism and role of technology in environmental issues.

CO6: An understanding of the design of built environment with due consideration of environmental implications.

REQUIRED READING

- Anubha Kaushik and C. P. Kaushik, 'Perspectives in Environmental Studies', 6th Edition, New Age International Publishers (2018).
- Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2016).
- Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).

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 Encyclopedia', 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).
5. ErachBharucha,'Textbook of Environmental Studies for Undergraduate Courses', Orient Blackswan Pvt. Ltd, 2013.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	3	-	-	-	-
2	-	-	-	-	-	-	-	3	-	-	-	-
3	-	-	-	-	-	-	-	3	-	-	-	-
4	-	-	-	-	-	-	-	3	-	-	-	-
5	-	-	-	-	-	-	-	3	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High;

UC23H02 **தமிழரும் தொழில்நுட்பமும்** **L T P C**
1 0 0 1

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: **3**

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: **3**

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தித் தொழில் நுட்பம்: **3**

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்: **3**

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: **3**

அறிவியல் தமிழின் வளர்ச்சி –கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:

International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

UC23H02	TAMILS AND TECHNOLOGY	L T P C 1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age -Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period -Type study (Madurai Meenakshi Temple)-Thirumalai NayakarMahal -ChettiNadu Houses, Indo-Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies -Iron industry - Iron smelting, steel -Copper and gold-Coins as source of history - Minting of Coins – Beads making-industries Stonebeads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE ANDIRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompuof Chola Period,Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing -KnowledgeofSea -Fisheries – Pearl - Conche diving - Ancient Knowledge ofOcean -KnowledgeSpecificSociety.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCEBOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

AR23204 BUILDING COMPONENTS AND THEIR REPRESENTATION L T P/S C
1 0 3 4

OBJECTIVES

- To introduce the components of a typical building and their nomenclature.
- To introduce the concept of scale and enable understanding of a building through measured drawing.
- To give skills of representing physical characteristics of materials.
- To give skills in isometric and perspective projections of the measured building.

UNIT I INTRODUCTION TO BUILDING COMPONENTS AND THEIR NOMENCLATURE 12

Building as act of construction for human use layered over the earth - foundation, structural systems, enclosures, weather protection. Understanding building components and their nomenclature using historic and contemporary examples from literature study, site visits, sketches. The nomenclature to include 1) basic types of construction such as load bearing/framed/space structure 2) basic components in a building such as foundation, plinth, walls, floors, roofs(flat, sloped, vaulted),roof covering, ceilings, staircases (principles and different geometric types), doors, windows and ventilators, lintel, sunshade, coping, cornice, stringcourse, parapet, waterproofing, finishing, mortar, decoration, paving3) basic materials for the components.

UNIT II MEASURED DRAWING AND PROJECTIONS OF BASIC COMPONENTS 16

Introduction to concept of scale and measured drawing through basic components such as handrails, furniture, arches, etc., Orthographic (plan, elevation, section) and isometric projection of the simple components. Representation of different materials through rendering, Perspective projection of simple components.

UNIT III MEASURED DRAWING OF HISTORICAL BUILDING 18

Understanding a historic building in totality or in part through measuring drawing.

UNIT IV MEASURED DRAWING OF CONTEMPORARY BUILDING 14

Understanding a contemporary building in totality or in part through measuring drawing.

TOTAL: 60 PERIODS

COURSE OUTCOME

CO1: Ability to recognise and name components of a building.
CO2: Ability to measure and draw components of a building.
CO3: Ability to make isometric and perspective projections of components of a building.
CO4: Understanding a building in total or in part through the process of measured drawing.

REQUIRED READING

- Francis D. K. Ching, ‘Architectural Graphics’ John Wiley and Sons, 2009.
- Rendow Yee, ‘Architecture Drawing: A Visual Compendium of Types and Methods’, John Wiley and Sons, 2012.
- Francis D. K. Ching, Steven P. Juroszek, ‘Design Drawing’, John Wiley and Sons, 2010.

REFERENCES

1. John M. Holmes, ‘Applied Perspective’, 2nd edition, Sir Isaac, Pitman and Sons Ltd., London 1967.
2. Robert W. Gill, ‘Basic Perspective’, Thames and Hudson, London, 2006.
3. Leslie Martin C., ‘Architectural Graphics’, 2nd edition, The Macmillan Company, New York,1970.
4. Natascha Meuser, ‘Drawing for Architects: Construction and Design Manual’, Dom Pub, 2015.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	2	-	-	-	3	-	2	-	-	-	-
2	-	2	-	-	-	3	-	2	-	-	-	-
3	-	2	-	-	-	3	-	2	-	-	-	-
Avg.	-	**2**	-	-	-	**3**	-	**2**	-	-	-	-

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23205 THINKING THROUGH DIAGRAMS AND MODELS L T P/S C
1 0 3 4

OBJECTIVES

- To introduce diagrams and models as representation of reality and thought.
- To enable understanding of the important attributes of built environment through diagrams and models.
- To introduce how design thinking can be enhanced through diagrams and models.

UNIT I INTRODUCTION TO DIAGRAMS IN ARCHITECTURE 12

Introduction to idea of diagrams and models as basic representation of reality and thought. Historical evolution of diagrams and models in architecture with key examples from the past to the present, illustrating how attributes are identified and diagrammed for study and for design.

UNIT II UNDERSTANDING BUILT ENVIRONMENT THROUGH DIAGRAMS 18

Introduction to conventional functional diagramming such as activity, zoning, matrix, proximity chart, etc., Overview of diagrammable aspects of a building. Understanding key attributes of a real building through diagrammatic aspects. Exploring various methods to diagram the same building. Exploring different real buildings with the same methods to discern key differences in them.

UNIT III UNDERSTANDING BUILT ENVIRONMENT THROUGH MODELS 18

Model making as a tool to understand buildings through analogical thinking. Understanding different degrees of representations in models from the most realistic to the most abstract, based on purpose for which model is done. Techniques and materiality in model making.

UNIT IV DIAGRAMS AND MODELS AS AID TO DESIGN THINKING 12

Creating simple diagrams and models as proposition towards the future for an existing simple real life situation or for a future projection. The scale could range from macro to micro.

TOTAL: 60 PERIODS

COURSE OUTCOME

CO1: An understanding of diagrams and models as a mode of thought and analysis.
CO2: An ability to discern the important attributes of a building through diagrams and models.
CO3: Ability to project thoughts towards the future through diagrams and models.

REQUIRED READING

- Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
- Iain Fraser and Rod Henmi, 'Envisioning Architecture – An Analysis of Drawing, 1991',John Wiley and Sons, 1993.
- Alan F. Blackwell, 'Thinking with Diagrams', Springer, 2001.
- Nikolaus Gansterer, 'Drawing A Hypothesis: Figures of Thought', Springer, 2011.
- Neil Spiller, 'Visionary Architecture: Blueprints of the Modern Imagination', Thames and Hudson, 2008.
- Mo Zell, 'The Architectural Drawing Course', Thames and Hudson, 2017.
- Marc Treib, 'Drawing/Thinking Confronting an Electronic Age', Routledge, 2008.
- Mo Zell – The Architectural Design course, Understand the Principles and Master the Practices, Thames, and Hudson, 2008.

REFERENCES

1. Peter Cook, 'Drawing: The Motive Force of Architecture', Wiley, 2014.
2. JuhaniPallasma, 'The Thinking Hand', John Wiley, 2009.
3. Anthony Vidler, 'Diagrams of Diagrams: Architectural Abstraction and Modern Representation', Representations, No. 72. (Autumn, 2000), pp. 1-20.
4. Shin, Sun-Joo, Lemon, Oliver and Mumma, John, 'Diagrams', The Stanford Encyclopaedia of Philosophy, Winter 2018 Edition, Edward N. Zalta (ed.). https://plato.stanford.edu/archives/win2018/entries/diagrams/
5. Matt Bua, 'Architectural Inventions: Visionary Drawing of Buildings', Laurence King

Publishing, 2012.
6. Lorraine Farrelly, Representational Techniques, AVA, 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	3	-	2	-	-	-	-	-	-	-
2	2	3	3	-	1	-	-	-	-	-	-	-
3	1	3	3	-	3	-	-	-	-	-	-	-
Avg.	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23206 **BASIC SPACE DESIGN STUDIO** **L T P/S C**
0 0 9 9

OBJECTIVES

- To enable the understanding of the qualitative and quantitative aspects of basic space design for human use.
- To facilitate exploration of ways to address timeless aspects involved in the design of human built habitat in a micro scale.
- To enable a sensitivity towards the cultural, particular and temporal aspects of architecture.

CONTENT

Humans create and shape spaces/ forms for use. Use includes all aspects of human life-starting from containing the human as a unit (anthropometrics), the needs for carrying out of basic activities, spatial requirements for them, relationship between spaces, requirements of shelter, privacy, social and cultural factors, environmental response, psychological well being, light and air, meaning and symbolism, structure and economy, and so on. Architecture as a discipline brings all these needs together into a coherent totality through the act of conscious design. Conscious design involves the study/analysis of the existing and extrapolating towards the future through speculation.

In the Basic Space Design Studio, the focus would be on simple architectural design projects that would enable the learning of the fundamentals of space with respect to all the above. The projects would be based on small, everyday situations involving simple circulation, materials and use. It could a typology of private or public nature. Some suggestive projects are bedroom, bathroom, kitchen, shop, pavilion, creche, snack bar, residence, petrol bunk, fire station, bus stop. There would be a maximum of three projects.

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.

TOTAL: 135 PERIODS

COURSE OUTCOME

CO1: Ability to design simple spaces for human use addressing spatial, social, cultural and temporal human needs.

CO2: Ability to consider the particular context in the process of designing.

REQUIRED READING

- Kent C. Bloomer, Charles W. Moore, ‘Body, Memory and Architecture’, Yale, 1977.
- Gaston Bachelard, ‘Poetics of Space’, Beacon Press, 1994.
- JuhaniPallasmaa, 'The Eyes of the Skin - Architecture and the Senses', John Wiley,2012.
- Joseph De Chiara, Michael J Crosbie, ‘Time Saver Standards for Building Types’, McGraw Hill Professional 2001.
- Julius Panero, Martin Zelnik, ‘Human Dimension and Interior Space,’ Whitney Library of Design, 1975.
- Joseph De Chiara, Julius Panero, Martin Zelnik, Time Saver Standards for Interior Design and Space Planning, McGraw Hill 2017.

REFERENCES

1. Hideaki Hareguchi, A Comparative Analysis of 20th Century Houses, Academy Editions, 1988.
2. Sam F.Miller, Design Process: A Primer for Architectural and Interior Design, Van Nostrand Reinhold, 1995.
3. Ernst Neuferts Architects Data, Wiley, 2012.
4. Philip Plowright, ‘Revealing Architectural Design: Methods, Frameworks and Tools’, Routledge, 2014.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	2	2	2	3	2	-	2	-	-	-	1
2	3	2	2	2	3	2	-	2	-	-	-	1
Avg.	**3**	**2**	**2**	**2**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

SEMESTER III

AR23301 ARCHITECTURE IN INDIA: EARLY CIVILISATIONS TO COLONIALISM

L	T	P/S	C
3	0	0	3

OBJECTIVES

- 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 prominent modes of architecture in India 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 I EARLY INDIA AND ITS CULTURAL PRODUCTIONS 8

Overview of early history of the Indian subcontinent bringing out different conjectures. Indus Valley Civilisation 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 II ARCHITECTURE OF SOUTHERN INDIA 11

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 III ARCHITECTURE OF NORTHERN INDIA 8

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

UNIT IV INTRODUCTION TO ISLAMIC ARCHITECTURE AND EARLY ISLAMIC ARCHITECTURE IN INDIA 8

Brief history of Islam. Islamic architecture of the world as rising from Islam as a socio-cultural and political phenomenon. 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 political history of Islam in India. Evolution of Islamic architecture under the Delhi Sultanate - Slave, Khaji, Tughlaq, Sayyid and Lodi dynasties. Study of important monuments. Early Islamic architecture of Punjab.

UNIT V REGIONAL ISLAMIC ARCHITECTURE, MUGHAL ARCHITECTURE AND AFTER 10

Spread of Islam into other regions of India and their architectural expressions - Gujarat, Bengal, Malwa and the Deccan. Study of important monuments.

Political History of the Mughals. Mughal architecture and urbanism under Humayun, Akbar,

Shahjahan and Aurangazeb. Study of important monuments.

Outline of Post Mughal Islamic architecture. Outline of architecture related to Islam in Tamil Nadu.

TOTAL: 45 PERIODS

COURSE OUTCOME

CO1: An understanding of the diversity of architecture in India and sensitivity towards its syncretic aspects.
CO2: Ability to appreciate particular cultural, symbolic, spatial and material qualities in architecture and cities as givers of meaning and continuity.
CO3: Ability to appreciate universal qualities of architecture and their effects.

TEXTBOOKS

1. Percy Brown, 'Indian Architecture (Buddhist and Hindu Period)', Taraporevala and Sons, Bombay, 2014.
2. Percy Brown, 'Indian Architecture (Islamic Period)', Taraporevala and Sons, Bombay, 2014.
3. Christopher Tadgell, 'The History of Architecture in India - From the Dawn of Civilization to the End of the Raj', Phaidon, 2002.
4. Robert Hillenbrand, 'Islamic Architecture - Form, Function and Meaning', Columbia University Press, 2004
5. RomilaThapar, 'The Penguin History of Early India', Penguin, 2015.
6. Burton Stein, A History of India, John Wiley and Sons, 2010.
7. K.A. NilakantaSastri, 'A History of South India: From the Prehistoric Times to the Fall of Vijayanagar', Oxford University Press, 2007.

REFERENCES

1. George Michell, 'The Hindu Temple', University of Chicago Press, 1988.
2. Stella Kramrisch, 'The Hindu Temple', MotilalBanarsidass, Vol I 2002,Vol II1996.
3. Satish Grover, 'Buddhist and Hindu Architecture in India', CBS, 2008.
4. Satish Grover, 'Islamic Architecture in India', CBS, 2012.
5. Catherine Asher, 'Architecture of Mughal India', Cambridge University Press, 2001.
6. Ananda K. Coomaraswamy, 'The Dance of Siva: Essays on Indian Art and Culture', Rupa Publications, 2013.
7. A.L. Basham, 'The Wonder that was India', Picador, 2004.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	-	-	3	2	-	-	-	-	-	-	-
2	1	-	-	3	2	-	-	-	-	-	-	-
3	2	-	-	3	2	-	-	-	-	-	-	-
Avg.	**1.99**	**-**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23302	STRUCTURAL SYSTEMS AND ANALYSIS	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To understand the different types of loads acting on structures and their impact on load flow and distribution.
2. To estimate the shear force and bending moment in various types of beams based on support conditions.
3. To determine the deflection and slope in beams using different analytical methods.
4. To understand the behavior of columns under axial and eccentric loads and apply relevant stability formulas.
5. To analyze statically determinate and indeterminate structures, including frames and trusses, using appropriate methods.

UNIT I LOADS AND LOAD DISTRIBUTION 4

Types of Load - Gravity, Wind, Dead, Live Load, Numerical Problems. Introduction to structural systems, Load flow and distribution. Concept of load distribution for structural systems and overall stability like a) One way slab b) Two way slab c) Arches d) portal frames e) Space Structures.

UNIT II BENDING OF BEAMS 12

Classification of beams based on support condition. Shear force and bending moment diagrams for simply supported, cantilever and overhanging beams. Theory of simple bending. Stress distribution at a cross section due to bending moment and shear for Rectangular, I and T sections. Concept of Flitched beams (no mathematical calculation).

UNIT III DEFLECTION OF BEAMS 12

Relation between slope, deflection and curvature. Determination of deflection and slope for simply supported and Cantilever beams using Double Integration Method, Macaulay's method and Moment Area Method. Simple problems.

UNIT IV COLUMNS 6

Columns- Concept of Axial and eccentric loads on columns. Combined effects of axial load and bending. Euler’s formula for axially loaded and eccentrically loaded columns and Rankine formula for axially loaded columns. Simple problems.

UNIT V STATICALLY DETERMINATE AND INDETERMINATE STRUCTURES 11

Introduction. Determination of degree of statical indeterminacy for beams and frames. Advantages and disadvantages of statically indeterminate structures. Concept of Perfect frames and imperfect frames and trusses, analysis by method of joints and method of sections, of simply supported and cantilever trusses. Method of Moment distribution for continuous beams and Single portal frames. Application to simple problems.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Classify different types of loads and explain their effects on structural stability.
2. Create shear force and bending moment diagrams for simply supported, cantilever, and overhanging beams.
3. Calculate the deflection and slope in beams using Double Integration Method, Macaulay's Method, and Moment Area Method.
4. comprehend the combined effects of axial load and bending on columns and apply Euler’s and Rankine’s formulas.
5. Display proficiency in analyzing perfect and imperfect frames and trusses, as well as determining the degree of statical indeterminacy in structures.

TEXT BOOKS

1. R.K. Bansal, 'A Text Book on Strength of Materials', 6th Edition, Laxmi Publications, New Delhi, 2018.
2. B.C. Punmia et al, 'SMTS-I, Strength of Materials', 10th Edition, Laxmi Publications, 2018.
3. Paul W. McMullin, Jonathan S. Price, 'Introduction to Structures, Routledge, 2016.

REFERENCES

1. M.M. Ratwani and V.N. Vazirani, 'Analysis of Structures, Vol. 1 ', Khanna Publishers, Delhi, 2015
2. M.M. Ratwani and V.N. Vazirani, 'Analysis of Structures, Vol. 2 ', Khanna Publishers, Delhi, 2015.
3. Timoshenko, S.P. and D.H. Young, 'Elements of Strength of Materials', 5th edition, East West Press, 2011.
4. A.R. Jain and B.K. Jain, 'Theory and Analysis of Structures', Vol. 1, Nemchand and Bros, Roorkee, 1987.
5. R.K. Rajput, 'Strength of Materials', S.Chand, 2015.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	3	-	-	-	1	-	-	-	-	-	-
2	-	3	-	-	-	1	-	-	-	-	-	-
3	-	3	-	-	-	1	-	-	-	-	-	-
4	-	3	-	-	-	1	-	-	-	-	-	-
5	-	3	-	-	-	1	-	-	-	-	-	-
Avg.	**-**	**3**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23303	CLIMATE AND BUILT ENVIRONMENT	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To introduce the climate and concept of human comfort.
2. To inform about the effects of sky and sun on the earth and buildings.
3. To inform about the effects of wind and air with respect to siting and design of buildings.
4. To inform about principles of daylighting in architecture.
5. To understand architecture as a response to the environment in totality, including climate, sun, sky, wind, lighting, vegetation, microclimate.

UNIT I CLIMATE, HUMAN COMFORT AND HEAT 9

Climate and Civilisation. Components and characteristics of climate. Classification of climate for building designers in tropics. Human body heat balance and heat loss. Effects of climatic factors on human body heat loss. Effective temperature, human thermal comfort. Parameters of adaptive thermal comfort, and visual comfort with daylighting for well-being of occupants - the study of climatic parameters, climatic analysis; Use of C. Mahoney's tables.

UNIT II BUILDING RESPONSE TO SUN AND SKY 15

Movement of sun. Locating the position of the sun. Sun path diagram. Azimuth and altitude angles. Overheated period. Solar shading. Shadow angles. Exercise in the design of shading devices through models/ calculations/ drawings/ software. Concepts and principles of daylight in buildings- transmission, reflection, glare, daylight factor, room proportion, opening size and distribution.

UNIT III HEAT FLOW THROUGH BUILDING ENVELOPE- CONCEPTS 6

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 heat flow through building envelope involving calculations. through use of measurement instruments to assess the performance of materials, assemblies, and buildings. Demonstration of software for design analysis.

UNIT IV AIR MOVEMENT AND BUILDINGS 9

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

UNIT V ENVIRONMENT AND DESIGN OF BUILDINGS 6

Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates. Introduction to all software and measurement tools and to assess compliance with performance standards and codes. Understanding through case studies and site visits.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Analyse climate components and human thermal comfort for occupant well-being.
2. Evaluate sun movement and shading devices to optimise natural lighting and reduce glare.
3. Apply heat transfer concepts to design efficient building envelopes.
4. Investigate air movement and ventilation principles for natural airflow in buildings.
5. Develop design strategies for different climates, using tools to meet performance standards.

TEXT BOOKS

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.
3. Benjamin H. Evans, 'Day lighting in Architecture', Mcgraw Hill, 1981.

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, NewYork,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, 2017.
6. Fergus Nicol, Hom Bahadur Rijal, Susan Roaf,' Routledge Handbook of Resilient Thermal Comfort' Taylor & Francis, 2012.
7. https://www.teriin.org/sites/default/files/2021-11/Thermal-Comfort-Prescription.pdf

CO - PO MAPPING

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	-	-	-	-	-	2	-	3	-	-	-	-
2	-	-	-	-	-	2	-	3	-	-	-	-
3	-	-	-	-	-	2	-	3	-	-	-	-
4	-	-	-	-	-	2	-	3	-	-	-	-
5	-	-	-	-	-	2	-	3	-	-	-	-
Avg.	-	-	-	-	-	2	-	3	-	-	-	-

'1' = Low; '2' = Medium; '3' = High

UC23U01 **UNIVERSAL HUMAN VALUES** **L T P C**
1 0 2 2

COURSE OBJECTIVE:

The objective of the course is four-fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Module I: Introduction **(3L,6P)**

Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration– Its content and process; 'Natural acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Practical Session: *Include sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking*

Module II: Harmony in the Human Being **(3L,6P)**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.

Practical Session: *Include sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.*

Module III: Harmony in the Family and Society **(3L,6P)**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual

happiness; Trust and Respect as the foundational values of relationship, Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Practical Session*: Include sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives*

Module IV: Harmony in the Nature and Existence (3L,6P)

Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature, Understanding Existence as Co-existence of mutually interacting units in all- pervasive space, Holistic perception of harmony at all levels of existence.

Practical Session: *Include sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.*

Module V: Implications of Harmony on Professional Ethics (3L,6P)

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations, Sum up.

Practical Session: *Include Exercises and Case Studies will be taken up in Sessions E.g. To discuss the conduct as an engineer or scientist etc.*

TOTAL: 45 (15 Lectures + 30 Practicals) PERIODS

COURSE OUTCOME:

By the end of the course, the students will be able to:

1. Become more aware of themselves, and their surroundings (family, society, nature);
2. Have more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

3. Have better critical ability.
4. Become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. Apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

REFERENCES:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 3rd revised edition, 2023.
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
4. The Story of Stuff (Book).
5. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
6. Small is Beautiful - E. F Schumacher.
7. Slow is Beautiful - Cecile Andrews.
8. Economy of Permanence - J C Kumarappa
9. Bharat Mein Angreji Raj - PanditSunderlal
10. Rediscovering India - by Dharampal
11. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
12. India Wins Freedom - Maulana Abdul Kalam Azad
13. Vivekananda - Romain Rolland (English)
14. Gandhi - Romain Rolland (English)

Web URLs:

1. Class preparations: https://fdp-si.aicte-india.org/UHV-II%20Class%20Note.php
2. Lecture presentations: https://fdp-si.aicte-india.org/UHV-II_Lectures_PPTs.php
3. Practice and Tutorial Sessions: https://fdp-si.aicte-india.org/UHV-II%20Practice%20Sessions.php

Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1	1	1	3			3
CO2						1	1	1	3			3
CO3						3	3	2	3		1	3
CO4						3	3	2	3		1	3
CO5						3	3	3	3		2	3

AR23304 BUILDING CONSTUCTION WITH BASIC MATERIALS L T P/S C

1 0 3 4

OBJECTIVES

- To introduce basic building materials including lime, mud, stone, brick and thatch.
- To give knowledge about building construction using the above materials.
- To facilitate in the design of buildings using wood and wood based materials

UNIT I LIME, MUD AND STONE 18

Lime as basic binding material/mortar. Extracting, slaking, hardening, storage, precautions in handling. Lime putty. Lime as finishing material. Lime based finishing materials and products.

Mud as basic material for construction, Mud plaster and mortar. Types of soil and soil stabilisation. Mud products- stabilised blocks, etc., Mud walls construction - cob, rammed earth, wattle and daub, adobe, compressed stabilised earthen blocks. Foundation and plinth for mud structures. Damp and weatherproofing of mud structures. Mud flooring. Mud domes.

Stone in building construction. Sources, characteristics selection, seasoning, dressing, testing, deterioration, preservation and durability of stone.

Basic principles of masonry with stone. Different types of stone masonry walls. Mortar, plastering, pointing and finishes for stone masonry. Structural use of stone masonry in foundation, walls, piers, columns, arches and lintels. Masonry integrated elements such as openings, cornices and copings. Structural use of stone for beams and slabs.

Understanding all the above through sketches/ drawing/ models/ product catalogues/site visits. Drawings of typical examples.

UNIT III BRICK AND CLAY PRODUCTS 18

Outline manufacture of brick. Types of brick and clay products in building construction. Brick for masonry walls. Roof tiles- pan/ pot tiles, Mangalore pattern tiles. Flooring and paving- brick tiles, clay tiles, ceramic tiles and vitrified tiles.

Basic principles of masonry with brick. Types of brick bonding. Mortar, plastering, pointing and finishes for brick masonry. Structural use of brick masonry in foundation, walls, piers, columns, arches and lintels. Masonry integrated elements such as openings, cornices and copings. Structural use of stone for beams and slabs. Structural use of brick for roofing as Madras Terrace.

Introduction to innovative and composite construction using brick and clay products - prefabricated brick panels, precast curved brick arch panels, reinforced brick/ reinforced brick concrete slabs, prefabricated floor/ roof using structural clay units, Hourdi block roofing,

Understanding construction principles and procedures through sketches/ drawings/ models / site visits/ documentation. Drawings of typical examples.

UNIT III STRAW AND THATCH IN BUILDING CONSTRUCTION 12

Straw and thatch as building materials. Physical aspects. Properties with respect to fire, moisture, insects and pests. Thatch and straw bale roofing details.

Understanding construction principles and procedures through sketches/ drawings/ models / site visits/ documentation.

UNIT IV DESIGN AND DETAILING USING BASIC MATERIALS 12

Innovative design and detailing of a small and simple structure for a specific purpose using basic materials applying the knowledge of materials and construction principles studied in the previous units. Design to be submitted in the form of sketches/ drawings/ detailing/ model.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Familiarity with the properties and uses of some basic building materials.

CO2 Knowledge about the construction details of the materials for structural and non structural use.

CO3 Ability to design and detail buildings using 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, 2013.
3. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
4. S.K.Sharma, 'A Text book of Building Construction', S. Chand and 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, 2017.

REFERENCES

1. American Institute of Timber Construction (AITC), 'Timber Construction Manual', Wiley Publishers, 2004.
2. Francis D.K Ching, 'Building Construction Illustrated', John Willey and Sons, 2014.
3. Willis H Wagner and Howard Bud Smith, 'Modern Carpentry', Good Heart–Wilcox Publishers, Portland, 2007.
4. Barry, 'Construction of Buildings, Volume 1and2', Blackwell Publishing Ltd., Oxford, 2005.
5. S.P Arora and S.P Bindra, 'A Text Book of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd, 2010.

CO-PO Mapping

CO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	-	-	-	-	3	-	2	-	-	-	-
2	1	-	-	-	-	3	-	2	-	-	-	-
3	2	-	-	-	-	3	-	2	-	-	-	-
Avg.	**2**	**-**	**-**	**-**	**-**	**3**		**2**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23305	SITE SURVEYING AND PLANNING	L	T	P/S	C
		1	0	3	4

OBJECTIVES

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

UNIT I INTRODUCTION TO SITE AND SITE SURVEYING 15

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 centre-line 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 CONTEXT AND ANALYSIS 15

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, differential vulnerabilities to physical, social and economic risks of climate change and analysis of risk maps. etc., especially in the context of large scale projects. Understanding the above through real projects/ case studies.

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 and composite analysis methods. Predicted and Understanding the above through real projects/ case studies.

UNIT III PRINCIPLES OF SITE LAYOUT AND DEVELOPMENT 15

Organisation 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. Adaptation and Resilience strategies such as heat action plans, resilience facilities, thermal protection, microclimate improvement and flood management.
Understanding the above through real projects/ case studies.

UNIT IV EXERCISE IN SITE SURVEYING AND PLANNING 15

Application of all the knowledge gained in previous units through a real/ hypothetical project involving a real site. The process would involve choosing a 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: 60 PERIODS

OUTCOMES

1. Apply various surveying methods and tools to measure and plot site data accurately.
2. Analyse site context and factors such as topography, hydrology, climate, and infrastructure for informed design decisions.
3. Design site layouts incorporating circulation, drainage, utilities, and vegetation to optimise functionality and microclimate.
4. Evaluate the impact of building developments on the environment and assess risks like traffic, pollution, and climate change.
5. Execute a comprehensive site surveying and planning project, integrating field measurements, analysis, and schematic development.

TEXT BOOKS

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 and Sons, 2013.
3. P.B. Shahani, 'Text of Surveying Vol.I', Oxford and IBH Publishing Co, 1980
4. 'Development Control Rules', CMDA 2008.
5. Genevieve S. Baudoin, 'Interpreting Site: Studies in Perception, Representation, and Design', Routledge, 2015.
6. R.K.Pachauri, ‘Dealing with Climate Change: Setting a global agenda for mitigation and adaptation’, The Energy and Resources Institute (TERI), 2010. Madan Kumar Jha, ‘Natural and Anthropogenic Disasters: Vulnerability, Preparedness and Mitigation’, Springer, 2016.

CO - PO MAPPING

CO						PO						
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	-	-	-	-	2	3	3	-	-	-	-
2	2	-	-	-	-	2	3	3	-	-	-	-
3	2	-	-	-	-	2	3	3	-	-	-	-
4	2	-	-	-	-	2	3	3	-	-	-	-
5	2	-	-	-	-	2	3	3	-	-	-	-
Avg.	**2**	**-**	**-**	**-**	**-**	**2**	**3**	**3**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23306 ADVANCED SPACE DESIGN STUDIO L T P/S C
0 0 9 9

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), lighting and ventilation, 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

COURSE OUTCOMES:

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

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, 1962.
4. Kent C. Bloomer and Charles W. Moore, 'Body, Memory, and Architecture', Yale University Press, 1977.
5. JuhaniPallasmaa, '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', Society for College and University Planning ,1996
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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	2	2	2	3	2	1	2	-	-	-	1
2	3	2	2	2	3	2	1	2	-	-	-	1
Avg.	**3**	**2**	**2**	**2**	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

SEMESTER IV

AR23401	REGIONAL AND VERNACULAR BUILT ENVIRONMENTS IN INDIA	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To introduce the nature of evolution/ determinants of human settlements.
2. To give an understanding of regional manifestations in settlements and architecture as evolving from contextual forces.
3. To give familiarity to the methods and approaches for the study of regional/ vernacular built environments.
4. To study the important manifestations of regional/ vernacular architecture and settlements in different regions of India.

UNIT I HUMAN SETTLEMENTS AND THEIR DETERMINANTS 6

Determinants of morphology of human settlements – climate, culture, socio-economic aspects, geography, etc, Differentiating between rural and urban settlements. Overview of settlement evolution in India. Relation between settlement morphology and architecture. Discussion of the terms traditional architecture, regional architecture, indigenous architecture, vernacular architecture, etc.,

UNIT II STUDY OF VERNACULAR/ REGIONAL ARCHITECTURE 6

Vernacular/ regional architecture as a process and responsive design. Concepts, approaches, survey and study of vernacular/ regional architecture -aesthetic, architectural, anthropological, etc., General aspects to be studied in vernacular/ regional architecture of India –climatic response, forms, spatial planning, socio-cultural aspects, symbolism, colour, art, materials of construction and construction technique, water and sewage management etc.,

UNIT III SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF GUJARAT AND RAJASTHAN 12

Determinants and morphology of rural and urban settlements in Gujarat. Vernacular/ regional architecture of Gujarat as particular productions. Determinants and morphology of rural and urban settlements in Rajasthan. Vernacular/ regional architecture of Rajasthan as particular productions.

UNIT IV SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF KASHMIR AND BENGAL 9

Determinants and morphology of settlements in Kashmir. Vernacular/ regional architecture of Kashmir as particular productions. Determinants and morphology of settlements in Bengal. Vernacular/ regional architecture of Bengal as particular productions. Colonial and modern influences.

UNIT V SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF TAMIL NADU AND KERALA 12

Determinants and morphology of settlements in Kerala. Vernacular/ regional architecture of Kashmir as particular productions. Determinants and morphology of rural and urban settlements in Tamil Nadu. Vernacular/ regional architecture of Tamil Nadu as particular productions. Colonial and modern influences.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Identify factors influencing settlement morphology and differentiate rural and urban settlements.

2. Analyse Indian vernacular architecture for climatic, spatial, socio-cultural, and construction aspects.
3. Evaluate settlement morphology and regional architecture of Gujarat and Rajasthan.
4. Assess settlement morphology and regional architecture of Kashmir and Bengal, including colonial influences.
5. Examine settlement morphology and regional architecture of Tamil Nadu and Kerala

TEXT BOOKS

1. Bernard Rudofsky, 'Architecture without Architects', University of New Mexico Press, 1987.
2. Paul Oliver, 'Encyclopedia of Vernacular Architecture of the World', Routledge, 2007.
3. Amos Rapoport, 'House, Form and Culture', Prentice Hall Inc. 1969.
4. Carmen Kagal, 'Vistara- The Architecture of India', The Festival of India, 1986.

REFERENCES

1. Kosambi D.D, 'The Culture and Civilisation of Ancient India in Historical Outline', Vikas,1997.
2. R W Brunskill, 'Illustrated Handbook on Vernacular Architecture', Faber and Faber, 2000.
3. V.S. Pramar, 'Haveli – Wooden Houses and Mansions of Gujarat', Mapin, 1989.
4. Kulbushanshan Jain and Minakshi Jain, 'Mud Architecture of the Indian Desert', Aadi Centre, Ahmadabad, 1992.
5. G.H.R. Tillotson, 'The Tradition of Indian Architecture: Continuity, Controversy, Change since 1850', Oxford University Press, Delhi, 1989.
6. S. Muthiah et al, 'The Chettiar Heritage', Chettiar Heritage, 2017.
7. Weber. W and Yannas. S, 'Lessons from Vernacular Architecture', Routledge, 2014.
8. Kalyan Kumar Chakravarthy, Gyani Lai Badam, Vijay paranjpye “Traditional Water Management Systems of India" ,Aryan books International, 2007.

CO-PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	3	-	-	-	2
2	-	-	-	3	2	-	-	3	-	-	-	2
3	-	-	-	3	2	-	-	3	-	-	-	2
4	-	-	-	3	2	-	-	3	-	-	-	2
5	-	-	-	3	2	-	-	3	-	-	-	2
Avg.	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23402	STRUCTURAL DESIGN OF MASONRY AND TIMBER	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To understand and compare different design methods, with a focus on the advantages of the limit state method over others.
2. To analyze and design masonry walls, both with and without openings, under various loading conditions.
3. To introduce the principles of reinforced masonry design and solve basic design problems.
4. To understand the design concepts, forces, and stability considerations for masonry retaining walls.
5. To learn the grading and permissible stresses of timber and design solid and built-up timber beams, columns, and trusses.

UNIT I DESIGN METHODS - INTRODUCTION 6

Concept of elastic method, Ultimate load method and limit state method. Advantages of limit state method over other methods. Serviceability limit states, ultimate limit states, characteristic loads and characteristic strengths. Soil bearing capacity and stability.

UNIT II BASIC MASONRY DESIGN 9

Analysis and design of masonry wall with and without openings. Use of nomograms. Design of masonry wall subjected to combined action of axial load and bending

UNIT III REINFORCED MASONRY DESIGN 9

Introduction to reinforced masonry design. Simple problems.

UNIT IV RETAINING WALLS 9

Terminology of retaining walls. Forces on retaining walls. Design concept of masonry retaining wall.

UNIT V DESIGN OF TIMBER BEAMS AND COLUMNS 12

Grading of timber. Permissible stresses. Design of solid timber beams. Madras terrace roof design. Design of solid timber columns. Built-up Column. Spaced Column.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Understand and compare elastic, ultimate load, and limit state methods, focusing on the advantages of the limit state method.
2. Analyse and design of masonry walls, subjected to axial load and bending.
3. Apply the principles of reinforced masonry design to solve basic structural problems.
4. Estimate the forces on masonry retaining walls considering soil bearing and stability.
5. Design timber beams, columns, and trusses, including Madras terrace roofs.

TEXT BOOKS

1. P. Dayaratnam and P. Saraha, ‘Brick and Reinforced Brick Structures’,Medtech, 2018.
2. A. S. Arya, ‘Structural Design in Steel, Masonry and Timber’,Nemchand and Bros, Roorkee, 1978.
3. B. C. Punmia, Ashok Kumar Jain , Arun Kumar Jain, ‘Comprehensive Design of Steel Structures’, Laxmi Publications (P) Ltd, 2014.
4. K. S. Jagadish, ‘Structural Masonry’, 3rd Edition, Wiley, 2021.
5. Harbhajan Singh, ‘Design of Masonry and Timber Structure with Earthquake Resistant Measures’, Abhishek Publications, 2015.

REFERENCES

1. National Building Code of India, Part VI, Structural Design,1983.
2. IS 883 – Code of Practice for Design of Structural Timber in Buildings.
3. IS 1905- Code of Practice for Structural use of Unreinforced Masonry-1987.
4. SP 10- Nomograms for Thickness of Masonry Walls – 1975
5. Arun Menon, NPTEL course on Design of Masonry Structures.

CO-PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	1	-	-	-	3	-	-	-	-	-	-
2	-	1	-	-	-	3	-	-	-	-	-	-
3	-	1	-	-	-	3	-	-	-	-	-	-
4	-	1	-	-	-	3	-	-	-	-	-	-
5	-	1	-	-	-	3	-	-	-	-	-	-
Avg.	**-**	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23403 WATER SUPPLY AND SANITATION IN BUILDINGS L T P/S C
3 0 0 3

OBJECTIVES

- To introduce and give knowledge about the different environmental services for human environment- water supply, sewerage, drainage, waste management and plumbing systems.
- To give familiarity about sustainable practices and systems for environmental services.
- To enable the conceptual design of small buildings/ campuses for environmental services.

UNIT I WATER SUPPLY 10

Water supply system at macro level - sources, pumping, reservoirs, water treatment, tanks, piping systems and materials. Quantitative and qualitative requirements of water for different activities in a small building/campus of simple typologies. Overhead tanks, underground sumps, fire fighting storage, water meter, R.O. Plant, water heating systems, solar water heaters, fixtures and fittings for a small building/ campus. Design calculations for the same and related mechanical equipment. Sustainable practices and systems.
Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT II SEWERAGE 10

Sewage and sullage. Sewerage systems. Different types/stages of sewage treatment at city level. Sewer line, gradients, manholes, inspection chambers. One pipe/ two pipe plumbing systems. Sewage treatment at campus/ building level -sewage treatment plants, septic tank, leach pits. Sustainable practices and systems.
Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT III DRAINAGE AND WASTE MANAGEMENT 6

Storm water drains at city level. Types of pipe. Storm water gutter. Drainage systems in small building/campus. Roof drainage. Rain water harvesting and storage sumps. Sustainable practices and systems.
Solid waste- types, segregation and refuse collection. Disposal - Incinerator, composting, vermicomposting, sanitary land filling, bio gas system, modern renewable energy system. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT IV PLUMBING SYSTEMS IN BUILDINGS 9

Basic principles of plumbing. Plumbing, sanitary fittings and their requirements for a small building - wash basins, water closets, urinals, bidets, sinks, gate valve, float valve, flap valve, ball valve, flush valve, etc, different types of taps, faucets, stop cocks, bib cocks, ‘P’, ‘Q’, ‘S’, floor/bottle traps.
Understanding of products, product catalogues, service drawings. Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT V DESIGN FOR ENVIRONMENTAL SERVICES 10

Site planning, building and room design principles for water supply, sewage and storm water in an integrated manner for a small building and campus. Understanding of service drawings. Site visits and documentation in the form of sketches/ drawings/ photos. Conceptual design for a small building.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Ability to understand environmental services from macro to micro level human environment.
CO2 Ability to adopt sustainable practices and systems for environmental services.
CO3 Ability to design environmental services in a building/ small campus.

TEXTBOOKS

1. 'Manual of Water Supply and Treatment', II Edition, CPHEEO, Ministry of Works and Housing, New Delhi, 1999.
2. AFE Wise, JA Swaffied Water, 'Sanitary and Waste Services in buildings', V Edition,

Mitchell Publishing, Co. Ltd., 2002.
3. Punmia B.C, 'Waste Water Engineering', Laxmi Publications, 2009.
4. Arceivala S.J, 'Waste Water Treatment for Pollution Control', Tata McGraw Hill, 2008.
5. 'National Building Code', Bureau of Indian Standards.
6. '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 and Sons, Inc. New York, 2010.
2. S.C.Rangwala, 'Water Supply and Sanitary Engineering', Charotar Publishing House, 2016.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	2	3	-	-	-	-	-
2	-	-	-	-	-	2	3	-	-	-	-	-
3	-	-	-	-	-	2	3	-	-	-	-	-
AVG	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23404	WOOD IN BUILDING CONSTRUCTION	L	T	P/S	C
		1	0	3	4

OBJECTIVES

1. To give introduction to bamboo and timber as a material for construction.
2. To give knowledge about construction using bamboo and timber.
3. To facilitate the design of buildings using bamboo, timber and engineered timber based materials.

UNIT I BAMBOO IN BUILDING CONSTRUCTION 12

Bamboo- anatomy, properties, strength, processing, harvesting. Working with bamboo. Treatment, preservation and uses of bamboo.

Joints in Bamboo. Framed construction for walls and floors. Techniques of construction of roofs with bamboo. Finishes for construction of all the above.

UNIT II TIMBER FOR STRUCTURAL USE 18

Types of timber, their classification and characteristics. Timber sources, defects, conversion, seasoning, storage, preservation, finishes.

Joints in timber. Timber frames for walls. Timber flooring. Timber staircase. Construction of timber roof trusses (to include lean to, couple, collar, king post, queen post and roof covering material). Understanding construction principles and procedures through sketches/ drawings/ models / site visits/ documentation/ drawing of typical examples.

UNIT III TIMBER FOR NON STRUCTURAL USE 18

Types and characteristics of Engineered/Alternative timber based products such as Plywood, Oriented strand board, Fibreboard, Particle board, Cross-laminated timber, etc.,.

Types of timber doors, windows and ventilators based on - swing (single, double, degree of swing), mechanisms of operation (fixed, openable, sliding, folding, sliding and folding, pivoted, revolving, top hung, bottom hung, louvred), nature (french, corner, bay). Along with their Basic components - outer frame, shutter frame, shutter material, hardware, fixtures, etc. Their joining and fixing procedures, insect screens, etc.,. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ drawings/ photos. Drawings/ sketches / models of the principles. Drawings of typical examples.

Basic components of building's interior elements such as partitions, flooring, false ceiling, panelling, handrails, etc., and their different types, **using timber/engineered timber based products.** Different kinds of systems and methods **used**. Drawings/ sketches of the principles. Understanding of product literature. Site visits with documentation in the form of sketches/ photos. Sketches/models of the principles. Drawings of typical examples.

Finishes for timber in all the above uses.

UNIT IV DESIGN AND DETAILING WITH WOOD 12

Innovative design and detailing of a small and simple structure for a specific purpose using wood as a material applying the knowledge of materials and construction principles studied in the previous units. Design to be submitted in the form of sketches/drawings/detailing/model.

TOTAL: 60 PERIODS

OUTCOMES

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

1. Understand the properties, classification and uses of bamboo and timber as a building material.
2. Decipher the construction details of bamboo and timber for structural use and non structural use.
3. Understand the types, characteristics and construction details of engineered timber products

used in buildings.
4. Design and detail simple buildings using bamboo, timber and engineered timber products.

TEXT BOOKS

1. Dunkelberg, Klaus, IL31 Bambus-Bamboo, Karl Kramer Verlag Stuttgart, Germany, 2000.
2. Minke, Gernot. Building with Bamboo: Design and Technology of a Sustainable Architecture Second and Revised Edition. Germany, Walter de Gruyter GmbH, 2016.
3. Mehta, Madan, et al. Building Construction: Principles, Materials, and Systems. United Kingdom, Pearson, 2018.
4. Herzog, Thomas, et al. Timber Construction Manual. Germany, De Gruyter, 2012.
5. McKay, William Barr. McKay's Building Construction. United Kingdom, Taylor & Francis, 2015.
6. S.C Rangwala 'Building Construction' Charotar Publishing House, India, 2016.
7. Duggal, S.K.. Building Materials. Netherlands, CRC Press, 2017.
8. S. C. Rangwala, 'Engineering Materials', Charotar Publishing House India, 2015.
9. National Building Code Of India 2016- Part 6 Structural Design- Section 3 Timber and Bamboo.

REFERENCES

1. Ching, Francis D. K.. Building Construction Illustrated. Spain, Wiley, 2020.
2. Rethinking Wood: Future Dimensions of Timber Assembly. Germany, Walter de Gruyter GmbH, 2019.
3. Emmitt, Stephen. Barry's Introduction to Construction of Buildings. United Kingdom, Wiley, 2023.
4. Willis H Wagner and Howard Bud Smith, 'Modern Carpentry', Good Heart–Wilcox Publishers, Portland, 2016.
5. Ghanshyam Pandya, M.P. Ranjan, Nilamlyer, ‘Bamboo and Cane Crafts of Northeast India’, National Institute of Design, 2004.
6. American Institute of Timber Construction (AITC), Jeff D. Linville, 'Timber Construction Manual', United Kingdom, Wiley, 2012.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	3	1	-	-	-
2	-	-	-	-	-	3	-	2	1	-	-	-
3	-	-	-	-	-	3	-	2	1	-	-	-
4	-	-	-	-	-	3	-	2	1	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**1**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23405	DIGITAL DRAWING, VISUALISATION AND REPRESENTATION	L	T	P/S	C
		1	0	3	4

OBJECTIVES

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

UNIT I INTRODUCTION TO IMAGE EDITING AND ARTIFICIAL INTELLIGENCE 8

Technology of small computer systems. 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. Introduction to Artificial Intelligence (A.I.), Generative image editing and illustration using A.I. and its Ethical Applications.
Exercise in creating visual compositions using digital graphics (pixels/vector).

UNIT II BASICS OF BUILDING MODELLING AND VIEWING THE BUILDING MODEL 18

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. 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. **Overview of A.I Plugins and tools in 2D Drafting.**
2D Drafting exercise of a simple building.

UNIT III INTRODUCTION TO 3D MODELLING 18

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. **Overview of A.I. Plugins and tools in 3D Modelling**.
3D sculpture exercise using 3D primitives (cubes, spheres etc.).

UNIT IV 3D RENDERING AND SETTING 16

Rendering and scene setting to create a photo realistic picture, understanding material mapping, environment setting and image filling. Overview of real-time rendering and visualisation using A.I. Tools.
Exercise on visualising a building and exploring the potential of lights and cameras.

TOTAL: 60 PERIODS

OUTCOMES

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

1. Understand the principles and methods of digital image editing and create 2D visualisations.
2. Create, manipulate and edit 2D drawings and 3D models of simple buildings using computer applications.
3. Develop photorealistic images of architectural objects using computer applications.
4. Understand the emerging technologies such as A.I. in the realm of architectural visualisation and consider the ethical implications of its application.

TEXT BOOKS

1. Chavez, Conrad. Adobe Photoshop Classroom in a Book 2024 Release. United States, Pearson Education, 2024.
2. Wood, Brian. Adobe Illustrator Classroom in a Book 2024 Release. United States, Pearson Education, 2023.
3. Douglas R. Seidler, ‘Digital Drawing for Designers’, Bloomsbury, 2014.
4. Aouad, Ghassan, et al. Computer Aided Design Guide for Architecture, Engineering and Construction. United Kingdom, CRC Press, 2013.
5. Mohammed Saleh Uddin, 'Digital Architecture – 3D Computer Graphics from 50 Top Designers', 1999.

REFERENCES

1. Benton, Brian C., and Omura, George. Mastering AutoCAD 2021 and AutoCAD LT 2021. United Kingdom, Wiley, 2021.
2. Seidler, Douglas R.. Revit Architecture 2022 for Designers. United States, Bloomsbury Publishing, 2021.
3. Melendez, Frank. Drawing from the Model: Fundamentals of Digital Drawing, 3D Modelling, and Visual Programming in Architectural Design. United Kingdom, Wiley, 2019.
4. Schreyer, Alexander C.. Architectural Design with SketchUp: 3D Modelling, Extensions, BIM, Rendering, Making, Scripting, and Layout. United Kingdom, Wiley, 2023.

CO-PO MAPPING

CO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	3	3	-	-	-	-	-	-	-	-	-
2	2	3	3	-	-	-	-	-	-	-	-	-
3	2	3	3	-	-	-	-	-	-	-	-	-
4	2	3	3	-	-	-	-	-	-	-	-	-
Avg.	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23406	RURAL HABITAT DESIGN STUDIO	L	T	P/S	C
		0	0	9	9

OBJECTIVES

1. To create understanding of the 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.
2. To enable a comprehensive study of rural settlement and architecture in order to understand them as exemplars of collective design that evolved through various parameters.
3. To observe changes in the above, analyse their nature and causes for them.
4. If required, to explore possible policy and physical interventions towards positive changes within the context studied.
5. To enable a 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, water supply and management 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: 135 PERIODS

OUTCOMES

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

1. Ability to collect, assimilate and integrate knowledge in a holistic manner.
2. Sensitivity towards the nature and values of unself conscious and collective design as well as the interconnectedness of human society and environment.
3. Ability to observe and analyse changes in the above.
4. Ability to project future transformations and give possible/ appropriate ways to address issues, if any.
5. Sensitivity in design approach in community oriented projects with respect to context, collective values and needs.

TEXT BOOKS

1. Amos Rapoport, 'House, Form and Culture', Prentice Hall, 1969.
2. Bernard Rudofsky, 'Architecture without Architects', University of New Mexico Press, 1987.
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,2012.
3. Hassan Fathy, 'Architecture for the Poor', University of Chicago Press, 1973.
4. R. C. Arora, 'Integrated Rural Development', S. Chand, 1979.
5. Kalyan Kumar Chakravarthy, Gyani Lai Badam, Vijay paranjpye “Traditional Water Management Systems of India" Aryan books International, 2007
6. Energy Conservation Building Code, Bureau of Energy Efficiency, 2017.
7. National Building Code of India, Bureau of Indian Standards, 2016.

CO - PO MAPPING

CO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	2	2	3	1	3	2	3	-	-	2	2
2	2	2	2	3	1	3	2	3	-	-	2	2
3	2	2	2	3	1	3	2	3	-	-	2	2
4	2	2	2	3	1	3	2	3	-	-	2	2
5	2	2	2	3	1	3	2	3	-	-	2	2
Avg.	**2**	**2**	**2**	**3**	**1**	**3**	**2**	**3**	**-**	**-**	**2**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

SEMESTER V

AR23501ARCHITECTURE AND URBANISM OF COLONIALISM AND MODERNITYLT P/S C

3 0 0 3

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 colonialism, modernity and nationalism.

UNIT I COLONIALISM, INDUSTRIAL REVOLUTION AND MODERNITY 9

Voyages of trade, colonialism, political and economic strategies and socio-cultural intersections. Modernity as historical phenomenon and its various aspects and manifestations, encompassing social, cultural, technological, economic and political changes. 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 standardisation. Split of design education into architecture and engineering streams. Industrial exhibitions. Chicago School, skyscraper development and Louis Sullivan.

UNIT II REACTIONS TO INDUSTRIALISATION 7

Reactions to industrialisation in design. Arts and Crafts in Europe and America. Works of Morris and Webb. Art Nouveau. Works of Horta, Van De Velde, Gaudi, Guimard and Mackintosh. Vienna Secession.

UNIT III EVOLUTION OF MODERN ARCHITECTURE - IDEOLOGIES, MOVEMENTS AND STYLES 10

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. Ideas, works and evolution of Gropius, Corbusier, Aalto, Wright, Mies, Neutra.

UNIT IV ARCHITECTURE OF COLONIALISM, MODERNITYAND NATIONALISM IN INDIA 9

Colonial rule in the Indian subcontinent and ambiguous modernity through colonialism. Colonial architecture and urbanism- forts, bungalows, cantonments, colonial urbanism, civic buildings, buildings of infrastructure, education, power, trade and other typologies. Characteristics and styles of colonial architecture based on chronology and changing intent/typology - Neo-Classicism, Gothic Revival and Indo-Saracenic. Influence of colonial modernity on Indians and their architecture. Building of New Delhi showcasing imperial power. Diverse directions and searches in early 20th century architecture of India. Art Deco and modern architecture in pre-independence India.

UNIT V MODERN ARCHITECTURE – SPREAD AND LATER DIRECTIONS 10

Brutalism. Team X. Ideas, works and evolution of Philip Johnson, Louis Kahn, Paul Rudolph, Eero Saarinen, SOM, Eames, I.M.Pei. Modern architecture and post independence India - national building, institutions and PWD architecture. Chandigarh and Corbusier's other works in India. Outline of evolution of the architectural profession in India, influences on architects. Outline of modernist architecture of India. Works of Kanvinde, Habib Rehman, Raje, early works of B.V. Doshi,Charles Correa, Uttam C.Jain, Hasmukh Patel

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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 various strands of modernism and modern architecture.

CO3 An understanding of architecture of colonialism, nationalism and modernity in India.

TEXTBOOKS

1. Kenneth Frampton, 'Modern Architecture: A Critical History', Oxford University Press, 2016.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Manfredo Tafuri, 'Modern Architecture', Rizzoli Publications,1991.
4. Leonardo Benevolo, 'History of Modern Architecture Vol 1 and 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 and Sons, 2017.
6. K.R.Sitalakshmi, 'Architecture of Indian Modernity- The Case of Madras', Palaniappa Brothers, 2015.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	2	-	3	2	2	-	-	-	-	-	1
2	-	2	-	3	2	2	-	-	-	-	-	1
3	-	2	-	3	2	2	-	2	-	-	-	1
Avg.	**-**	**2**	**-**	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23502	STRUCTURAL DESIGN OF CONCRETE	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To design singly and doubly reinforced beams and continuous beams for bending and shear using IS 456 codal coefficients.
2. To design one-way and two-way slabs for various edge conditions.
3. To design circular slabs under uniform loads and dog-legged staircases.
4. To design short rectangular and circular columns under axial loads and bending using column interaction diagrams and SP16.
5. To design wall footings, rectangular and sloped footings, and combined footings.

UNIT I LIMIT STATE DESIGN OF BEAMS 10

Analysis and design of singly and doubly reinforced rectangular and flanged beams for bending and shear. Design of Continuous Beams using IS 456 codal coefficients.

UNIT II LIMIT STATE DESIGN OF SLABS 8

Behaviour of one way and two way slabs. Design of one way and two way slabs for various edge conditions.

UNIT III LIMIT STATE DESIGN OF CIRCULAR SLABS AND STAIRCASES 6

Design of simply supported and fixed circular slabs subjected to uniformly distributed loads. Types of staircases. Design of dog legged staircase.

UNIT IV LIMIT STATE DESIGN OF COLUMNS 10

Long and short columns. Design of short axially loaded rectangular and circular column. Short columns subjected to uniaxial and biaxial bending. Design of column using column interaction diagram. Use of SP16.

UNIT V LIMIT STATE DESIGN OF FOUNDATION 11

Types of foundation and retaining walls. Design of Wall footing. Design of axially loaded rectangular and sloped footing. Design of combined rectangular footings. Design concepts of cantilever and counterfort retaining wall.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Design reinforced concrete beams as per IS 456 codal provisions.
2. Design one-way and two-way slabs for different edge conditions.
3. Design simply supported and fixed circular slabs and dog-legged staircases
4. Design short columns, including rectangular and circular columns under axial load and bending loads.
5. Design various foundations types, including wall footings, rectangular and sloped footings, and combined rectangular footings.

TEXT BOOKS

1. Dr. B.C. Punmia, 'Reinforced Concrete Structures' Vol, 1 and 2', Laxmi Publication, Delhi, 2015.
2. S.Unnikrishnan Pillai and Devados Menon, 'Reinforced Concrete Design', Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2017.
3. S.N. Sinha, “Reinforced Concrete Design”, Tata McGraw Hill, 2017.

REFERENCES

1. P.Dayaratnam, 'Design of Reinforced Concrete Structures', Medtech, 2017.
2. C. Sinha and S.K. Roy, 'Fundamentals of Reinforced Concrete', S. Chand and Co., New Delhi,2007.
3. N. Krishna Raju, 'Design of Reinforced Concrete Structures', CBS Publishers and Distributors, 2016.
4. IS 456-2000, 'Indian Standard, Plain and Reinforced Concrete, Code of Practice', Bureau of Indian Standards, 2000.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	-	3	-	-	-	-	-	-
3	-	-	-	-	-	3	-	-	-	-	-	-
4	-	-	-	-	-	3	-	-	-	-	-	-
5	-	-	-	-	-	3	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23503 ELECTRICITY, LIGHTING AND ACOUSTICS IN BUILDINGS L T P/S C
3 0 0 3

OBJECTIVES

- To give familiarity about the different requirements of electrical services in a building.
- To give knowledge about sources, principles, products and design of lighting from artificial sources.
- To give knowledge about basics of acoustics and acoustical design of buildings.

UNIT I GENERATION OF ELECTRICITY AND DISTRIBUTION IN BUILDINGS 11

Generation of electricity. Ohms and Kirchoffs laws. Units: watt, volt, amps. Distribution from grid to facilities. Two phase and three phase systems. Substation, transformers, wires and conduits, distribution boards, meters, switch boards, earthing, lightning conductors. Generators, inverters. Electrical load estimation and electrical wiring design for a small building/ campus.
Site visits with documentation in the form of sketches/ drawings/ photos. Understanding of products, product catalogues for a small building.

UNIT II ELECTRIC LIGHTING 9

Laws and terminologies of light and lighting. Light from artificial sources, quantity and quality. Types of lamps and luminaires. Applications and choice of luminaires. Lighting level for different uses in outdoor and indoor environment. Supplementary electrical lighting.
Site visits with documentation in the form of sketches/ photos. Understanding of products, product catalogues.

UNIT III LIGHTING DESIGN FOR BUILDINGS 8

Lighting calculations. Brief overview of lighting simulation and performance analysis using software. Design exercise involving lighting design for appropriate projects of simple scale through choice, calculations, layout, drawings, physical models.

UNIT IV FUNDAMENTALS OF ACOUSTICS 9

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. 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.

UNIT V DESIGN FOR ACOUSTICS 8

Basic principles in acoustic designing of 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.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

CO1 Ability to understand electrical services in a building.
CO2 Ability to design artificial lighting in a building.
CO3 Knowledge of principles of acoustic design in different building typologies.

TEXTBOOKS

1. Derek Phillips and John Howard, '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 and 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', SP 27:2010.
3. Descottes, Herve and Cecilia E. Ramos, 'Architectural Lighting: Designing with Light and Space, Princeton Architectural Press, Princeton, 2013.
4. A.K.Mittal, 'Electrical and Mechanical Services in High Rise Building: Design and Estimation Manual', CBS, 2015.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	2	3	3	-	-	-	-
2	-	-	-	-	-	2	3	3	-	-	-	-
3	-	-	-	-	-	2	3	3	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**	**-**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23504	CONCRETE IN BUILDING CONSTRUCTION	L	T	P/S	C
		1	0	3	4

OBJECTIVES

1. Understand the properties, composition, and uses of cement and concrete.
2. Learn construction principles for cast in-situ and precast concrete components.
3. Explore types of special concrete and innovations in concrete technology.
4. Integrate knowledge to design and detail a concrete construction project.

UNIT I INTRODUCTION TO CEMENT AND CONCRETE 8

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 AND PRECAST CEMENT CONCRETE IN BUILDING CONSTRUCTION 28

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, introduction to shear walls and retaining walls, lintels and sun shades, staircases, sump, water tank, flooring.

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.

Drawings/ models/ sketches of the principles. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ photos. Drawings of typical examples.

UNIT III SPECIAL CONCRETES AND INNOVATIONS 16

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. Advanced concrete components like flat slabs, waffle slabs. Surface active structures – plates, folded plates, shells, domes and vaults. Insulated concrete forms (ICF).

Building materials and components developed by research organisations like CBRI, SERC, NBO, and BMTPC. Techniques for renovation and retrofitting.

3d Printing of concrete and cementitious materials, Process of 3d printing, Case studies of Application of 3d printing in practice at different scales;

Sketches/ drawings/ 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 8

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

OUTCOMES

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

1. Identify types of cement and concrete, their uses, and perform basic quality tests.
2. Design building components using cast in-situ and precast concrete with detailed drawings and site documentation.
3. Apply special concrete and innovative techniques in projects, documenting through sketches and models.
4. Complete a detailed construction project with drawings, sketches, and models, applying theoretical knowledge practically.

TEXT BOOKS

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, 2016.

REFERENCES

1. Arthur Lyons, 'Materials for Architects and Builders - An Introduction', Routledge,2017.
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 organisations.
9. Branko Kolarevic, Architecture in the Digital Age: Design and Manufacturing, London: Taylor & Francis 2005
10. Bob Shiel, Ruairi Glynn, Fabricate: Making Digital Architecture, Toronto: Riverside Architectural Press, 2011
11. Michael Weinstock, Michael Hensel, Achim Menges (eds.), Emergence: Morphogenetic Design Strategies, AD, Vol 74, No. 3, May/June 2004

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	-	3	-	-	-	-	-	-
3	-	-	-	-	-	3	-	-	-	-	-	-
4	-	-	-	-	-	3	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23505 URBAN ARCHITECTURE DESIGN STUDIO L T P/S C
0 0 10 10

OBJECTIVES

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

CONTENT

Human environment today 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/typologies 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

COURSE OUTCOMES:

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

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.
6. Luis Alexandre Casanovas Blanco (Ed), 'After Belonging: Objects, Spaces, and Territories of the Ways We Stay in Transit', Lars Muller Publishers, 2016.
7. Manuel Gausa, 'Housing: New Alternatives, New Systems', Birkhäuser Basel 1999
8. Mark Hutter, 'Experiencing Cities (The Metropolis and Modern Life)', Routledge, 2015.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	2	3	3	1	-	3	-	-	-	1
2	3	-	2	2	3	1	-	-	-	-	-	1
3	3	3	2	1	3	1	3	-	-	-	-	1
Avg.	**3**	**2**	**2**	**2**	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

SEMESTER VI

AR23601 SPECIFICATION, ESTIMATION AND BUDGETING L T P/S C
3 0 0 3

OBJECTIVES

- To give basic understanding of specification writing and how to draw specification for the different items of a building.
- To give knowledge about different types of estimates and introduction to cost estimation.
- To prepare detailed estimates and basic rate analysis.
- To give understanding of how to prepare valuation of real and rental property.
- To give exposure to budgeting in projects..

UNIT I SPECIFICATION AND SPECIFICATION WRITING 9

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 and weathering course in terrace.

UNIT II ESTIMATION 9

Types and 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.

UNIT III DETAILED ESTIMATE 11

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. Rate analysis for some basic items of work.

UNIT IV VALUATION 8

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.

UNIT V BUDGETING 8

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

COURSE OUTCOMES:

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

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.
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,2016.
4. S.SangaReddi 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. India Govt Publication.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	2	-	-	-	-	-	-
2	-	-	-	-	-	3	-	-	3	-	-	-
3	-	-	-	-	-	3	-	-	3	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**2**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23602 STRUCTURAL DESIGN OF STEEL L T P/S C
3 0 0 3

OBJECTIVES

- To introduce basic structural members in steel.
- To enable an understanding of the types, efficiency and strength, advantages and disadvantages of bolted and welded joints.
- To enable the design of tension members, beams and columns under different conditions.

UNIT I INTRODUCTION TO STRUCTURAL STEEL 6

Introduction to properties of steel, Standard sections, advantages and disadvantages of steel as construction material.

UNIT II BOLTED AND WELDED JOINTS 10

Assumptions. Types of Joints and Failure–Advantages and Disadvantages. Design of joints for axially loaded members using limit state method. (excluding eccentric connections).

UNIT III TENSION MEMBERS 10

Introduction. Net sectional area. Permissible stresses. Design of axially loaded tension member using limit state method. Lug angle. Tension splice.

UNIT IV COMPRESSION MEMBERS 10

Introduction. Different sections. Built up section. Design of columns using limit state method (excluding lacing, battening).

UNIT V FLEXURAL MEMBERS 9

Introduction. Laterally supported and unsupported beams. Design of laterally supported beams using limit state method.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Ability to design steel joints for maximum efficiency and strength.

CO2 Ability to design tension and compression members for different conditions by applying the code provisions.

CO3 Ability to design different types of laterally unsupported and supported steel beams for different conditions.

TEXTBOOKS

1. S.K. Duggal, 'Limit State Design of Steel Structures', McGraw Hill Education, Private Limited,2017.
2. N. Subramanian, 'Design of Steel Structures', Oxford, 2015.

REFERENCES

1. M.R. Shiyekar, 'Limit State Design in Structural Steel', PHI Learning Private Limited, 2013.
2. Dr. V. L. Shah and 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.
4. IS 800 - 2007 – Code of Practice for use of Structural Steel in General Building Construction.
5. SP 6 IS Handbook for Structural Engineers.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	-	3	-	-	-	-	-	-
3	-	-	-	-	-	3	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23603 ADVANCED BUILDING SERVICES L T P/S C
3 0 0 3

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 PRINCIPLES AND SYSTEMSOF AIR CONDITIONING 12

Thermodynamics. Transfer of heat. Refrigeration cycle components. Vapor compression cycle. Refrigerant, Compressor, condenser, evaporator, refrigerant control devices, electric motors, air handling units, cooling towers. Cooling load. Air conditioning systems for buildings of different scales and their requirements- window type, split system, package unit, direct expansion system, chilled water system, fan coil unit, district cooling systems. Energy efficient systems, environmental aspects and latest innovations.

Understanding all the above through product literature/ field visits.

UNIT II DESIGN ASPECTS OF AIRCONDITIONING SYSTEMS 9

Design criteria for selection of air conditioning. Configuring/ sizing of mechanical equipment, equipment and spaces for them. Horizontal and vertical distribution of services for large buildings.

Exercise on the above through choice, calculations, layout, drawings.

UNIT III FIRE SAFETY 6

Causes of fire in buildings. Stages of fire and how it spreads. Fire drill. Heat/ fire/ smoke detection. Alarm and extinguisher systems. Fire safety standards. General guidelines for egress design for multi-storey buildings.

Understanding all the above through product literature/ field visits. Exercise on design of fire safety systems for different building types through choice, calculations, layout and drawings.

UNIT IV MECHANICAL, COMMUNICATION AND SECURITY SYSTEMS 9

Lifts and escalators - types and applications. Round trip time for lifts. Design of lift lobby and vertical transportation core. Conveyors, travelators, 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.

Access control CCTV system. Security and surveillance systems. Telecommunication and related information technology based facilities. Understanding the above through product literature/ field visits.

UNIT V INTEGRATION OF SERVICES INTO ARCHITECTURAL DESIGN 9

Principles of grouping and integrating of all services for horizontal and vertical distribution in a multi-storeyed building/ large building. Services to include vertical transportation, electrical, communication, air conditioning and fire safety, communication and security systems.

Integrating service requirements into architectural design in an appropriate typology involving a simple scale project through sketches/ conceptual layout and sections/ drawings.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Familiarity with different air conditioning systems, their context of use and basics of planning involved.
CO2 An understanding of fire safety, fire fighting, fire prevention and installations in buildings.
CO3 An understanding of mechanical, communication and security systems in a building.
CO4 Ability to design building layouts and sections for service integration.

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.
5. 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, 2017.
3. Swenson S. Don, 'Heating, Ventilating and Air Conditioning', American Technical Publishers, 2003.
4. ISHRAE, 'All about AHUs- Air Handling Units'.
5. CIBSE Guide D, 'Transportation Systems in Buildings',2015.
6. A.K.Mittal, 'Electrical and Mechanical Services in High Rise Building: Design and Estimation Manual', CBS, 2012.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	-	3	-	-	-	-	-	-
3	-	-	-	-	-	3	-	-	-	-	-	-
4	-	-	-	-	-	-	-	2	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23604 STEEL, GLASS AND PLASTIC IN BUILDING CONSTRUCTION L T P/S C
1 0 3 4

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 of steel in building construction.
- To enable design and detail using steel, glass and plastic in buildings.

UNIT I METAL, GLASS AND PLASTIC 12

Introduction to different types of metals in building construction- iron, steel, aluminium, brass, etc., Brief history of iron in building construction 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.

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. Current innovations

Plastic as a building material. Brief history of their use through examples. Manufacture. properties, types, uses and application of plastics in building industry. Plastic based finishes and paints including types, composition, characteristics, context of usage, preparation and application techniques and methods. Different types of adhesives and sealants. Water proofing using plastic based materials. Plastic based materials for roofs such as fibre glass, etc., Specific materials such as polycarbonate sheet and teflon. Current innovations.

Understanding of product literature and site visits with documentation in the form of sketches/ photos for all the above.

UNIT II STEEL IN BUILDING CONSTRUCTION 18

Construction principles and procedures for structural building components using steel of different sections. Components to include foundations, columns, beams, staircases, roofs (different types of trusses, space frames, etc), roofing and glazing material.Connections between the different components and fixing. Sketches/ models of the principles. Understanding of product literature/ shop drawings. Site visits with documentation in the form of sketches/ drawings/ photos.Drawings of typical examples.

Overall understanding of total structures such as geodesic dome, space frame, diagrid, etc., Outline of prefabrication in steel. Preco beams, cellular beams, composite slim floor beam. Steel curtain wall glazing. Recent trends in roofing materials like corrugated GI Sheets, corrugated hypar shells, pre-coated metal sheets. Cable Structures.

UNIT III METAL, PLASTIC AND GLASS IN DOORS, WINDOWS VENTILATORS AND INTERIOR COMPONENTS 18

Outline of steel, aluminium, PVC/UPVC material for doors, windows and ventilators. Comparing their characteristics and context of use. Basic components for door/ window/ ventilator of different types- typical sections for outer and shutter frame, shutter material, hardware and fixtures, etc., Their joining and fixing procedures, insect screens. Finishing materials and procedures. Sketches/models of the principles. Understanding of product literature/shop drawings. Site visits with documentation in the form of sketches/ photos. Outline of specialised products such as steel rolling shutters.

Steel, aluminium, PVC/UPVC, glass,partitions, flooring, false ceiling, panelling, handrails, etc., and their different types. Different kinds of systems and methods. Sketches of the principles. Understanding of product literature. Site visits with documentation in the form of sketches/ photos. Drawings of typical examples.

Basic waterproofing of buildings. Understanding of product literature. Understanding construction techniques through site visits/ case studies.

UNIT IV DESIGN AND DETAILING USING STEEL, GLASS AND PLASTIC 12

A design and detailing exercise involving steel as primary construction material with glass and plastic in building envelope 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

COURSE OUTCOMES:

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

CO1 Knowledge of properties of ferrous and non ferrous metals as materials for buildings.
CO2 Knowledge of the use of glass and plastics in building industry.
CO3 An understanding of possibilities of steel as an important building construction material.
CO4 Ability to use steel, glass and plastic appropriately in building projects.

TEXTBOOKS

1. Gorenc, Tinyou, Syam, 'Steel Designer's Handbook', CBS Publishers and Distributors, New Delhi, Bangalore, 2012.
2. P.C Vargheese, 'Building Materials', Prentice Hall of India, 2015.
3. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
4. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
5. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

REFERENCES

1. Alan Blanc, 'Architecture and Construction in Steel', E and FN Spon, London, 1993
2. Allan Brookes, 'Cladding of Buildings', Taylor and Francis,2008.
3. Mark Lawson, Peter Trebilcock, 'Architectural Design in Steel', Taylor and Francis, 2004.
4. Terri Meyer Boake, 'Understanding Steel Design', Birkhauser, 2011.
5. R.M. Davis, 'Plastics in Building Construction', Battersea College of Technology, Blackie, London, 1966
6. Ralph Monletta, 'Plastics in Architecture– A Guide to acrylic and Polycarbonate', Marcel Dekker Inc, New York, 1989
7. 'IS 7883. Code of Practice for the Use of Glass in Buildings ', Bureau of Indian Standards,2013.
8. Billie Faircloth, 'Plastics Now: On Architecture's Relationship to a Continuously Emerging Material', Routledge, 2015.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	-	3	-	-	-	-	-	-
3	-	-	-	-	-	3	-	-	-	-	-	-
4	-	-	-	-	-	-	-	2	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**-**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23605	ENVIRONMENTAL DESIGN STUDIO	L	T	P/S	C
		0	0	10	10

OBJECTIVES

1. To introduce buildings as consumers of resources for human needs and to enable responsible, creative addressing of this fact through design choices.
2. To enable an understanding of architectural design as integrating diverse functional concerns in a complex building through analysis and innovation.
3. 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. Concerns of sustainability drive the basic act of designing through the act of making. Further, architecture today is also required to integrate several physical concerns in a building as human needs in the built environment have become more complex with respect to intensity, distribution and interdependency of activities/ programmes. Here the challenge is to address complex, service intensive needs in an efficient and innovative manner so as to conserve/ optimise resources and use them in an ingenious manner. Appropriate tools and techniques can be used in study and design**.** One of the exercises should incorporate the design and demonstration of net zero energy performance built environment with calculations and assessing compliance with performance standards and codes.

Following this, 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 are left to the discretion of the faculty based on scale and complexity.

TOTAL: 150 PERIODS

OUTCOMES

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

1. Critically and sensitively understand and address the issue of resources.
2. Balance diverse aspects/concerns of buildings by making informed choices and innovative design in the context of buildings with intense or complex programmes.
3. Apply knowledge intensively in the realm of building services.
4. Incorporate the net zero energy performance built environment standards and codes in design.
5. Apply their understanding of sustainable building principles and practices.

TEXT BOOKS

1. Daniel Williams, 'Sustainable Design, Ecology, Architecture and Planning', John Wiley and Sons Inc, NJ, 2007.
2. Mili Majumdar, 'Energy Efficient Buildings in India', TERI, New Delhi, 2012.
3. 'Sustainable Building Design Manuals I and 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 Customising 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 and Sons, 2009.
6. Andreas Athienitis , William O'Brien , “Modeling, Design, and Optimization of Net-Zero Energy Buildings (Solar Heating and Cooling)”,Wiley 2015

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	1	1	2	3	3	1	1	1	-	-	1
2	3	3	2	1	2	1	1	1	3	-	-	1
3	3	2	3	1	1	1	3	3	1	-	-	1
4	3	1	1	1	1	1	1	1	2	-	-	1
5	3	1	1	2	1	2	2	2	1	-	-	2
Avg.	**3**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

SEMESTER VII

AR23701 CONTEMPORARY ARCHITECTURE: THEORIES AND PRACTICE L T P/S C
3 0 0 3

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 post modern 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 THE POSTMODERN WORLD- CRITIQUE AND THEORIES 7

The postmodern world and multiple world views- to include the realms of literature, economics, technology, culture, society, environment. Critique of modernist cities by Jane Jacobs. Theories and works of Christopher Alexander. Aldo Rossi's ideas on the city. Neorationalism. Semiology. Writings of Venturi and Umberto Eco. Poststructuralism and Deconstruction.

UNIT II TECHNOLOGY AND ARCHITECTURE 7

Urban ideas/works of Soleri, Archigram and Metabolism. High Tech architecture, works of Stirling, Rogers and Piano.

UNIT III POSTMODERNISM AND DECONSTRUCTIVISM 9

Postmodernism. Works of Venturi Scott Brown, Graves and Moore. Deconstructivism as new architectural movement. Ideas and works of Eisenmann, Hadid, Gehry, Libeskind, Tschumi.

UNIT IV CONTEXT AND MODERN ARCHITECTURE 10

Critical Regionalism as a category of architecture. Ideas and works of Fathy, Ando, Bawa, Barragan, Siza. Evolution of the architecture of Raje, Doshi, Correa, Raj Rewal. Philosophy and works of Nari Gandhi, Laurie Baker. Outline of contextual approaches in Indian architecture after the 60s.

UNIT V CONTEMPORARY ARCHITECTURE 12

Nature of contemporary society. Architectural responses and movements today -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, Mcdonough, 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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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 post independence 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 and Hudson, London, 2007.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Diane Ghirardo , 'Architecture after Modernism', Thames and Hudson, London, 1996.
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', Grantha Corporation, 1999
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', HatjeCantz, 2011.

REFERENCES

1. Jane Jacobs, 'Deaths and Life of Great American Cities', Modern Library, 2011.
2. Christopher Alexander, ' A Pattern Language', Oxford University Press, Oxford, 2015.
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 and Sons, 2017.
7. 'Architecture in India', Exhibition Catalogue, ElectaMoniteur, 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, 2017.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	-	-	-	-	1
2	-	-	-	3	2	-	-	-	-	-	-	1
3	-	-	-	3	2	-	-	-	-	-	-	1
4	-	-	-	3	2	-	-	-	-	-	-	1
Avg.	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23702 PROFESSIONAL PRACTICE OF ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To introduce the evolution of the architectural profession.
- To give familiarity about the role of professional and statutory bodies as well as ethics of the profession.
- To introduce the basic aspects of running an architectural practice – fees, services, project management, etc.,
- 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 9

Historical evolution of the architectural profession and changing 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 and COMPETITIONS 9

Mode of engaging an architect. Comprehensive services, partial services and specialised 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 and CONTRACT 12

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 6

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 CURRENT TRENDS 9

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 specialisations in the field of architecture -architect as construction/ project manager, architectural journalism, architectural photography.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An understanding about the evolution of the architectural profession.
CO2 An awareness of the role and responsibilities of an architect in all realms.
CO3 Familiarity with the laws related to architecture.
CO4 Knowledge about current issues and aspects related to the architectural profession.

TEXTBOOKS

1. Acts and Regulations of Council of Architecture
2. Roshan Namavati, 'Professional Practice', Lakhani Book Depot, Mumbai, 2016.
3. Ar. V.S. Apte, 'Architectural Practice and Procedure', Mrs. PadmajaBhide, 2008.
4. MadhavDeobhakta, 'Architectural Practice in India', COA, 2007.
5. Manual of Architectural Practice 2022 (Published by Registrar Council of Architecture, India)

REFERENCES

1. J.J. Scott, 'Architectural Practice', Butterworth, London 1985.
2. Tamil Nadu Combined Building Rules 2019
3. Master plans of CMDA.
4. Chennai City Corporation Building Rules 1972.
5. T.N.D.M. Buildings rules, 1972.
6. Consumer Protection Act, 1986.
7. Arbitration Act, 1996.
8. Factories Act, 1948.
9. Persons with Disabilities Act, 1995.
10. Tamil Nadu Cinematography Act. DTCP Act.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	-	-	3	-	-
2	-	-	-	-	-	-	-	-	-	-	-	3
3	-	-	-	-	-	-	-	-	-	3	-	-
4	-	-	-	-	-	-	-	-	-	-	2	-
5	-	-	-	-	-	-	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23703 CONTEMPORARY HOUSING L T P/S C
3 0 0 3

OBJECTIVES
- To introduce housing in the Indian context and the various agencies involved in the production of housing.
- To outline factors, aspects and standards related to housing.
- To inform about the various housing design typologies and the processes involves in housing project development.
- To inform about current issues and aspects in housing.

UNIT I INTRODUCTION TO HOUSING AND HOUSING ISSUES IN INDIA 9
Housing and its importance in architecture, its relationship with neighborhood and city planning. Housing demand and supply. National Housing Policy. Housing agencies and their role in housing development. Impact of life style. Rural Housing. Public and private sector housing.

UNIT II SOCIO-ECONOMIC ASPECTS 9
Economics of housing. Social economic factors influencing housing affordability. Formal and informal sector. Equity in housing development. Sites and services. Slum housing, up gradation and redevelopment. Low Cost Housing. Health principles in housing. Legislation for housing development. Cost-effective materials and technologies for housing. Case studies in India and developing countries.

UNIT III HOUSING STANDARDS 8
UDPFI guide lines, standard and regulations. DCR. Performance standards for housing.

UNIT IV SITE PLANNING AND HOUSING DESIGN 11
Site Planning for housing. Selection of site for housing, consideration of physical characteristics of site, location factors, orientation, climate, topography, landscaping. Integration of services and parking. Housing design relating to Indian situations – traditional housing, row housing, cluster housing, apartments, high-rise housing. Case studies in India of the various types.

UNIT V CURRENT ASPECTS AND ISSUES IN HOUSING 8
Green building and sustainable practices. Disaster resistance and mitigation. Prefabrication Community participation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 Knowledge of various issues concerning housing and housing development in Indian and global context covering a cross section of income groups.
CO2 Ability to appreciate socio-economic aspects in housing.
CO3 An understanding of housing standards, site planning principles, housing concepts and types.
CO4 An understanding of key issues in housing today.

TEXTBOOKS

1. Christopher Alexander, 'A Pattern Language', Oxford University Press, New York 1977.
2. Leuris S, 'Front to Back: A Design Agenda for Urban Housing', Architectural Press, 2006.
3. S.K.Sharma, 'Mane A New Initiative in Public Housing', Housing and Urban Development Corporation, 1991.

REFERENCES

1. Richard Kintermann and Robert Small, 'Site Planning for Cluster Housing', Van Nostrand Reinhold Company, London/New York, 1982.
2. Joseph de Chiara et al, 'Time Saver Standards for Housing and Residential Development', McGraw Hill Co, New York, 2011.
3. Forbes Davidson and Geoff Payne, 'Urban Projects Manual', Liverpool University Press,

Liverpool 1983.
4. HUDCO Publications, 'Housing for Low Income, Sector Model'.
5. 'Sustainable Building Design Manual: Vol 1 and 2',The Energy Research Institute, 2015.
6. A.K.Lal, 'Handbook of Low Cost Housing', New Age International Private Limited, 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	2	-	-	-	-	-	-	-	-
2	-	-	-	2	-	-	-	2	-	-	-	-
3	-	-	-	-	2	1	1	-	-	-	-	-
4	-	-	-	-	-	-	-	2	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**2**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23704 **CRITICAL DESIGN STUDIO** **L T P/S C**

0 0 11 11

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 respect to various aspects of contemporary life and to explore architectural morphology as an expression of those positions.
- To encourage propositions/projections directed at positive future transformations.

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, social processes, contemporary processes such as mapping and diagramming, methods related to 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: 165 PERIODS

COURSE OUTCOMES:

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

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, 2005.
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,2011.
2. HimanshuBurte, 'Space For Engagement', Seagull Books, 2008.
3. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
4. BjarkeIngels, 'Yes is More', Taschen, 2009.
5. Steven Holl, JuhaniPallasmaa, Alberto Pérez Gómez, 'Questions of perception: Phenomenology of Architecture', William Stout, 2006.
6. Richard Coyne, ‘Interpretation in Architecture: Design as Way of Thinking’, Routledge, 2005.
7. Adam Sharr, ‘Reading Architecture and Culture’, Routledge,2012.
8. Wendy Gunn, Ton Otto, Rachel Charlotte Smith, ‘Design Anthropology: Theory and Practice’, Berg, 2013.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	1	2	3	1	1	2	1	1	2	2
2	3	3	3	2	3	1	1	2	1	1	2	2
Avg.	**3**	**3**	**2**	**2**	**3**	**1**	**1**	**2**	**1**	**1**	**2**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23801 **PRACTICAL TRAINING** **L T P/S C**

0 0 0 26

OBJECTIVES

- To give overall exposure to the practice of architecture, its scope, needs and challenges.
- To give familiarity about different stages in real life architectural projects.
- To create involvement in these stages as much as possible within the scope of a specific architectural practice.

CONTENT

Practical Training will be done in offices/ firms in India, empaneled 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 involved in real life projects as possible through direct involvement, and wherever that is not possible, through study and indirect observation. The aspects include initiation and ideation of project (including competitions), study research in specific areas, development of concepts into schematic drawings, or 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. 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 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 participate and contribute to research, study, ideation.
- 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 the specific work done by the student during the period of internship certified by the office should be submitted for evaluation through a viva voce examination.

TOTAL: PERIODS

COURSE OUTCOMES:

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

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 Clarity about the field of architecture that could be carried forth to the higher semester(s).

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	2	3	2	2	3	3	3	2	3	2	3
2	2	2	3	2	2	3	3	3	2	3	2	3
3	2	2	3	2	2	3	3	3	2	3	2	3
Avg.	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**2**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23901 **URBAN DESIGN** **L T P/S C**
3 0 0 3

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 analysing cities.

UNIT I URBANISM IN HISTORY 9

Outline of forces shaping urbanism. Urbanism of river valley civilisations. 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 9

Industrialisation 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. Components of modern urbanism such as blocks, density, neighbourhood, streets etc., and their interdependencies. Evolution of urban design as a discipline, its scope and objectives.

UNIT III CITIES AND URBANISM THROUGH TEXTS AND THEORIES 9

Introduction to and discussion of key texts and theories of cities and urbanism - 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 CONTEMPORARY URBANISM AND URBAN INTERVENTIONS 9

Understanding aspects, issues and solutions related to urbanism today through study of literature and best practices/case studies in urban design. Topics to include urban decay, change and renewal, place making, heritage, conservation, identity, suburban sprawl, gated communities, generic form, privatisation of public realm, role of real estate, transportation, zoning, globalisation, technology, digital age, sustainability, community participation, gender, class, power.

UNIT V URBAN STUDIES 9

Introduction to study and interpretation of cities (especially Indian) through understanding published studies/ analysis. The focus will be on components/aspects as well as tools/ methods. Tools and methods to include different types of maps/mapping, drawings, sketches, photo documentations, reading, data collection, analysis. Aspects to include topography, geology, hydrology, micro climate, vegetation, urban density, growth, city limits/boundaries, history, urban architecture, typologies, infrastructure, land parcels, public space, demographics, patterns of usage, land use.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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.

TEXTBOOKS

1. A.E.J. Morris, 'History of Urban Form before the Industrial Revolution', Routledge, 2013.
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, 2017.
6. Kevin Lynch, 'The Image of the City', MIT Press, 1960.
7. Rithchie. A, 'Sustainable Urban Design: An Environmental Approach', Taylor and Francis, 2009.
8. Tridib Banerjee, Anastasia Loukaitou-Sideris, Editors, 'Companion to Urban Design', Routledge, 2014.

REFERENCES

1. Jonathan Barnett, 'An Introduction to Urban Design', Harper Row, 1982.
2. Lawrence Halprin, 'Cities', MIT Press, 1972.
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 and Francis, 2003.
6. AnuradhaMathu, 'Deccan Traverses', Rupa, 2006.

CO-PO Mapping

CO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	1	-	3	2	-	-	2	-	-	-	3
2	1	1	-	3	2	-	-	2	-	-	-	3
3	1	1	3	3	2	-	-	2	-	-	-	3
Avg.	**1**	**1**	**1**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**3**

'1' = Low; '2' = Medium; '3' = High

AR23902 **LANDSCAPE AND ECOLOGY** **L T P/S C**
3 0 0 3

OBJECTIVES

- To introduce the different ways in which humans have shaped and designed landscapes across history and region in terms of need, culture and experience.
- To give an overview of ecological balance and impacts of human activities today and stress on the role and scope of landscape design in sustainability and environmental conservation.
- To provide familiarity with the various elements and principles of landscape design and its contribution to human built environment.
- To introduce analytical, artistic and technical aspects involved in site planning, open space and outdoor design.

UNIT I LANDSCAPES IN HISTORY 10

Human civilisations 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 II BASICS OF ECOLOGY 7

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 III ELEMENTS IN LANDSCAPE DESIGN 10

Introduction to hard and soft landscape elements. Different types of hard landscape elements. Plant materials, water and landform - classification, characteristics, use and application in landscape design.

UNIT IV SITE PLANNING 10

Organisation of spaces in the outdoor environment. Role of circulation and built form in shaping the environment. Role of landscape design in design of neighbourhood parks, children's play area and campus development.

UNIT V LANDSCAPING OF FUNCTIONAL AREAS 8

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

COURSE 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 functional typologies of spaces.

TEXTBOOKS

1. Motloch, J.L., 'An Introduction to Landscape Design', John Wiley and Sons,2001.
2. Michael Laurie, 'Introduction to Landscape Architecture', Elsevier, 1986.
3. Sauter D; 'Landscape Construction', Cengage Learning, Third edition, 2010.
4. Geoffrey And Susan Jellico, 'The Landscape of Man', Thames And Hudson, 1985.

REFERENCES

1. 'Time Saver Standards for Landscape Architecture', McGraw Hill, Inc, 1997.
2. Grant W Reid, 'From Concept to Form in Landscape Design', Wiley, 2007.
3. Albert J. Rutledge, 'Anatomy of a Park', McGraw-Hill Book Company, 1971.
4. Richard P. Dober, 'Campus Landscape', John Wiley and Sons; 2000.
5. Strom Steven, 'Site Engineering for Landscape Architects', John Wiley and Sons, 2013.
6. Brian Hacket, 'Planting Design', Mc Graw Hill Inc, 1976.
7. T.K. Bose and Chowdhury, 'Tropical Garden Plants in Colour', NayaUdyog, 2011.
8. Rahoul B Singh, 'Gardens of Delight- Indian Gardens through the Ages', Lustre Press, Roli Books, 2008.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	2	-	-	1	3	-	-	-	-
2	-	-	-	2	-	-	1	3	-	-	-	-
3	-	-	-	2	-	-	1	3	-	-	-	-
4	-	-	-	2	-	-	1	3	-	-	-	-
Avg.	**-**	**-**	**-**	**2**	**-**	**-**	**1**	**3**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23903 CONSTRUCTION AND PROJECT MANAGEMENT L T P/S C
3 0 0 3

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 7

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 11

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 break 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 7

Cost model- project cost, direct cost, indirect cost, slope curve, total project cost. Optimum duration contracting the network for cost optimisation. Steps in cost optimisation, updating, resource allocation, resource smoothing, resource leveling.

UNIT IV COMPUTERISED PROJECT MANAGEMENT 11

Creating a new project, building task. Creating resources and assessing costs, refining project. Project tracking, recording actual. Reporting on progress. Analysing financial progress. Introduction to BIM.

UNIT V CONCEPT TO COMMISSIONING 9

Project feasibility study. Real estate and regulatory strategies. Facility programming and planning. Design management. EPC. testing and commissioning.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Summarize the concepts of project management.
CO2 Construct critical path diagrams for construction projects.
CO3 Organise resources for effective project execution.
CO4 Demonstrate the use of computers for project management.
CO5 Inspect feasibility reports and projects before commissioning.

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 2016 Bible', Prentice Hall, 2016.
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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	1	-	1	1	1	1	-	1	1	1
2	-	-	1	-	3	1	2	1	-	1	1	1
3	-	-	1	-	3	2	3	1	-	1	1	1
4	-	-	1	-	2	1	1	1	-	1	1	1
5	-	-	3	-	3	1	1	1	-	1	1	1
Avg.	-	-	**1**	-	**2**	**1**	**2**	**1**	-	**1**	**1**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23904 **DISSERTATION** **L T P/S C**
0 0 3 3

OBJECTIVES

- To inculcate the spirit of exploration and 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 thought, reading, study, analysis, expression, documentation.
- To enable the conversion of effort into a coherent line of thought through writing/ documentation/models/ any media.
- To serve as prelude to Thesis.

CONTENT

Design studio emphasises 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 and built environment through phenomena, ideas, texts, intent. 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, materiality, visual culture, contemporary society, cities, 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 1000 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 report that is a maximum of 100 pages should be submitted in the prescribed format. The suggested structure for the report is open- it could be writing, visual, documentation, sketches or analysis based depending on the topic. However, a written structure should tie the research together with the following areas -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 study/documentation (any suitable way based on the nature of topic- drawings, sketches, photos, surveys, etc.,)/analysis/ arguments, etc., final conclusion. The report will be presented in the viva-voce exam and defended.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 A dissertation report with a coherent line of thought as reflected in the written structure and the core content which could be open ended.

CO2 Ability to research deeply into a subject and develop depth in thought in any specific area based on point of view, observation, analysis and study.

CO3 Ability to look at architecture from an informed, analysed and well thought out personally unique or objective perspective which would help strengthen the thesis process.

TEXTBOOKS

1. BjarkeIngels, 'Yes is More', Taschen, 2009
2. Bernard Tschumi, ‘Manhattan Transcripts’, Wiley, 1994.
3. Rem Koolhaas et al, 'Project on the City II: The Harvard Guide to Shopping', Taschen, 201.
4. Charles Correa, ‘The New Landscape:Urbanisation in the Third World’, Concept Media, 199.
5. Iain Borden and KaaterinaRuedi; 'The Dissertation: An Architecture Student’s Handbook', Architectural Press, 2006.
6. Linda Grant and David Wang, 'Architectural Research Methods', John Wiley Sons, 2013.
7. Vian Ahmed, Alex Opoku, Zeeshan Aziz, ‘Research Methodology in the Built Environment’, Rutledge, 2016.

REFERENCES

1. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Reearch',2nd Edition, University of Chicago Press, 2016.
2. Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners', Sage Publications, 2011.
3. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Aproaches', Sage Publications, 2014.
4. Richard Coyne, 'Interpretation in Architecture: Design as Way of Thinking', Routledge, 2005.
5. Adam Sharr, 'Reading Architecture and Culture', Routledge,2012.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	2	3	3	2	1	1	1	1	1	3	3
2	1	2	3	3	2	1	1	1	1	1	3	3
3	1	2	3	3	2	1	1	1	1	1	3	3
Avg.	**1**	**2**	**3**	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**3**	**3**

'1' = Low; '2' = Medium; '3' = High

AR23905 URBANISM AND ARCHITECTURE DESIGN STUDIO L T P/S C
0 0 11 11

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/urbanism.
- 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, l and use 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, multi-use 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: 165 PERIODS

COURSE OUTCOMES:

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

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 and 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', ArkitektensForleg,2011.
5. 'Time Savers Standard for Urban Design', Donald Watson, McGraw Hill, 2017.
6. Malcolm Moore and Jon Rowland Eds, 'Urban Design Futures', Routledge, 2006.

REFERENCES

1. Michelle Provoost et al., 'Dutchtown', NAI Publishers, Rotterdam, 1999.
2. Lawrence Halprin, 'Cities', MIT Press, 1972.
3. Gosling and Maitland, 'Urban Design', St. Martin’s Press, 1984.
4. Kevin Lynch, 'Site Planning', MIT Press, Cambridge 1984.
5. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	2	2	3	3	-	-	2	-	1	2	3
2	3	2	2	3	3	-	-	2	-	1	2	3
Avg.	**3**	**2**	**2**	**3**	**3**	**-**	**-**	**2**	**-**	**1**	**2**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23X01	THESIS	L	T	P/S	C
		0	0	23	23

OBJECTIVES

- To ensure consolidation and application of the knowledge gained in preceding years of architectural education in the context of an architectural design project of the student's choice.
- To enable identification and addressing of key issues/aspects inherent in a project or to enable development of thought processes in specific issues/aspects/situations leading organically to an architectural design project.
- To facilitate development of ability to handle and complete projects independently as a precursor to professional life in architecture.

CONTENT

Thesis is the culmination in the journey of architectural education that encapsulates ability of design exploration and skills of design execution. Students should decide a thesis topic of their choice in terms of design potential and/or idea/issue exploration. 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 their interest in the topic, the nature of the project, area of focus, 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, architectural philosophy, 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 summarising the entire thesis work and soft copy of all the work.

TOTAL: 345 PERIODS

COURSE OUTCOMES:

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

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

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

CO3 Ability to intensify thought process directed at a specific area of focus and convert it to a product.

TEXTBOOKS

1. Linda Grant and David Wang, 'Architectural Research Methods', John Wiley and Sons, 2013.
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 RüediRay, LesleyNaaNorleLokko, 'The Portfolio - An Architecture Student's Handbook', Routledge, 2015.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	3	3	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3	3	3	3	3
Avg.	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

PROFESSIONAL ELECTIVE COURSES (PEC)

AR23001 DESIGN PROCESS AND THINKING L T P/S C
2 0 1 3

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 introduce collaborative design and consideration of all stake holders.

UNIT I INTRODUCTION TO DESIGN 7

Definition and understanding of design as a fundamental activity of humans. History of design process -earliest times through Renaissance, Beaux Arts, Bauhaus, contemporary processes. Classification of design - according to scale, process, mode of production, etc., Self-conscious and unselfconscious design. Design through drawing and design through craft. Pragmatic design, iconic design, analogic design, canonic or syntactic design.

UNIT II DESIGN METHODOLOGY 10

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. Different approaches to design process- parametric or analysis/ synthesis/ evaluation, conjecture-refutation, paradigmatic. Current ideas on Design Thinking in different disciplines including IDEO. Exercises using different methodologies.

UNIT III CREATIVE THINKING 12

Understanding the term creativity. Theories on thinking - left brain/ right brain, convergent/ divergent thinking, lateral/ vertical thinking. Blocks in creative thinking. Techniques to generate creativity – brainstorming, reversal, metaphor, analogy, generation of alternatives, role playing, attribute listing and morphological analysis. Role of inspiration in creativity. Architectural inspirations. Concept of Creative Flow. Exercises in creative thinking.

UNIT IV CREATIVITY AND PEOPLE 9

Design as social process. Team work and group creativity. Consensus in design decisions. Participatory approach to design. Stakeholders, iteration and the design process. Exercises involving roleplaying.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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 in an appropriate manner.
CO4 Awareness of the importance of considering people/ stakeholders in the design process.

TEXTBOOKS

1. Geoffrey Broadbent, 'Design in Architecture - Architecture and the Human Sciences', John Wiley and Sons, New York, 1981.
2. Bryan Lawson, 'How Designers Think', Architectural Press, 2005.
3. James C. Snyder, Anthony J. Catanese, Timothy L. McGinty, 'Introduction to Architecture', McGraw Hill, 1979.
4. Edward De Bono, 'Lateral Thinking- Textbook of Creativity', Penguin Books, 1990.
5. Christopher Jones, 'Design Methods', Wiley, 1992.
6. Tom Heath, 'Method in Architecture', John Wiley and Sons, New York, 1984.

7. Nigel Cross, 'Developments in Design Methodology', John Wiley and Sons, 1984.
8. James L. Adams, 'Conceptual Blockbusting', Basic Books, 2001.
9. C. Thomas Mitchell, 'Redefining Designing: From Form to Experience', Van Nostrand Reinhold, 1992.
10. Design Process in Architecture, Geoffrey Makstutis , Laurence King 2018
11. https://designthinking.ideo.com/

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 Alexander, 'A Pattern Language', Oxford University Press, 1977.
4. Mihaly Csikszentmihalyi, Flow: The Psychology of Optimal Experience, Harper 2008
5. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.
6. Philip Plowright, 'Revealing Architectural Design: Methods, Frameworks and Tools', Routledge, 2014.
7. Anthony Antoniades, 'Poetics of Architecture- Theory of Design', VNR,1992.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	1	-	3	-	-	3	2	-	-	2
2	3	2	3	-	3	2	-	1	3	-	2	-
3	3	3	2	2	3	2	-	2	3	2	2	2
4	3	-	2	2	3	-	-	2	-	2	-	-
Avg.	**3**	**2**	**2**	**1**	**3**	**1**	**-**	**2**	**2**	**1**	**1**	**1**

'1' = Low; '2' = Medium; '3' = High

AR23006 **SUSTAINABLE DESIGN** **L T P/S C**
3 0 0 3

OBJECTIVES

- To give understanding of the concept of sustainability and sustainable development in the context of issues like climate change, ecological footprint, etc.
- To inform about concepts of sustainable settlements design.
- To give knowledge about passive building design.
- To inform about the role of material and construction practices in sustainability.
- To inform about the concept of green buildings and rating systems.

UNIT I INTRODUCTION TO SUSTAINABILITY 7

Ecosystems, food chain and natural cycles on earth. Need for sustainable design in the context of anthropogenic activities. Climate change, ecological footprint, carbon footprint, loss of bio-diversity, urban heat islands, energy crisis. Overview of sustainable development. Life cycle analysis. Cradle to cradle concept.

UNIT II SUSTAINABILITY IN SETTLEMENT DESIGN 10

Principles of sustainable settlements. Morphology of historic/vernacular settlements in different climatic zones through case studies. Sustainable community - social, cultural and economic factors. Urban ecology, urban heat island effects, smog etc. Case studies of eco city or communities.

UNIT III SUSTAINABILITY IN BUILDING DESIGN 12

Sustainable site selection and development. Simple passive design considerations involving site conditions, building orientation, plan form and building envelope for sun and wind.
Passive heating of buildings- direct, indirect and isolated gain.
Passive cooling of buildings – shading of buildings, insulation, induced ventilation (air vents, wind tower, etc.,), radiative cooling, evaporative cooling, earth coupling, dessicant cooling.

UNIT IV SUSTAINABILITY IN MATERIALS AND CONSTRUCTION 9

Sustainability in choice of materials and construction techniques/ methods. Embodied energy in buildings. Use of local materials. Recyclable products. Eco building materials and construction. Bio mimicry, Zero energy buildings, Photo voltaic electricity generation. Thermal energy storage. Nano technology and smart materials.

UNIT V BUILDING RATING SYSTEMS 7

Concept of Green Architecture/ Buildings. Rating systems - LEED, TERI, GRIHA and BREEAM.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An overall understanding of sustainability and its relation to human activities.
CO2 Knowledge about sustainable design of settlements, buildings, materials and technology.
CO3 Familiarity with 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, ‘Eco-design : A Manual for Ecological Design’, Wiley Academy, 2006.
4. 'Manual on Solar Passive Architecture', IIT Mumbai and Mines, New Delhi, 1999.
5. Arvind Krishnan et al, 'Climate Responsive Architecture A Design Handbook for Energy Efficient Buildings', Tata McGraw Hill Publishing Company Limited, New Delhi, 2001.
6. Majumdar M, 'Energy-efficient Building in India', TERI Press, 2009.

7. Givoni .B, 'Passive and Low Energy Cooling of Buildings', Van Nostrand Reinhold, New York, 1994.

REFERENCES

1. Arian Mostaedi , ‘Sustainable Architecture : Low Tech Houses’, CarlesBroto, 2002.
2. Sandra F. Mendler and William Odell, ‘HOK Guidebook to Sustainable Design’, John Wiley and sons, 2005.
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.
5. Sophia and Stefan Behling, 'Solpower The Evolution of Solar Architecture', Prestel, New York, 2000.
6. Dean Hawkes, 'Energy Efficient Buildings: Architecture, Engineering and Environment', W.W. Norton and Company, 2002.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	3	1	1	3	-	-	3	3
2	-	-	-	3	3	2	3	3	-	3	3	3
3	-	-	-	-	-	-	2	3	3	-	-	-
Avg.	**-**	**-**	**-**	**2**	**2**	**1**	**2**	**3**	**1**	**1**	**2**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23011 STRUCTURE AND ARCHITECTURE L T P/S C
3 0 0 3

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.
- To give information about contemporary structures and architecture.
-

UNIT I STRUCTURES IN THE PRE INDUSTRIAL ERA 9

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 STRUCTURES IN THE INDUSTRIAL AND POST INDUSTRIAL PERIOD 9

Industrial revolution, evolution of modern typologies such as railway stations, factories, etc., Use of iron and steel. Concrete in modern architecture. Modular construction. Suspension structures. Projects by Pier Nuigi Nervi, Maillart, Candella, Buckminster Fuller, Eero Saarinen, Calatrava.

UNIT II BUILDING TYPOLOGIES AND LARGE SPAN STRUCTURES 9

Evolution of building typologies with need for larger spans - airports, stadia, multiuse architecture, public architecture, exhibition pavilions, etc., Corresponding structural and material innovations based on need. Contemporary use of steel, concrete, glass, plastic and other materials, Examples of different building typologies with large span structures from late 20^{th} century and early 21^{st} century with focus on iconic structures.

UNIT III STRUCTURAL DESIGN AND PARAMETRIC PROCESSES 9

Parametric/ digital processes and structure. Structural calculations. Iterative design process. Material and technical advancements including structural calculations, simulations, etc. Examples of buildings using all this.

UNIT V CASE STUDY 9

Detailed case study of any innovative structure based on history/ typology/ structural innovation/ material innovation/ design process.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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.

CO3 Awareness of contemporary innovations in structures.

TEXTBOOKS

1. Mario Salvadori,Structure in Architecture: The Building of Buildings, Pearson, 2016.
2. 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.
4. Andrew Charleson, Structure as Architecture, Architectural Press, 2005.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	1	3	2	3	-	2	1	-	1	2
2	3	3	2	-	3	3	-	1	2	-	2	-
3	-	-	-	-	1	3	-	-	-	-	-	1
Avg.	**2**	**2**	**1**	**1**	**2**	**3**	**-**	**1**	**1**	**-**	**1**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23015 CONTEMPORARY PROCESSES IN ARCHITECTURAL DESIGN L T P/S C
1 0 2 3

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 digital media in architecture.

UNIT I INTRODUCTION 15

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.

Aspects of digital architecture. Design and computation. Difference between digital process and non-digital process. Architecture and cyberspace. Qualities of the new space. Issues of aesthetics and authorship of design. Increased Automatism and its influence. Exercises using digital process.

UNIT II CONTEMPORARY PROCESS 10

Emerging phenomena such as increasing formal and functional abstractions. Diagrams, diagrammatic reasoning, diagrams and design process. Animation and design. Digital hybrid. Exercises.

UNIT III GEOMETRIES AND SURFACES 9

Fractal geometry. Shape grammar. Hyper surface. Liquid architecture. Responsive architecture. Exercises

UNIT IV CONTEMPORARY PROCESS AND ARCHITECTURAL WORKS 11

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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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.

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 and 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 and Sons, 2001.
2. L. Convey et al, 'Virtual Architecture', Bats ford, 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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	1	1	-	-	-	-	-	1	-	-	-
2	2	2	2	-	-	-	-	-	1	-	-	-
3	3	2	3	-	-	-	-	-	1	-	-	-
4	3	2	2	-	-	-	-	-	1	-	-	-
Avg.	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23019 HUMAN BEHAVIOUR AND BUILT ENVIRONMENT L T P/S C
2 0 1 3

OBJECTIVES

- To introduce the relationship between human behaviour and the built environment.
- To give familiarity about theories and frameworks related to human behaviour and built environment.
- To give knowledge about methods and techniques to study human behaviour in the context of specific situations.
- To give theoretical and practical basis to approach architectural design through the understanding of human behaviour.

UNIT I INTRODUCTION TO ENVIRONMENTAL PSYCHOLOGY 9

Introduction to the term environmental psychology as relation between human behaviour and natural and built environment. Interdisciplinary and multidisciplinary aspect of environmental psychology. Outline of history of study of human behaviour with respect to context.

UNIT II ENVIRONMENTAL PERCEPTION AND COGNITION 12

Theories of environmental perception. Gestalt Theory. Perception and cognition of natural and built environment. Cognitive maps and way finding in larger built environment.

UNIT III ENVIRONMENT AND BEHAVIOUR 12

Proxemics, Personal space. Defensible space. Territoriality. Privacy. Ambient Environment. Stress. Density. Crowding. Behaviour Setting. Patterns and activities. Archetypical spaces. Place identity and place attachment. Human behaviour in different contexts- nature, residential, work, urban public space, city, etc., Human behaviour and geometry of spaces/ buildings.

UNIT IV ENVIRONMENT BEHAVIOUR STUDIES AND DESIGN 12

Environment behaviour studies. Methods of study such as physical traces, observation, interviews, self reporting, experimental methods, mock up, post occupancy evaluation. Methods and case studies to apply environment-behaviour studies in design.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An overall understanding of the relationship between human behaviour and built environment.
CO2 Knowledge about various terms and aspects related to human behaviour.
CO3 An ability to study physical situations with respect to human behaviour.
CO4 Sensitivity to apply knowledge of human behaviour in design situations.

TEXTBOOKS

1. Francis Andrew, ‘Environmental Psychology’, Wadsworth, 1993.
2. John Zeisel ‘Enquiry by Design: Tools for Environment-Behaviour Research’, Cambridge University Press, 1984.
3. Robert Bechtel, ‘Enclosing Behaviour’, John Wiley, 1977.
4. Clovis Heimsath, ‘Behavioural Architecture’, McGraw Hill, 1977.
5. Gwen Bell, Edwina Randall, ‘Urban Environment and Human Behaviour'- An Annotated Bibliography’, Dowden Hutchinson Ross, 1973.

REFERENCES

1. Robert Gifford, ‘Environmental Psychology: Principles and Practice’, Optimal Books, 2007.
2. RikardKuller, ‘Architectural Psychology’, McGraw Hill, 1978.
3. Robert Sommer, ‘The Behavioural Basis of Design’, Englewood Cliffs, 1969.
4. Christopher Alexander, ‘A Pattern Language’, Oxford University Press, 1977.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	2	3	2	3	-	-	1	-	-	2	2
2	3	3	3	3	2	-	-	2	-	-	3	3
3	3	3	3	3	2	-	-	2	-	-	2	3
4	3	3	3	3	3	-	-	2	-	-	3	3
5	3	3	3	3	3	-	-	3	-	-	3	3
Avg.	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**2**	**-**	**-**	**2**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23025 **TECHNIQUES OF VISUAL ART** **L T P/S C**
1 0 2 3

OBJECTIVES

- To enhance the students in fundamental strategies, methods of making paintings.
- To create and experiment colour concepts and render architecture.
- To produce art works from everyday environment and to effectively communicate theirobservations to others.
- To have a good understanding of the various 3D art techniques.

UNIT I DRAWINGS FROM OBSERVATION 11

Freehand drawing, Leaf study, foliage, Tree. Observational Study: Drawings from Natural objects and Manmade objects. Various shading techniques such as Hatching, Cross catching, stippling, stumbling and Blending. Principles of light and shade: Light and shade, Aware of depth, Illusion of depth, Emulate on a two-dimensional plane.

UNIT II WATERCOLOUR SKETCHES 12

Basic watercolour practices, Painting Techniques, Reproduction, Paintings from direct observations, Still life, Life study, Outdoor study, Landscape Painting, Mixed media, Pen and Colour, Rendering massive drawing.

UNIT III URBANSCAPE 11

Direct observational sketches & Paintings, Buildings, Indoor Sketches, Outdoor Sketches, Street sketches, Garden sketches, Landscape, Seascape, Public space, market, festivals, street scenes, monuments, recreational spaces, etc

UNIT IV 3D VISUAL ART 11

Clay Modelling, Moulding, Casting, Architectural Models, Relief Sculpture, Wall Mural, Terracotta Mural, Installation Art.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Capacity to create art works with understanding of elements and principles of art.
CO2 Ability to experiment with colour techniques and visual language.
CO3 Ability to create illustrations from their direct observation.
CO4 Ability to use 3D modeling techniques and explore the creativity through 3D art.

REFERENCES

1. Webb, Frank, “The Artist guide to Composition”, David & Charles, U.K, 1994.
2. Micheal Reardon, “Watercolour Techniques”, North light Books, U.S, 2016.
3. Ian Robertson, Mind Sculpture, Transworld, U.K, 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	3	1	-	1	-	-	-	-	-	-	-
2	1	3	1	-	1	-	-	-	-	-	-	-
3	1	3	1	-	1	-	-	-	-	-	-	-
4	1	3	1	-	1	-	-	-	-	-	-	-
Avg.	**1**	**3**	**1**	-	**1**	-	-	-	-	-	-	-

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23026 INTERIOR DESIGN L T P/S C
2 0 1 3

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 12

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.

Exercises in understanding historical aspects of interior spaces through literature review and case studies. Exercises involving conceptual design of contemporary interiors inspired by precedents.

UNIT II VOCABULARY OF INTERIOR DESIGN 9

Introduction to the professions of interior decoration, interior design and furniture design, bringing out their origin, evolution and current scope of work. Definition and process of interior design. Introduction to the design of interior spaces as related to typology, function and themes. Vocabulary of design in terms of elements (point, line, shape, form, space, colour, light, pattern, texture) and principles (balance, proportion, scale, rhythm, hierarchy, unity, contrast, harmony, emphasis, movement) with specific reference to examples from interior design.

Exercises in understanding vocabulary of design through case studies and conceptual design.

UNIT III COMPONENTS OF INTERIOR SPACE 12

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.

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.

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 for all the above. Conceptual design exercises in all the above.

UNIT IV FURNITURE 12

Introduction to furniture design as related to parameters such as human comfort and function (including anthropometrics and ergonomics), built in or freestanding, materials and methods of construction, cultural particularities, changing trends and lifestyles, innovations and design ideas. Study of representative examples.

Furniture design exercises involving conceptual understanding of the above

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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 and 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. Hie singer and George H. Marcus, 'Landmarks of Twentieth Century Design; Abbey Ville Press, 1995.
4. Susanne Sles in 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 and Sons, 2009.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	1	-	-	-	3	-	-	-	-	-	-
2	2	1	-	-	-	3	-	-	-	-	-	-
Avg.	**2**	**1**	-	-	-	**3**	-	-	-	-	-	-

'1' = Low; '2' = Medium; '3' = High

AR23002 **DESIGN DETAILING** **L T P/S C**
1 0 2 3

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 give knowledge to create architectural drawings for construction and as a base for structures and services drawings.
- To give knowledge to design, incorporate and detail architectural and interior components of the architectural design project.

UNIT I UNDERSTANDING ARCHITECTURE THROUGH BUILDING DRAWINGS 9

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 12

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 III ARCHITECTURAL WORKING DRAWINGS 12

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. Design and preparation of layouts of service intensive rooms like kitchens and toilets.

UNIT IV DETAILED DRAWINGS OF ARCHITECTURAL AND BUILT IN COMPONENTS 12

Design and preparation of detailed drawings of joinery including doors, windows and ventilators. Design and detailing out of floor, wall and ceiling finishes/ construction/ laying. 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: 45 PERIODS

COURSE OUTCOMES:

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

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 Die truck, '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, 2016.

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', Watson-Gup till , 2002.
5. Francis. D. K. Ching, 'Building Construction Illustrated', John Wiley and Sons, 2014.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	3	-	1	-	-	-
2	-	-	-	-	-	3	3	-	1	-	-	-
3	-	-	-	-	-	3	3	-	1	-	-	-
Avg.	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23007 CLIMATIC DESIGN PROCEDURES L T P/S C
1 0 2 3

OBJECTIVES

- To introduce the procedure of climatic design of buildings.
- To emphasize on the climatic significance of architectural “form”.
- To learn through application; the understandings of climatic design in form of design exercises.

UNIT I SITE AND BUILDING FORM 15

Climatic data of a place: sourcing, analysing and inferring. Mahoney tables, periodic chart, Overheated periods, other climatically significant periods, activity charts of building. Site specific climatic factors; identification, listing and analysis. Land form and orientation – its effects on radiation and daylight. Open space and built form – its effects on radiation and air flow. Ground character. Climatic design of outdoor spaces and adjacent outdoor spaces – its design considerations; lowering surface temperature and air temperatures of outdoor spaces. Orientation of building; evaluation of best orientation, optimum orientation climatically. Form and proportion of the overall building and site. Exercises on analysis of the above aspects at different climatic conditions.

The geometrical form of building envelop and its climatic significance; varieties of form and its influence of heat gain and wind flow. Study of various roof forms and Study of various building form in plan, for various climatic conditions. Form and its relation to radiant and convective cooling. Optimum built form. Exercises on the application of the above understandings.

UNIT II FORM, MATERIAL AND HEAT FLOW - 10

Form, material and heat flow. Selection of materials for climatic performance. U value and time lag calculations for various climatic situations. Homogenous material elements and Heterogeneous material elements Thermal properties of commonly used building materials. Thermal performance of some typical building section and building components. Exercises on the application of the above understandings.

UNIT III CLIMATIC DESIGN OF BUILDING ELEMENTS – I 10

Wall opening varieties. Wall opening design considering wind, light and heat gain. Orientation, Size, Position; its climatic significance. Protection and Control of wall openings.
Sunshade and Louver design; its varieties, its performance optimization considering wind, light and heat. Exercises on design and detailing of wall openings for different of climatic conditions.

UNIT IV CLIMATIC DESIGN OF BUILDING ELEMENTS – II 10

Courtyards and its effect on heat gain and heat loss in building interiors. Form, scale and proportion of courtyards; their climatic effect. Courtyards and ventilation inside building. Exercises on design of courtyards for applying the understanding of above aspects. Verandahs, corridors and other transition spaces and their roles. Different varieties of roof openings; their climatic significance. Water bodies in building and evaporative cooling.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An understanding of procedures involved in climatic design of buildings
CO2 An understanding on the significance of architectural “form”; climatically.
CO3 Ability to design and generate multiple iterations for various building elements climatically.

TEXTBOOKS

1. O.H. Koenigsberger and Others, 'Manual of Tropical Housing and Building-ClimaticDesign',`Orient Longman, Madras, India, 2010.
2. Arvind Krishnan, Szokolay et.al, 'Climate Responsive Architecture- A Design HandbookFor Energy Efficient Buildings', Tata McGraw Hill, 2010.

3. Bureau of Indian Standards IS 3792, 'Hand book on Functional Requirements of Buildingsother 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 SciencePublishers Ltd., London, 1981.
3. B. Givoni, 'Passive and Low Energy Cooling of building', Van Nostrand Reinhold, NewYork,1994.
4. Galloe Salam and Sayigh A.M.M, 'Architecture, Comfort and Energy', Elsevier Science Ltd.,Oxford,1998.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	2	3	-	3	-	-	2	-
2	-	-	-	-	2	3	-	3	-	-	2	-
3	-	-	-	-	2	3	-	3	-	-	2	-
Avg.	-	-	-	-	**2**	**3**	**-**	**3**	-	-	**2**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23008	DIGITAL TOOLS FOR BUILDING MODELLING,	L	T	P/S	C
	ANALYSIS AND ASSESSMENT	1	0	2	3

OBJECTIVES

1. To give knowledge about the importance of analysing a building design on various parameters.
2. To give familiarity with digital tools available to model the attributes and information of a building.
3. To enable the analysis and simulation of attributes and qualities of a building in order to improve the quality of design from different considerations.

UNIT I INTRODUCTION 6

Importance of analysing a building design based on various parameters- energy performance, attributes of lighting and ventilation, structure, cost estimating, phasing of project, construction, administration and management, etc., Overview of different platforms available to analyse a building on its various parameters. Difference between CAD and BIM. Outline of the whole process- building modelling, giving information in terms of inputs, understanding the attributes/parameters of the model and extracting information in terms of analysis and performance. Various BIM platforms currently available- Revit, Bently, Archicad, Digital Project, Vector works, Tekla Structures, DProfiler, etc., Knowledge required by an architect as designer and as advisor in the building projects with respect to analysis of a building.

UNIT II BASIC BUILDING MODELLING 15

Overview of modelling of a building - components, materials, assemblies, relational structures, objects, libraries, parametric shapes, details, property, attributes, etc., Basic modelling of a building - creating components such as walls, roofs, floors and ceilings, doors and windows, skylights, staircases and railings, etc., Adding information in terms of dimensioning.
Exercise in some of the above.

UNIT III APPLYING DETAILED ATTRIBUTES TO BUILDING MODEL 12

Overview of applying specification, material information, consideration of day lighting and sun path, artificial lighting fixtures, MEP (Mechanical, Electrical, Plumbing) components, site and landscape components, applying performance information, installation and application info, sustainability information, management information, quality control information, etc., to a basic building model.
Exercise in some of the above.

UNIT IV ADVANCED BUILDING PERFORMANCE ASSESSMENT METHODS 12

Overview of how to understand, analyse and assess the qualities and working of a modelled building through simulation of the building model. The qualities will include thermal performance, cooling load, energy consumption with the integration of HVAC systems, artificial lighting systems, glare analysis for lighting systems, computational fluid dynamic analysis for natural ventilation. Quantitative analysis of water, waste-water and stormwater calculations for net zero water performance. Extracting information from the model in terms of BOQ and cost analysis.
Exercises in some of the above using software tools.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Understand the analysis of building designs for energy, lighting, ventilation, and cost and Differentiate CAD from BIM.
2. A familiarity with making basic BIM models.
3. Applying detailed attributes/parameters to the model using BIM tools.
4. Use simulation tools to assess building's performance using the building models.

TEXT BOOKS

1. Robert S. Wegant, 'BIM Content Development: Standards, Strategies, and Best Practices', John Wiley, 2011.
2. Chuck Eastman et al, 'BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors', John Wiley, 2011.

REFERENCES

1. Eastman, C.; Teicholz, P.; Sacks, R.; Liston, K,.'BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors', Wiley, 2011.
2. Ray Crotty, 'The Impact of Building Information Modeling: Transforming Construction'. Spons Architecture Price Book, 2011.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	2	-	-	1	2	-	-	3	-	-	-
2	-	2	-	-	1	2	-	-	3	-	-	-
3	-	2	-	-	1	2	-	-	3	-	-	-
4	-	2	-	-	1	2	-	-	3	-	-	-
Avg.	**-**	**2**	**-**	**-**	**1**	**2**	**-**	**-**	**3**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23012 EARTHQUAKE RESISTANT ARCHITECTURE L T P/S C
3 0 0 3

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 a seismic prone area.
- To give knowledge for applying earthquake resistant principles in an architectural design project.

UNIT I FUNDAMENTALS OF EARTHQUAKES 7

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, epicentre, focal depth etc.

UNIT II SITE PLANNING, PERFORMANCE OF GROUND AND BUILDINGS 10

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 III SEISMIC DESIGN CODES AND BUILDING CONFIGURATION 10

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 IV DIFFERENT TYPES OF CONSTRUCTION DETAILS 11

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 V URBAN PLANNING AND ARCHITECTURAL DESIGN 7

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, multi-storeyed RC framed apartment/commercial building.

TOTAL: 45 PERIODS

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 to resist earthquakes.

TEXTBOOKS

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

REFERENCES

1. Ian Davis, 'Safe Shelter within Unsafe Cities: Disaster Vulnerability and Rapid Urbanization', Open House International, UK, 1987
2. 'Socio-economic developmental record'- Vol.12, No.1, 2005.

3. 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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	1	3	2	-	-	-
2	-	-	-	-	-	3	3	3	2	-	-	-
Avg.	-	-	-	-	-	**3**	**2**	**3**	**2**	-	-	-

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23011 PARAMETRIC MODELLING AND CODING L T P/S C
3 0 0 3

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 the final outcome.

UNIT I INTRODUCTION TO PARAMETRIC MODELLING 12

Introduction to Parametric Modelling: Difference between Parametric and Non-Parametric Modelling; Advantages of Parametric Modelling; Introduction of Software tools like Rhino/Grasshopper, and its interface; Etc.,

UNIT II INTRODUCTION TO CODING 11

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 11

Construct Curve, Surface, Solid, Mesh Etc., in parametric setup difference between Polygon & Nurbs modelling, Poly-surfaces, b-reps and meshes, Field, Operations, Modifiers, Manipulations, Etc.,

UNIT IV GENERATIVE & PERFORMATIVE MODELS 11

(Grasshopper/ Processing/Phython, Etc.),
Computational Geometry: Voronoi, Delaunay Triangle, Etc;
Rule-based System: L-System (LS), Fractals, Etc.,
Performative: Simulation, Analysis, Evaluation, Etc.,

UNIT V

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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

1. Form+Code by Casey Reas, Chandler McWilliams, Lust, Princeton Architectural Press/New York;
2. The Nature of Code: Simulating Natural Systems with Processing by Daniel Shiffman;
3. Elements of Parametric Design by Robert Woodbur, Bentley Institute Press & Routledge;
4. From Control to Design Paperback by Tomoko Sakamoto, Actar;
5. The Alphabet and the Algorithm by Mario Carpo, The MIT Press;
6. AAD Algorithms-Aided Design by Arturo Tedeschi, Le Penseur;

REFERENCES:

1. Patrick Schumaker, ‘ Parametricism as Epochal Style n, Antoine. ‘Digital culture in Architecture’
2. Stavric, Milena & Marina, Ognen. (2011). Parametric modeling for advanced architecture. International Journal of Applied Mathematics and Informatics. 5. 9-16.
3. Janssen, Patrick & Stouffs, Rudi. (2015). Types of Parametric Modelling. 10.52842/conf.caadria.2015.157.
4. 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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	2	-	-	3	-	-	3	-	2	-
2	-	3	2	-	-	3	-	-	3	-	-	-
3	3	3	2	-	3	3	-	-	3	-	1	-
Avg.	**2**	**3**	**2**	**-**	**1**	**3**	**-**	**-**	**3**	**-**	**1**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23020	DISASTER MANAGEMENT	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To provide knowledge about disasters, their significance and types.
2. To inform about the relationship between vulnerability, disasters, disaster prevention and risk reduction.
3. To give a preliminary understanding of approaches to Disaster Risk Reduction (DRR).
4. To enhance awareness of institutional processes in the country.
5. To give information about how to respond to surroundings with potential disaster response in familiar areas.

UNIT I INTRODUCTION TO DISASTERS 9

Disaster, hazard, vulnerability, resilience, risks. Types of disasters – earthquake, landslide, flood, drought, fire etc. Classification and causes. Impact including social, economic, political, environmental, health, psychosocial, etc. Differential impacts in terms of caste, class, gender, age, location, disability. Global trends in disasters: urban disasters, pandemics, complex emergencies, climate change. Dos and don'ts during various types of disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle.. Culture of safety, prevention, mitigation and preparedness. Structural and non structural measures. Roles and responsibilities of community, Panchayat Raj Institutions/ Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders. Institutional processes and framework at State and Central Level. State Disaster Management Authority (SDMA). Early warning Advisories from appropriate agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting vulnerabilities. Differential impacts. Impact of development projects such as dams, embankments, changes in land-use etc. Climate change adaptation. IPCC scenario and scenarios in the context of India. Relevance of indigenous knowledge, appropriate technology and local resources. Case studies of communities in normal and extreme conditions affected by climate change hazards to develop understanding of coping methods.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and vulnerability profile of India. Components of disaster relief: Water, food, sanitation, shelter, health, and waste management, Institutional arrangements (mitigation, response and preparedness. Disaster Management Act and Policy. Other related policies, plans, programmes and legislation. Role of GIS and Information technology components in preparedness, risk assessment, response and recovery. Phases of Disaster. Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS, CASE STUDIES AND FIELD WORK 9

Landslide hazard zones - case Studies. Earthquake vulnerability assessment of buildings and infrastructure- case studies. Drought assessment- case studies. Coastal flooding, storm surge assessment, floods (fluvial and pluvial flooding) - case Studies. Forest fire - case studies. Manmade disasters - case studies. multi-hazard assessment techniques for risk and vulnerability- case studies. Space based inputs for disaster mitigation and management. Field work related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Define disasters, hazards, vulnerability, and resilience. Analyse impacts and differential effects.
2. Implement prevention, mitigation, and preparedness. Understand roles in disaster management.
3. Explore impacts of infrastructure and climate change. Evaluate indigenous knowledge in resilience.
4. Analyse hazard profiles, relief efforts, and institutional frameworks like the Disaster Management Act.
5. Apply assessment techniques through case studies on landslides, earthquakes, floods, and man-made disasters. Gain fieldwork experience in disaster management.

REQUIRED READING

1. Singhal J.P. 'Disaster Management', Laxmi Publications, 2010.
2. Tushar Bhattacharya, 'Disaster Science and Management', McGraw Hill India Education Pvt. Ltd., 2012.
3. Gupta Anil K, Sreeja S. Nair. 'Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011.
4. KapurAnu, 'Vulnerable India: A Geographical Study of Disasters', IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005.
2. Government of India, National Disaster Management Policy,2009.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	1	1	-	-	-
2	3	2	-	-	-	3	1	-	-	-	-	-
3	3	-	-	2	-	-	-	3	1	-	-	-
4	3	-	-	2	-	-	-	3	1	-	-	-
5	3	-	-	2	-	-	-	3	1	-	-	-
Avg.	**2**	**2**	**-**	**2**	**-**	**3**	**1**	**2**	**1**	**-**	**-**	**-**

'1' = Low; '2' = Medium; '3' = High

AR23027 ART APPRECIATION L T P/S C
2 0 1 3

OBJECTIVES

- To introduce art as a fundamental human activity, its characteristics and ways in which it can be understood. To introduce the vocabulary of art and to enable the appreciation of art.
- To understand different productions of art as manifestations within particular contexts.

UNIT I INTRODUCTION TO ART AND ANCIENT ART 11

Definition of art, need for art, role of art. Art, reality, perception, representation. Appreciating art in terms of form (means, types, tools and techniques, vocabulary of art - principles and elements), content (story conveyed, meaning) and context (the situation and time of production of art).

Prehistoric Art across the world. Egyptian and Mesopotamian art. Greek and Roman art. Indian Art: Manuscript paintings, Mural paintings, Miniatures, Folk Paintings.

UNIT II WESTERN ART: RENAISSANCE TO MODERN 12

Renaissance and Baroque art. Neoclassicism. Romanticism. Realism. Art in India during colonial period. Impressionism. Post Impressionism. Fauvism. Expressionism. Birth of modern art. Abstract/ Non-Objective art. Cubism. Dadaism. Surrealism. Futurism. Constructivism. Suprematism. De Stijl. Abstract Expressionism. Collage Art. Modern Indian art.

UNIT III INDIAN MODERN ART 12

Art in India during colonial period. Birth of modern art, CollEge of Arts, Madras, Bengal, Mumbai, Baroda. Subaltern art movements in India, Progressive Artists' Group, Delhi Silpi Chakra, Cholamandal Artist's Village, Women Artist.

UNIT IV POSTMODERN AND CONTEMPORARY 12

Postmodernism in Art. Pop art. Conceptual Art. Neo-Conceptual Art. Minimalism & Kinetic Art. Op Art. Photorealism. Post-minimalism. Installation art. Land art. Environmental Art. Virtual Reality and Art. Artificial Intelligence. Major Trends In Modern Art in India: Folk Art, Tantric Art, Abstract Art, Figurative Art, Popular Art, Miniature Art.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An understanding and appreciation of art as basic and varied human creation related to cognition and experience.
CO2 Awareness of important art productions in the West and India.
CO3 Sensitivity towards collective and individual cultural productions as unique expressions of historical and geographic context.

TEXTBOOKS

1. Fred, S. Kleiner, 'Gardener's Art through Ages', Wadsworth Publishing, 2012.
2. Bernard S. Myers, 'Understanding the Arts', Holt Rinehart and Winston Inc, 1964.
3. H.H. Arnason, 'History of Modern Art', Thames and Hudson, 1977.
4. Partha Mitter, 'Indian Art', Oxford University Press, 2001.
5. Edith Tomory, 'A History of Fine Arts in India and the West', Orient Blackswan, 1989.

REFERENCES

1. Peter and Linda Murray, 'The Penguin Dictionary of Art and Artists', Penguin, 1989.
2. E.H. Gombrich, 'The Story of Art', Phaidon, 2002.
3. E.H. Gombrich, 'Art and Illusion', Phaidon, 2002.
4. 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village, Madras,1974.
5. A.K.Coomaraswamy, Fundamentals of Indian Art, Historical Research Documentation Programme, Jaipur, 1985.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	-	2	3	-	-	-	-	-	-	-	-
2	1	-	1	3	-	-	-	-	-	-	-	-
3	1	-	1	3	-	-	-	-	-	-	-	-
Avg.	**1**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23028 **CRITICAL WRITING** **L T P/S C**
0 0 3 3

OBJECTIVES

- To enable the building of critical thinking through discussions, reading and writing exercises exploring specific themes.
- To enable a coherent line of thought, connecting and ordering different aspects of a situation/theme.
- To help in verbal and written expression at an advanced level.
- To facilitate applyingskills in critical thinking in the realm of architecture.

CONTENT

Critical writing will help to develop thoughts/ideas/opinion on a topic backed by discussion, research and discernment.

A list of themes will be selected and offered to the class in small groups. The themes will be similar in terms of scope and workload. Students would read up on the themes and come for discussion to class. Based on the discussion, the students will hone their thoughts and read further. They would then write about the themes. Thesewritings would be presented and discussed in class. A further development of the writing would then be done. This process would be iterated a few times so that a coherent thought process and written narrative results about the theme in consideration. The discussions and draft essayfor this would constitute the first assessment.

Furtherto this, themes within architecture will be introduced. The training ensured in the previous themes would be applied to looking at larger architectural themes. While the process would be the same as for the general themes, in the architectural themes, the scale would be larger and the discussions would be more one to one with faculty. There will be sessions on developing a voice, finding sources, referencing research, narrative building. One well-researched essay on a topic of interest in architecture would ensue. The length and nature of the essay will be based on the topic and will be informed during the course of the semester. The discussions and draft essay on architecture would be evaluated in the second and third assessment.

The final two essays would be submitted for the Viva Voce Examination in the form of a report.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Ability to think, talk, discuss, read, conclude and write about a specific topic with knowledge, insight and skill.
CO2 Clarity in identifying, connecting and structuring facts and thoughts through writing.
CO3 Ability to write an architectural essay that is perspective based supported by facts and arguments or fact based supported by analysis and argument.
CO4 Overall development of skills in critical thinking that would guide design actions.

REQUIRED READING

- Creme, P. and M. Lea, Writing at University: A guide for students. Open University Press, 2008.
- Murray, N. Writing Essays in English Language and Linguistics, Cambridge University Press, 2012.
- Stephen Bailey, ‘Academic Writing: A Handbook for International Students’, Routledge, 2011.

REFERENCES

1. Andrew Goatly, ‘Critical Reading and Writing in the Digital Age: An Introductory Coursebook’, Routledge, 2016.
2. Richard Coyne, ‘Interpretation in Architecture: Design as Way of Thinking’, Routledge, 2005.

CO-PO Mapping

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12

1	-	-	3	2	3	-	-	-	-	-	-	-
2	-	-	3	2	3	-	-	-	-	-	-	-
3	-	-	3	1	2	-	-	-	-	-	-	-
4	-	-	3	1	3	-	-	-	-	-	-	-
Avg.	**-**	**-**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23003 **SOFT SKILLS** **L T P/S C**
3 0 0 3

OBJECTIVES

- To introduce soft skills as important human attribute/ quality to be developed.
- To enable development of communication skills in various scales and media.
- To enable development of skills in terms of group and team behaviour.

UNIT I INTRODUCTION TO SOFT SKILLS 9

Introduction to Soft Skills. Understanding of self. Self-awareness, Self- Management and Self Development. Values. Attitude. Positive Thinking and optimism. Confidence and excellence. Developing perception. Patience, persistence and flexibility. Empathy and Emotional Intelligence. Interpersonal relations and social behaviour. Stress management. Time Management.

UNIT II INTRODUCTION TO COMMUNICATION SKILLS; LISTENING AND TALKING 9

Classification and types of Communication. Verbal and non-verbal communication. Formal and formal communication. Barriers in communication.
Listening Skills, Types of Listening. Enhancing listening. Understanding context of words.
Responding. Speaking. Self development through speaking.
Nonverbal Communication. Body language. Proxemics.
Telephonic Communication. Telephone etiquette.

UNIT III COMMUNICATION SKILLS – READING AND WRITING 9

Reading as cognitive process. Types and rate of reading. Critical Reading. Skimming and scanning. Techniques for effective reading.
Writing Skills. Writing Style. Purpose of writing.
Business writing, Report writing. Writing papers. Email Communication. Strategies based on purpose.

UNIT IV GROUP COMMUNICATION 9

Understanding of cultural, social and economic diversity and adapting to others. Body language and etiquette. Organisational Communication. Group Communication, Communication Breakdown. Conflict Management. Negotiation Skills. Meeting Management. Team Building and Team work. Leadership Skills.

UNIT V PRESENTATIONS, INTERVIEW AND GROUP DISCUSSIONS 9

Advanced Speaking Skills. Body language. Emotional intelligence and Critical Thinking.
Oral Presentations, Speeches and Debates, Combating Nervousness, Patterns and Methods of Presentation, Oral Presentation- Planning and Preparation, Making Effective Presentation, Speaking for Various Occasions.
Planning and Preparation for interviews, Drafting Resume. Facing Job Interview. Group Discussion.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Familiarity with the importance of soft skills.
CO2 Knowledge about how to communicate effectively in various scales and media.
CO3 Exposure to importance of appropriate team and group behaviour.

TEXTBOOKS

1. Soft Skills, K.Alex, S.Chand, 2010
2. Soft Skills, Hariharan S, Sundararajan N, Shanmugapriya S.P, MJB Publishers 2010.
3. The ACE of Soft Skills, Gopalaswamy Ramesh, Mahadevan Ramesh, Pearson 2010.

REFERENCES

1. Understanding Interpersonal Communication, Richard West and Lynn H.Turner, Cengage Learning, 2010.
2. Interpersonal Communication, Steven A. Beebe, Susan J. Beebe, Mark V. Redmond, Pearson 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	-	-	**3**	-	-
2	-	-	-	-	-	-	-	-	-	**3**	-	-
3	-	-	-	-	-	-	-	-	-	**3**	-	-
Avg.	-	-	-	-	-	-	-	-	-	**3**	-	-

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23004 DESIGN COMMUNICATION L T P/S C
1 0 2 3

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 I INTRODUCTION TO DESIGN COMMUNICATION 10

Introduction to design communication as an integral part of the architectural design process. Outline of 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 through popular diagrams and drawings of notable architecture/ architects' works. Design Communication by contemporary architects/ visualisers – Diagrams by BIG, Models by Richard Meier, Visualisations 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 studies of architects' work through first hand study, websites, other collected data,etc

UNIT II COMMUNICATING STUDY, SITE ANALYSIS AND CONCEPT 12

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 students themselves or other students' work. Discussion and dialogue on the various attributes to be communicated and finalising 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 III COMMUNICATING DESIGN INTENT IN THE DESIGN PRODUCT 13

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 students themselves or other students' work. Discussion and dialogue on the various attributes to be communicated and finalising best way to communicate. Sheet sizing, scale and composition. Manual sketching 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 IV DESIGN NARRATIVE AND WRITING 10

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

COURSE OUTCOMES:

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

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:

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

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	-	3	-	2	-	-	-	-	-	-	-
2	3	-	3	-	2	-	-	-	-	-	-	
3	3	-	3	-	3	-	-	-	-	-	-	-
4	3	-	3	-	3	-	-	-	-	-	-	-
Avg.	**3**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23009 GREEN BUILDING L T P/S C
3 0 0 3

OBJECTIVES

- To give introduction to the concept of green building.
- To give exposure to the different systems and organisations associated with green building concept.
- To give knowledge about the various areas/ realms of architecture in which green building concepts can be applied.

UNIT I INTRODUCTION TO CONCEPT OF GREEN BUILDING 9

Evolution and definition of the term Green Building. Benefits of green building. History and role of different organisations. World Green Building Council, LEED, BREEAM, GREENSTAR, ECBC, GRIHA, IGBC, etc., Different methods and systems to rate a building. Criteria in different systems. Salient points common to all systems.Typology wise parameters for green building. Sustainable Development Goals.

UNIT II SITE AND RESOURCES 9

Green building and site selection. Working with the site and optimal utilisation of resources. available. Soil, ecology, landscape, water, circulation, microclimate, lighting, air quality, noise. Site planning principles. Accessibility for differently abled. Recycling and reuse of materials. Rain water management. Waste management. Health and well being. Case studies.

UNIT III ARCHITECTURAL MORPHOLOGY 9

Building footprint, shape, size and proportion to optimise comfort and energy consumption. Building components such as openings, courtyards, skylights, shading devices, fenestration, etc., Designing for lighting, ventilation and rain within the local climatic context.Case studies.

UNIT IV ENERGY AND MATERIALS 9

Embodied energy of materials. Thermal performance of materials. Optimising energy performance. Reducing energy demand. Life Cycle Cost. Building system management. Finishes and fenestration. Recycling and reuse of materials. Air quality in buildings. Non Toxic materials. Renewable energy for buildings. Case studies.

UNIT V ZERO CARBON BUILDING 9

Different techniques and methods for zero carbon building. Case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Recall green building concepts and various rating systems.
CO2 Identify sites and resources for sustainable building performance.
CO3 Analyse buildings and their components for sustainable architectural design.
CO4 Examine buildings for their life cycle performance.
CO5 List techniques for design of zero carbon buildings.

TEXTBOOKS

1. GRIHA Manuals
2. Francis D.K.Ching, Green Building Illustrated, Wiley 2014
3. Michael Bauer, Peter Mösle, Michael Schwarz, Green Building, Guidebook for Sustainable Architecture, Springer 2010

REFERENCE

1. Bill Maclay, The New Net Zero, Chelsea Green Publishing Co 2014

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	1	-	-	-	-	-	3	1	-	-	-
2	3	1	-	-	-	-	-	3	1	-	-	-
3	3	3	-	-	-	-	-	2	3	-	-	-
4	3	2	-	-	-	-	-	2	3	-	-	-
5	3	1	-	-	-	-	-	2	1	-	-	-
Avg.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23013 CONTEMPORARY BUILDING MATERIALS L T P/S C
3 0 0 3

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 7

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 10

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 10

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 9

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 9

Types of materials and its constitution, manufacturing and construction technology requirement for 3D printed buildings 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

COURSE OUTCOMES:

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

CO1 Exposure to the need and use of various contemporary materials in creating innovationand 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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23018 DIGITAL FABRICATION AND ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To give exposure to various digital production tools to build artefacts as part of creative design process.
- To give knowledge about utilising prototyping and modelling as a design medium that supports the full spectrum of digital design as a paperless process.
- To give knowledge about fabrication process in Digital Architecture as a way to bring software models into reality.

UNIT I INTRODUCTION TO DIGITAL FABRICATION 9

Introduction to Digital Fabrication; Advantages of Digital Fabrication; Evolution of digital fabrication in architecture, overview of the impact the technology, new realm of possibilities for architectural expression, Etc.,

UNIT II ADDITIVE FABRICATION 9

3d Printing, Process of 3d printing, it's Possible Materials Etc., Case studies of Application of 3d printing in practice at different scales;

UNIT III SUBTRACTIVE FABRICATION 9

Laser Cut, CNC Milling, Water Jet Cutting, Etc., it's Possible Materials Etc., Case studies of Application of Subtractive Fabrication in practice at different scales;

UNIT IV TRANSFORMATIVE FABRICATION 9

Robotic Fabrication, Mechanically Transformative Process, Etc., it's Possible Materials Etc., Case studies of Application of Transformative Fabrication in practice at different scales;

UNIT V FILE TO FACTORY PROCESS 9

Preparation of File to Factory Process, Optimization of meshes/files, STL Formats, Etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Awareness to the machines, different methods of fabrication and the workability with materials.

CO2 Ability to correlate between the design processes and Digital Prototype or Model attribute.

REFERENCES

1. Branko Kolarevic and Kevin Klinger, Manufacturing Material Effects: Rethinking Design and Making in Architecture, 2014
2. Digital Fabrication, Paul Andersen, David Salomon, Sanford Kwinter, David Carson, Architecture of Patterns, W. W. Norton & Co, 2010
3. Heino Engel, Structure Systems, 1997
4. Lisa Iwamoto, Digital Fabrications: Architectural and Material Techniques, Princeton: Princeton Architectural Press, 2009
5. Branko Kolarevic, Architecture in the Digital Age: Design and Manufacturing, London: Taylor & Francis 2005
6. Bob Shiel, Ruairi Glynn, Fabricate: Making Digital Architecture, Toronto: Riverside Architectural Press, 2011
7. Emergent Design Group, Morphogenetic Design Strategies AD, 2004
8. Farshid Moussavi, Daniel Lopez, Garrick Ambrose, Ben Fortunato, Ryan R. Ludwig and Ahmadreza Schricker, The Function of Form
9. Rivka Oxman and Robert Oxman, The New Structuralism: Design, Engineering and Architectural Technologies
10. Michael Weinstock, Michael Hensel, Achim Menges (eds.), Emergence: Morphogenetic Design Strategies, AD, Vol 74, No. 3, May/June 2004

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	1	-	-	-	3	-	-	1
2	-	-	-	-	1	-	-	-	3	-	-	1
Avg.	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23021 CHENNAI- EVOLUTION AND ARCHITECTURE L T P/S C
3 0 0 3

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 I PRE-COLONIAL CHENNAI REGION 7

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 – Tamilagam, fishing hamlets, urban settlements, rural areas. Pallava architecture. Historic settlements such as Mylapore, Triplicane, West Mambalam.

UNIT II COLONIAL CHENNAI 11

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- educational institutions, 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 and cultural modernity.

UNIT III MODERN CHENNAI 11

Urbanisation 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. Urbanisation and Master plans in the 1970s. New typologies 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 IV URBAN CULTURE 8

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 V URBAN ISSUES AND SOLUTIONS 8

Changes in 21st century Chennai- urbanisation, migration, globalisation, growth of IT, new industries and 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

COURSE 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 READING

- 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 by C.P.RamaswamiAiyar Foundation, Chennai, 2008.
- P. Rajaraman, ‘Chennai Through The Ages’, Poompozhil Publishers, 1997.

REFERENCES

1. S. Muthiah, ‘Madras Miscellany – People, Places and Potpourri’ , East West Press Pvt Ltd, 2011.
2. Nandhitha Krishna, ‘Madras- Chennai- Its History and Environment’, C.P.RamaswamiAiyer Foundation 2009.
3. David Waltner et al, ‘The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability’, Columbia University Press, 2008.
4. C.S. Srinivasachari, ‘History of the City of Madras’, Varadachary, 1939.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	-	-	-	-	2
2	-	-	-	3	2	-	-	-	-	-	-	2
3	-	-	-	3	2	-	-	-	-	-	-	2
4	-	-	-	3	2	-	-	-	-	-	-	2
Avg.	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23022 HISTORY OF NON-WESTERN ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To create awareness about the history of non-Western Architecture
- To give outline knowledge of various non-Western Architectural traditions.
- To inform about colonial influences on non-Western architecture.

UNIT I CHINESE, JAPANESE AND KOREAN ARCHITECTURE 11

China - Prehistoric history, regional architecture, dynasty architecture, architecture of the general public, imperial architecture, religious architecture, Horizontality, Enclosure, hierarchy, symmetry, influences of Chinese architecture on neighbouring regions, influence of neighbouring regions on Chinese architecture

Japanese - Prehistoric history, regional architecture and architecture of different periods, pagodas, shrines, temples, wooden structures, zen architecture, gardens, castles, imperial architecture, early minimalism, Japanese-Western eclectic architecture, colonial architecture, FLW, Corbusier, Tange's architecture in Japan.

Korea – Dolmens, Buddhist architecture, hanoks, semi-subterranean houses, Korean forts, pagodas, differences from Chinese and Japanese pagodas, tombs.

UNIT II SOUTH-EAST ASIAN ARCHITECTURE 11

Historic architecture of Thailand, Cambodia, Laos, Myanmar and Indonesia, Khmer architecture, Buddhist architecture, Dutch architecture of Indonesia, British colonial architecture of Singapore and Sri Lanka, French architecture of Vietnam, Spanish colonial architecture of Philippines, temple complexes, Angkor wat, Borobudur, Angkor thom, Luang Prabang, Preah Vihear.

UNIT III AFRICAN ARCHITECTURE 9

Early history – Egyptian, Phoenician, Nubian, Roman architecture, Aksumite architecture, Nigerian dry stone buildings, Islamic and Moorish architecture of north Africa- in the regions of Tunisia, Egypt, Morocco, Great Mosque of Djenné, Tomb of Aksia, Ibwami of Rwanda, Swahili architecture, Colonial architecture of Cape Town, Saint-Louis, Grand-Bassam, Gold Coast, etc.

UNIT IV RUSSIA AND MONGOLIA AND KOREA 7

Russia - Slav medieval forts, Christian architecture of Kievan Rus, Veliky Novgorod, Kiev, Murom. Muscovite architecture, Imperial architecture of Russia – castles, cathedrals and palaces, post-revolution architecture.

Mongolia – Stupas, Yurts, Imperial architecture at Karakorum, Buddhist monasteries.

UNIT V OCEANIA 7

Indigenous architecture of Oceania. Colonial Architecture of Australia and New Zealand.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Familiarity with the architecture of non-Western traditions
CO2 Exposure to colonial influence on non-Western cultures
CO3 Broader awareness of historical processes across the world in the realm of architecture

TEXTBOOKS

1. Banister Fletcher, A History of Architecture, CBS 1999
2. Ching et Al, A Global History of Architecture, Wiley 2017

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	3	-	-	-	2
2	-	-	-	3	2	-	-	3	-	-	-	2
3	-	-	-	3	2	-	-	3	-	-	-	2
Avg.	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23029 **PRODUCT DESIGN** **L T P/S C**
1 0 2 3

OBJECTIVES

- To give understanding about the evolution of form and space in product design.
- To facilitate the interpretation of design concepts in different ways and layers.

UNIT I INTRODUCTION TO PRODUCT DESIGN 9

Concept of Form and Space. Form elements and their properties - Volume, Plane, Line, Point. Form: Dimensions, Proportions, 3-D Primary Geometric Forms. Movement and Forces Relationships: Axis, Axial Movement, Forces, Curves and their application in Form. Study of Form relationships – Order, Joined Forms, Transitional Forms, Evolution of Form. Organisation of form – Spatial, Matrix. Static, Dynamic and Organic. Symmetry and Asymmetry. Balance: Structural, Visual. Orientation of form: Direction, Position. Overall Proportion. Considerations of Colour, Pattern, Texture and Proportion in products and product environments. Relating Form to Materials and Processes of Manufacture. Use of Computers for Form generation.

UNIT II PRODUCT DESIGN 12

Selection of the projects is based on the possibility of user interaction leading to innovation. Projects end with a comprehensive presentation through working/ mock up models, design drawing and a report. The project is supported by detailed discussion on various stages in the design process emphasising the complementary nature of systematic and creative thinking. This is achieved by short supporting assignment in following topics: Creativity techniques like brain storming and synectics to develop creative attitude and open mind, design opportunity, problem perception , Idea Sketching ,clustering of ideas for concept development, exploratory mock up models for concept development, evaluation of concepts, final concept selection, concept development, refinement and detailing.

UNIT III PRODUCT DETAILING 12

Batch production and mass production of products. Technical considerations of internal subsystems of a product and their influence on product detailing. Selection of natural, synthetic and manmade materials and their processes for detailing products for manufacture. Detailing mechanisms for foldable, stackable and collapsible considerations of the product. Design detailing of components vis-à-vis considerations of manufacture, maintenance and assembly. Detailing of products to be manufactured in Plastics. Component design of electronic products. Detailing for conditions of use including knock-down systems and its joinery. Usability and Ergonomic issues in product detailing. Design assignments on detailing of a given product component.

UNIT IV PRODUCT DESIGN PROTOTYPING AND ADVANCED MANUFACTURING PROCESSES 12

Introduction to automation and Computer Aided Design (CAD), Principles of Basic Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM). Hardware and graphics software in CAD. CAD applications and integration with other software packages. Evolution of Numerically Controlled (NC) machines and Computer Numerically Controlled (CNC) machines, programming of CNC machine. Free form or generative manufacturing processes (Rapid Prototyping). Working Principles of Rapid Prototyping machines. Types of Rapid Prototyping machines with technology employed. Rapid Tooling (RT): Soft tooling, Vacuum casting, Room temperature vulcanisation (RTV). Input devices, Contact and non-contact type digitisers such as Co-ordinate measuring machines, Laser and White light scanners. Product Modeling using CAD software and Rapid Prototyping machine. Production using Rapid Tooling approach.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An understanding of product design as a discipline.
CO2 Ability to interpret real life situation into design.
CO3 Knowledge about contemporary design process and manufacturing process of design.

REFERENCES

1. H. G. Greet and R. R. Kostellow, ‘Elements of Design and the Structure of Visual Relationships’, Architectural Press, NY, 2002.
2. K. Critchlow, ‘Order in Space: A Design Source Book’, Thames and Hudson, 2000.
3. C. Akner-Koler, ‘Three-dimensional Visual Analysis, Institution for Industrial Design’, Konftfack, Sweden, 1994.
4. Mike Baxter, ‘Product Design: Practical Methods for the Systematic Development of New Products’, Chapman and Hall, 1995.
5. Roozenburg and Eekels, ‘Product Design: Fundamentals and Methods’, John Wiley and Sons Inc; New Ed edition, 1995.
6. Goodrich, Kristina, ‘Design Secrets: Products: 50 Real-Life Projects Uncovered’, Industrial Designers Society of America, Rockport Publishers, 2001.
7. Rouse, William B, ’Design for Success: A Human-Centered Approach to Designing Successful Products and Systems’, Wiley-Interscience, 1991.
8. J.M. Gordon Jr.,’ Industrial Design of Plastics Products’, John Wiley and Sons, 2003.
9. G. Boothroyd, ‘Product Design for Manufacture and Assembly’, 2nd Edition, Marcel Dekker Inc., 2002.
10. J.W. Priest, S. M. Jose, ‘Product Development for Manufacturing’, Marcel Dekker Inc., 2001.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	3	-	2	-	-	-	-	-	1	1
3	3	-	-	-	1	-	-	-	-	-	2	2
Avg.	**2**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23010 BUILDING AUTOMATION AND CONTROL SYSTEMS L T P/S C
3 0 0 3

OBJECTIVES:

- To giveintroduction to automation and management systems in buildings.
- To give knowledge about specific systems in the field of fire safety, security, communication, HVAC, lighting, climate control, etc.,
- To give information about integration of systemswith each other and with building construction.

UNIT I INTRODUCTION TO BUILDING AUTOMATION AND CONTROL SYSTEMS9

Introduction to and History of Building Automation Systems (BAS). Building Types and Key Requirements. Different systems in BAS which includes HVAC, security and surveillance, communication, fire, lighting systems, climate control, etc. Ideas of intelligent buildings, Human Machine Interface (HMI), facilities management and life cycle costs. The fundamental concepts of building control, and building automation. Control Theory. Building automation topics include device technology (sensors, control elements), direct digital control, control applications, communication systems, and Building Automation Protocols.

Role of different stakeholders (Architect, contractor, consultant, application engineer and engineer) in BAS system design.

UNIT II FIRE SAFETY SYSTEMS 9

Statutory Standards and codes for fire safety. Objective and essential components and working of a Fire Alarm System. Type of detection technology in the Fire alarm system.Basic knowledge on working, design and installation of Fire alarm system. Fire suppression systems. Components, working and installation.

various types of technologies currently in use.

UNIT III SECURITY, SURVEILLENCEAND COMMUNCATION SYSTEMS 6

Introduction to Access Control, Intruder Alarm, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they work, are designed and installed. Introduction to CCTV, Perimeter protection system, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they work, are designed and installed.

Public Address System and other communication systems and their requirements.

UNIT IV HVAC, LIGHTING, CLIMATE CONTROL 12

Building Automation and Control Systems for HVAC, Lighting and Climate Control. Energy Conservation Control Strategies.

UNIT V INTEGRATED BUILDING MANAGEMENT SYSTEM 9

Overview of various components, technology, sensors, etc., that are common to more than one system. Integrated Building Management System IBMS.Integrated approach in design, maintenance and management system. Current trend and innovation in building automation systems. Impact of Information Technology.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Outline the various building management systems.
CO2 Choose appropriate fire safety systems for buildings.
CO3 Categorise the various systems of security and surveillance for buildings.
CO4 Demonstrate the basics of HVAC, lighting and climate control.
CO5 Recall the use of integrated building management system.

TEXTBOOKS:

1. Building Automation Systems – A Practical Guide to Selection and Implementation, Maurice Eyke
2. National Building Code of India

REFERENCES

1. George Clifford , Modern Heating Ventilating and Air Conditioning
2. Vaughn Bradshaw , Building control Systems
3. Roger W. Haines, HVAC Systems Design Handbook, Fifth Edition by 5.
4. James E. Brumbaugh, HVAC Fundamentals
5. Herman Kruegle, CCTV Surveillance,
6. John L. Bryan, Fire Suppression Detection System
7. Vivian Capel, Security Systems and Intruder Alarm System,
8. Mike Constant & Peter Turnbull, The Principles and Practice of Closed Circuit Television.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	-	-	-	-	1	3	1	-	-	-	-
2	2	-	-	-	-	1	3	3	-	-	-	-
3	2	-	-	-	-	1	3	3	-	-	-	-
4	2	-	-	-	-	1	3	3	-	-	-	-
5	2	-	-	-	-	3	3	1	-	-	-	-
Avg.	**2**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23018 DATA VISUALISATION AND ANALYSIS L T P/S C
2 0 1 3

OBJECTIVES

- To give exposure to the importance of understanding Information through visual thinking.
- Enabling skill in exploring the various ways of visualising and analysing data.
- To enable generating innovative diagrams from the collected data to discern and recognise patterns and phenomena.

UNIT I INTRODUCTION TO DATA VISUALISATION 9

Introduction to data visualisation. Principles of data visualisation. Conventional methods of visualisation.various applications. Types of Digital Data and Data structures. Terminologies Used in Big Data Environments. Various ways of Collection, Processing and Analysing the data. Classification of Data. Analytics frameworks. Open data platforms.

UNIT II OUTLINE OF DATA VISUALISATION TOOLS 12

Overview on Visual analysis languages. Interactive data visualisations. Multivariate visualisation. Geospatial visualisation. Data Visualisation platforms- Tableau,Polaris,GGplot2,Matplotlib,PowerBI, etc.
Exercises using some of the above platforms using sample datasets.

UNIT III DATA VISUALISATION IN ARCHITECTURE 12

Introduction to mapping and data visualisation in architecture. Types of visualisation tools - 2D/3D. Architectural design process outline. Various Data collection techniques. Basics sets of architecture and urban design data required. Quantitative and Qualitative data. Spatial and Non-Spatial data. Introduction to functional visualisation of various attributes of buildings -Activity, zoning, matrix, proximity chart, human behaviour, demographics, circulation patterns, etc.
Exercises related to above.

UNIT IV ANALYSIS OF ARCHITECTURAL AND URBAN DATA 12

Overview of recent design approach related to study and design for people and space with help of big data. Analysis and visualisation of data. Quantitative and Qualitative data. Programme, Micro climate, Geospatial Analysis, Energy modelling, Vegetation,User behaviour studies, Sensory analysis, Post occupancy studies, Participatory/Interactive approach etc.
Case studies of Data Visualisation as design process- Works of Rem Koolhaas, UN Studio, FOA etc.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Knowledge about the importance of data visualisation.
CO2 Familiarity with different methods and techniques of data visualisation.
CO3 Skill in working out simple exercises related to data visualisation in the realm of architecture and urban design.

TEXTBOOKS

1. Winifred E. Newman, Data Visualisation for Design Thinking: Applied Mapping, Routledge 2017
2. C. J. Date, A. Kannan, S. Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
3. Andy Kirk, “Data Visualization: a successful design process”, Second Edition, Packt publishing limited,2012
4. Andy Kirk , “Data Visualisation: A Handbook for Data Driven Design”,Second Edition,SAGE Publication Ltd,2019
5. David McCandless ,”Knowledge is Beautiful”,William Collins,2014
6. David McCandless ,”Information is wealth”,William Collins,2012
7. Anthony Vidler, ‘Diagrams of Diagrams: Architectural Abstraction and Modern Representation’, Representations, No. 72. (Autumn, 2000), pp. 1-20
8. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.

9. Iain Fraser and Rod Henmi, ‘Envisioning Architecture – An Analysis of Drawing, 1991’,John Wiley and Sons, 1993.

REFERENCES

1. Robert S. Wegant, ‘BIM Content Development: Standards, Strategies, and Best Practices’, John Wiley, 2011.
2. Chuck Eastman et al, ‘BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors’, John Wiley, 2011.
3. Joseph Clarke, ‘Energy Simulation in Building Design’, Routledge, 2007
4. BIM Handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors (second edition) by Chuck Eastman, Paul Teicholz, Rafael Sacks, and Kathleen Liston Available online (e.g. $55 on Amazon) - please use the second edition ISBN-13: 978-0470541371 ISBN-10: 0470541377

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1			1									
2			2									
3	3		3									
4												
Avg.	**3**		**2**									

1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23023 HERITAGE CONSERVATION L T P/S C
3 0 0 3

OBJECTIVES

- To introduce the need for heritage and rationale for architectural conservation and to provide familiarity with the history of conservation.
- To give familiarity about various agencies involved in the field of conservation worldwide.
- To give an overview of conservation of architecture and heritage towns of India.
- To give detailed information about the materials and methods of heritage preservation.
- To give an overview of conservations practice and strategies in India.

UNIT I INTRODUCTION TO HERITAGE AND CONSERVATION 12

Importance of heritage. Need, debate and purpose of conservation. History of conservation movement. International agencies like ICCROM, ICOMOS, UNESCO and their role in conservation. Charters. principles and ethics of conservation. Scope and approaches to conservation - material based, value based, living heritage. Issues of historicity, authenticity, preservation, restoration, transformation, conservation. Conservation, preservation and adaptive reuse.

UNIT II CONSERVATION IN INDIA 7

Museum conservation. Monument conservation and the role of ASI, SDA, INTACH. Central and state government policies and legislations. Inventories and projects. Selected case studies of sites such as Hampi, Golconda, Mahabalipuram. Craft Issues of conservation.

UNIT III CONSERVATION MATERIALS, METHODS AND STRUCTURAL SYSTEMS10

Investigation techniques and tools. Behaviour of historic materials and structures. Problems with masonry, foundation. Repair methods, traditional and modern methods. Seismic retrofit, services additions and disabled access to historic buildings. Moisture and pollution problems.

UNIT IV CONSERVATION PRACTICE 7

Listing of monuments. Documentation of historic structures. Assessing architectural character. Historic structure report. Guidelines for preservation, rehabilitation and adaptive re-use of historic structures. Case studies of palaces in Rajasthan, dwellings in Chettinad and Swamimalai. Heritage site management.

UNIT V URBAN CONSERVATION STRATEGIES 9

Understanding the character and issues of historic towns. Cultural landscapes. Selected case studies. Historic districts and heritage precincts. Conservation through planning. Heritage economics. Financial incentives and planning tools such as TDR. Heritage tourism. Community based approach to conservation. Conservation management. Case studies of sites like Cochin, Pondicherry French town.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 An understanding of the importance of heritage and scope of conservation.
CO2 Familiarity with issues and practices of conservation through case studies.
CO3 Knowledge about methods for preserving and repairing historic buildings.
CO4 Familiarity with conservation strategies through principles and project case studies.

TEXTBOOKS

1. Bernard Fielden, 'Conservation of Historic Buildings', Architectural Press, 2003.
2. Bernard Fielden, 'Guidelines for Conservation - A Technical Manual', INTACH, 1989.
3. MS Mathews, 'Conservation Engineering', University at Karlsruhe, 1998.
4. J. Kirk Irwin, 'Historic Preservation Handbook', McGraw Hill, 2003.
5. Donald Appleyard, 'The Conservation of European Cities', M.I.T. Press, Massachusetts, 1979.
6. Publications of INTACH

REFERENCES

1. James M. Fitch, ‘Historic Preservation: Curatorial Management of the Built World’, University Press of Virginia, Reprint Edition,1990.
2. Robert E. Stipe, 'A Richer Heritage: Historic Preservation in the Twenty-First Century’, University of North Carolina Press, 2003.
3. B.P. Singh, 'India's Culture- The State, The Arts and Beyond', Oxford University Press, 2009
4. A.G. K. Menon (Ed), 'Conservation of Immovable Sites', INTACH Publication, N. Delhi.
5. John H. Stubbs and Emily G Makas. ‘Architectural Conservation in Europe and the Americas’, John Wiley and Sons, 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	2	-	-	-	1	-	1
2	-	-	-	3	2	2	-	-	-	1	-	1
3	-	-	-	3	2	2	-	-	-	-	-	1
4	-	-	-	3	2	2	-	-	-	-	-	1
Avg.	**-**	**-**	**-**	**3**	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23030 TECHNIQUES OF DIGITAL ART L T P/S C
1 0 2 3

OBJECTIVES

- To give introduction to digital art as a domain.
- To give exposure to different types of and media for digital art.
- To develop skills in basic techniques of digital art.

UNIT I INTRODUCTION TO DIGITAL ART 9

Definition of digital art. Origin and history of digital art. Classification of different types of digital art – photography, photopainting, digital collage, Digital painting, 3D Digital painting, vector drawing, algorithmic art, mixed media, video art, interactive digital installations. Critical theories of digital art. Famous digital art works. Elements and principles of art as applicable to digital art- as light, colour, texture, scale, motion, etc., through examples.

UNIT II 2D ART 12

Software and techniques for raster image editing. Editing and creating digital raster images through various kinds of manipulation based on elements and principles for a selected theme. Creating 2D vector art based on elements and principles for a selected theme.

UNIT III 3D ART 12

Software and techniques for3D drawing and video. Creating 3D art based on elements and principles for a selected theme.

UNIT IV MIXED MEDIA 12

Introduction to different types of mixed media in digital art. Project involving mixed media on any theme.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Awareness of digital art as a domain.
CO2 Knowledge about the types and media for digital art.
CO3 Skill in basic techniques for digital art.

TEXTBOOKS

1. Thomson-Jones, Katherine and Shelby Moser, "The Philosophy of Digital Art", The Stanford Encyclopedia of Philosophy (Spring 2021 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/spr2021/entries/digital-art/>.

REFERENCES

1. Mark Von Wodtke, ‘Mind over Media: Creative Thinking Skills for Electronic Media’, McGraw-Hill, New York, 1993.
2. Noah Wardrip-Fruin and Nick Montfort, Eds, ‘The New Media Reader’, MIT Press, 2003.
3. Zalanski and Fischer, ‘Shaping Space: The Dynamics of Three-Dimensional Design’, Cengage, 2006.
4. Ocvirk, Stinson, Wigg, Bone and Cayton, ‘Art Fundamentals: Theory and Practice’, McGraw-Hill Education, 2012
5. Mary Stewart, ‘Launching the Imagination: A Comprehensive Guide to Basic Design’, McGraw Hill 2011.
6. Catherine Elwes, ‘Video Art: A Guided Tour’, Tauris, 2004.
7. Peter Ratner, ‘3-D Human Modeling and Animation’, Wiley, 2009.
8. Jaejin Choi, ‘Maya Character Animation’, SybexInc; Bk and CD-Rom Edition, 2002.
9. Nikos Sarris and Michael G. Strintzis, ‘3D Modeling and Animation: Synthesis and Analysis Techniques for the Human Body’, IRM Press, 2004.
10. 3DTotal.com, ‘Digital Art Masters’.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	-	3	-	1	-	-	-	-	-	-	-
2	2	-	3	-	1	-	-	-	-	-	-	-
3	2	-	3	-	1	-	-	-	-	-	-	-
Avg.	**2**	**-**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23029 GREEN BUILDING L T P/S C
3 0 0 3

OBJECTIVES

- To give introduction to the concept of green building.
- To give exposure to the different systems and organisations associated with green building concept.
- To give knowledge about the various areas/ realms of architecture in which green building concepts can be applied.

UNIT I INTRODUCTION TO CONCEPT OF GREEN BUILDING 9

Evolution and definition of the term Green Building. Benefits of green building. History and role of different organisations. World Green Building Council, LEED, BREEAM, GREENSTAR, ECBC, GRIHA, IGBC, etc., Different methods and systems to rate a building. Criteria in different systems. Salient points common to all systems.Typology wise parameters for green building. Sustainable Development Goals.

UNIT II SITE AND RESOURCES 9

Green building and site selection. Working with the site and optimal utilisation of resources. available. Soil, ecology, landscape, water, circulation, microclimate, lighting, air quality, noise. Site planning principles. Accessibility for differently abled. Recycling and reuse of materials. Rain water management. Waste management. Health and well being. Case studies.

UNIT III ARCHITECTURAL MORPHOLOGY 9

Building footprint, shape, size and proportion to optimise comfort and energy consumption. Building components such as openings, courtyards, skylights, shading devices, fenestration, etc., Designing for lighting, ventilation and rain within the local climatic context.Case studies.

UNIT IV ENERGY AND MATERIALS 9

Embodied energy of materials. Thermal performance of materials. Optimising energy performance. Reducing energy demand. Life Cycle Cost. Building system management. Finishes and fenestration. Recycling and reuse of materials. Air quality in buildings. Non Toxic materials. Renewable energy for buildings. Case studies.

UNIT V ZERO CARBON BUILDING 9

Different techniques and methods for zero carbon building. Case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO6 Recall green building concepts and various rating systems.
CO7 Identify sites and resources for sustainable building performance.
CO8 Analyse buildings and their components for sustainable architectural design.
CO9 Examine buildings for their life cycle performance.
CO10 List techniques for design of zero carbon buildings.

TEXTBOOKS

4. GRIHA Manuals
5. Francis D.K.Ching, Green Building Illustrated, Wiley 2014
6. Michael Bauer, Peter Mösle, Michael Schwarz, Green Building, Guidebook for Sustainable Architecture, Springer 2010

REFERENCE

2. Bill Maclay, The New Net Zero, Chelsea Green Publishing Co 2014

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	1	-	-	-	-	-	3	1	-	-	-
2	3	1	-	-	-	-	-	3	1	-	-	-
3	3	3	-	-	-	-	-	2	3	-	-	-
4	3	2	-	-	-	-	-	2	3	-	-	-
5	3	1	-	-	-	-	-	2	1	-	-	-
Avg.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23014 ADVANCED STRUCTURES L T P/S C
3 0 0 3

OBJECTIVES

- To give an understanding of the loss of pre- stress and design requirements for determinate pre-stressed concrete 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 plate

UNIT I PRESTRESSED CONCRETE 10

Losses of Prestress. Design requirements. Design of determinate beams.

UNIT II INDUSTRIAL STRUCTURES 8

Classification, planning and layout requirements, functional requirements. Types of industrial structures- power plants, bunkers and silos, cooling towers, containment structures, chimneys. Merits. Case studies.

UNIT III HIGH–RISE BUILDINGS 7

Introduction. Load action in high rise buildings. Various structural systems. Waffle slab. Approximate analysis of frames for gravity and horizontal loadings. Case studies.

UNIT IV TENSILE STRUCTURES 10

Concept, development, laws of formation, merits and demerits of pneumatic structures. Basic principles, forms, merits and demerits of cable structures. Case studies.

UNIT V SHELLS, DOMES AND FOLDED PLATES 10

Shells of translation. Shells of revolution. Classification of shells and different forms. Domes. Types of folded plates. Space frames. Case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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.

TEXTBOOKS

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.
7. Ramaswamy G.S, 'Design and Construction of Concrete Shell Roofs', CBS, 2005.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	2	3	-	-	-	-	-	1
2	-	-	-	-	2	3	-	-	-	-	-	1
3	-	-	-	-	2	3	-	-	-	-	-	1
Avg.	**-**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23013 ART APPRECIATION L T P/S C
2 0 1 3

OBJECTIVES

- To introduce art as a fundamental human activity, its characteristics and ways in which it can be understood. To introduce the vocabulary of art and to enable the appreciation of art.
- To understand different productions of art as manifestations within particular contexts.

UNIT I INTRODUCTION TO ART AND ANCIENT ART 11

Definition of art, need for art, role of art. Art, reality, perception, representation. Appreciating art in terms of form (means, types, tools and techniques, vocabulary of art - principles and elements), content (story conveyed, meaning) and context (the situation and time of production of art).

Prehistoric Art across the world. Egyptian and Mesopotamian art. Greek and Roman art. Indian Art: Manuscript paintings, Mural paintings, Miniatures, Folk Paintings.

UNIT II WESTERN ART: RENAISSANCE TO MODERN 12

Renaissance and Baroque art. Neoclassicism. Romanticism. Realism. Art in India during colonial period. Impressionism. Post Impressionism. Fauvism. Expressionism. Birth of modern art. Abstract/ Non-Objective art. Cubism. Dadaism. Surrealism. Futurism. Constructivism. Suprematism. De Stijl. Abstract Expressionism. Collage Art. Modern Indian art.

UNIT III INDIAN MODERN ART 12

Art in India during colonial period. Birth of modern art, CollEge of Arts, Madras, Bengal, Mumbai, Baroda. Subaltern art movements in India, Progressive Artists' Group, Delhi Silpi Chakra, Cholamandal Artist's Village, Women Artist.

UNIT IV POSTMODERN AND CONTEMPORARY 12

Postmodernism in Art. Pop art. Conceptual Art. Neo-Conceptual Art. Minimalism & Kinetic Art. Op Art. Photorealism. Post-minimalism. Installation art. Land art. Environmental Art. Virtual Reality and Art. Artificial Intelligence. Major Trends In Modern Art in India: Folk Art, Tantric Art, Abstract Art, Figurative Art, Popular Art, Miniature Art.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO4 An understanding and appreciation of art as basic and varied human creation related to cognition and experience.
CO5 Awareness of important art productions in the West and India.
CO6 Sensitivity towards collective and individual cultural productions as unique expressions of historical and geographic context.

TEXTBOOKS

1. Fred, S. Kleiner, 'Gardener's Art through Ages', Wadsworth Publishing, 2012.
2. Bernard S. Myers, 'Understanding the Arts', Holt Rinehart and Winston Inc, 1964.
3. H.H. Arnason, 'History of Modern Art', Thames and Hudson, 1977.
4. Partha Mitter, 'Indian Art', Oxford University Press, 2001.
5. Edith Tomory, 'A History of Fine Arts in India and the West', Orient Blackswan, 1989.

REFERENCES

1. Peter and Linda Murray, 'The Penguin Dictionary of Art and Artists', Penguin, 1989.
2. E.H. Gombrich, 'The Story of Art', Phaidon, 2002.
3. E.H. Gombrich, 'Art and Illusion', Phaidon, 2002.
4. 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village, Madras,1974.
5. A.K.Coomaraswamy, Fundamentals of Indian Art, Historical Research Documentation Programme, Jaipur, 1985.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	-	2	3	-	-	-	-	-	-	-	-
2	1	-	1	3	-	-	-	-	-	-	-	-
3	1	-	1	3	-	-	-	-	-	-	-	-
Avg.	**1**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23014 **CRITICAL WRITING** **L T P/S C**
0 0 3 3

OBJECTIVES

- To enable the building of critical thinking through discussions, reading and writing exercises exploring specific themes.
- To enable a coherent line of thought, connecting and ordering different aspects of a situation/theme.
- To help in verbal and written expression at an advanced level.
- To facilitate applyingskills in critical thinking in the realm of architecture.

CONTENT

Critical writing will help to develop thoughts/ideas/opinion on a topic backed by discussion, research and discernment.

A list of themes will be selected and offered to the class in small groups. The themes will be similar in terms of scope and workload. Students would read up on the themes and come for discussion to class. Based on the discussion, the students will hone their thoughts and read further. They would then write about the themes. Thesewritings would be presented and discussed in class. A further development of the writing would then be done. This process would be iterated a few times so that a coherent thought process and written narrative results about the theme in consideration. The discussions and draft essayfor this would constitute the first assessment.

Furtherto this, themes within architecture will be introduced. The training ensured in the previous themes would be applied to looking at larger architectural themes. While the process would be the same as for the general themes, in the architectural themes, the scale would be larger and the discussions would be more one to one with faculty. There will be sessions on developing a voice, finding sources, referencing research, narrative building. One well-researched essay on a topic of interest in architecture would ensue. The length and nature of the essay will be based on the topic and will be informed during the course of the semester. The discussions and draft essay on architecture would be evaluated in the second and third assessment.

The final two essays would be submitted for the Viva Voce Examination in the form of a report.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO5 Ability to think, talk, discuss, read, conclude and write about a specific topic with knowledge, insight and skill.

CO6 Clarity in identifying, connecting and structuring facts and thoughts through writing.

CO7 Ability to write an architectural essay that is perspective based supported by facts and arguments or fact based supported by analysis and argument.

CO8 Overall development of skills in critical thinking that would guide design actions.

REQUIRED READING

- Creme, P. and M. Lea, Writing at University: A guide for students. Open University Press, 2008.
- Murray, N. Writing Essays in English Language and Linguistics, Cambridge University Press, 2012.
- Stephen Bailey, ‘Academic Writing: A Handbook for International Students’, Routledge, 2011.

REFERENCES

3. Andrew Goatly, ‘Critical Reading and Writing in the Digital Age: An Introductory Coursebook’, Routledge, 2016.
4. Richard Coyne, ‘Interpretation in Architecture: Design as Way of Thinking’, Routledge, 2005.

CO-PO Mapping

CO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12

1	-	-	3	2	3	-	-	-	-	-	-	-
2	-	-	3	2	3	-	-	-	-	-	-	-
3	-	-	3	1	2	-	-	-	-	-	-	-
4	-	-	3	1	3	-	-	-	-	-	-	-
Avg.	**-**	**-**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23015 **SOFT SKILLS** **L T P/S C**
3 0 0 3

OBJECTIVES

- To introduce soft skills as important human attribute/ quality to be developed.
- To enable development of communication skills in various scales and media.
- To enable development of skills in terms of group and team behaviour.

UNIT I INTRODUCTION TO SOFT SKILLS 9

Introduction to Soft Skills. Understanding of self. Self-awareness, Self- Management and Self Development. Values. Attitude. Positive Thinking and optimism. Confidence and excellence. Developing perception. Patience, persistence and flexibility. Empathy and Emotional Intelligence. Interpersonal relations and social behaviour. Stress management. Time Management.

UNIT II INTRODUCTION TO COMMUNICATION SKILLS; LISTENING AND TALKING 9

Classification and types of Communication. Verbal and non-verbal communication. Formal and formal communication. Barriers in communication.
Listening Skills, Types of Listening. Enhancing listening. Understanding context of words.
Responding. Speaking. Self development through speaking.
Nonverbal Communication. Body language. Proxemics.
Telephonic Communication. Telephone etiquette.

UNIT III COMMUNICATION SKILLS – READING AND WRITING 9

Reading as cognitive process. Types and rate of reading. Critical Reading. Skimming and scanning. Techniques for effective reading.
Writing Skills. Writing Style. Purpose of writing.
Business writing, Report writing. Writing papers. Email Communication. Strategies based on purpose.

UNIT IV GROUP COMMUNICATION 9

Understanding of cultural, social and economic diversity and adapting to others. Body language and etiquette. Organisational Communication. Group Communication, Communication Breakdown. Conflict Management. Negotiation Skills. Meeting Management. Team Building and Team work. Leadership Skills.

UNIT V PRESENTATIONS, INTERVIEW AND GROUP DISCUSSIONS 9

Advanced Speaking Skills. Body language. Emotional intelligence and Critical Thinking.
Oral Presentations, Speeches and Debates, Combating Nervousness, Patterns and Methods of Presentation, Oral Presentation- Planning and Preparation, Making Effective Presentation, Speaking for Various Occasions.
Planning and Preparation for interviews, Drafting Resume. Facing Job Interview. Group Discussion.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO4 Familiarity with the importance of soft skills.
CO5 Knowledge about how to communicate effectively in various scales and media.
CO6 Exposure to importance of appropriate team and group behaviour.

TEXTBOOKS

1. Soft Skills, K.Alex, S.Chand, 2010
2. Soft Skills, Hariharan S, Sundararajan N, Shanmugapriya S.P, MJB Publishers 2010.
3. The ACE of Soft Skills, Gopalaswamy Ramesh, Mahadevan Ramesh, Pearson 2010.

REFERENCES

1. Understanding Interpersonal Communication, Richard West and Lynn H.Turner, Cengage Learning, 2010.
2. Interpersonal Communication, Steven A. Beebe, Susan J. Beebe, Mark V. Redmond, Pearson 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	-	-	**3**	-	-
2	-	-	-	-	-	-	-	-	-	**3**	-	-
3	-	-	-	-	-	-	-	-	-	**3**	-	-
Avg.	-	-	-	-	-	-	-	-	-	**3**	-	-

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23017 CONTEMPORARY BUILDING MATERIALS L T P/S C
3 0 0 3

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 7

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 10

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 10

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 9

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 9

Types of materials and its constitution, manufacturing and construction technology requirement for 3D printed buildings 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

COURSE OUTCOMES:

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

CO3 Exposure to the need and use of various contemporary materials in creating innovationand ultra-performance in building design.

CO4 An understanding of characteristics and performance of the newer materials in terms of detailing and application to the context.

TEXTBOOKS

1. 1Christiane 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.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	3	-	-	-	-	-	-
2	-	-	-	-	2	-	-	-	-	-	-	-
Avg.	**-**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23018 DIGITAL FABRICATION AND ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To give exposure to various digital production tools to build artefacts as part of creative design process.
- To give knowledge about utilising prototyping and modelling as a design medium that supports the full spectrum of digital design as a paperless process.
- To give knowledge about fabrication process in Digital Architecture as a way to bring software models into reality.

UNIT I INTRODUCTION TO DIGITAL FABRICATION 9

Introduction to Digital Fabrication; Advantages of Digital Fabrication; Evolution of digital fabrication in architecture, overview of the impact the technology, new realm of possibilities for architectural expression, Etc.,

UNIT II ADDITIVE FABRICATION 9

3d Printing, Process of 3d printing, it's Possible Materials Etc., Case studies of Application of 3d printing in practice at different scales;

UNIT III SUBTRACTIVE FABRICATION 9

Laser Cut, CNC Milling, Water Jet Cutting, Etc., it's Possible Materials Etc., Case studies of Application of Subtractive Fabrication in practice at different scales;

UNIT IV TRANSFORMATIVE FABRICATION 9

Robotic Fabrication, Mechanically Transformative Process, Etc., it's Possible Materials Etc., Case studies of Application of Transformative Fabrication in practice at different scales;

UNIT V FILE TO FACTORY PROCESS 9

Preparation of File to Factory Process, Optimization of meshes/files, STL Formats, Etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO3 Awareness to the machines, different methods of fabrication and the workability with materials.

CO4 Ability to correlate between the design processes and Digital Prototype or Model attribute.

REFERENCES

1. Branko Kolarevic and Kevin Klinger, Manufacturing Material Effects: Rethinking Design and Making in Architecture, 2014
2. Digital Fabrication, Paul Andersen, David Salomon, Sanford Kwinter, David Carson, Architecture of Patterns, W. W. Norton & Co, 2010
3. Heino Engel, Structure Systems, 1997
4. Lisa Iwamoto, Digital Fabrications: Architectural and Material Techniques, Princeton: Princeton Architectural Press, 2009
5. Branko Kolarevic, Architecture in the Digital Age: Design and Manufacturing, London: Taylor & Francis 2005
6. Bob Shiel, Ruairi Glynn, Fabricate: Making Digital Architecture, Toronto: Riverside Architectural Press, 2011
7. Emergent Design Group, Morphogenetic Design Strategies AD, 2004
8. Farshid Moussavi, Daniel Lopez, Garrick Ambrose, Ben Fortunato, Ryan R. Ludwig and Ahmadreza Schricker, The Function of Form
9. Rivka Oxman and Robert Oxman, The New Structuralism: Design, Engineering and Architectural Technologies
10. Michael Weinstock, Michael Hensel, Achim Menges (eds.), Emergence: Morphogenetic Design Strategies, AD, Vol 74, No. 3, May/June 2004

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	1	-	-	-	3	-	-	1
2	-	-	-	-	1	-	-	-	3	-	-	1
Avg.	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23019 CHENNAI- EVOLUTION AND ARCHITECTURE L T P/S C
3 0 0 3

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 I PRE-COLONIAL CHENNAI REGION 7

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 – Tamilagam, fishing hamlets, urban settlements, rural areas. Pallava architecture. Historic settlements such as Mylapore, Triplicane, West Mambalam.

UNIT II COLONIAL CHENNAI 11

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- educational institutions, 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 and cultural modernity.

UNIT III MODERN CHENNAI 11

Urbanisation 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. Urbanisation and Master plans in the 1970s. New typologies 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 IV URBAN CULTURE 8

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 V URBAN ISSUES AND SOLUTIONS 8

Changes in 21st century Chennai- urbanisation, migration, globalisation, growth of IT, new industries and 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

COURSE 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 READING

- 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 by C.P.RamaswamiAiyar Foundation, Chennai, 2008.
- P. Rajaraman, ‘Chennai Through The Ages’, Poompozhil Publishers, 1997.

REFERENCES

1. S. Muthiah, ‘Madras Miscellany – People, Places and Potpourri’ , East West Press Pvt Ltd, 2011.
2. Nandhitha Krishna, ‘Madras- Chennai- Its History and Environment’, C.P.Ramaswami Aiyer Foundation 2009.
3. David Waltner et al, ‘The Ecosystem Approach: Complexity, Uncertainty, and Managing for Sustainability’, Columbia University Press, 2008.
4. C.S. Srinivasachari, ‘History of the City of Madras’, Varadachary, 1939.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	-	-	-	-	2
2	-	-	-	3	2	-	-	-	-	-	-	2
3	-	-	-	3	2	-	-	-	-	-	-	2
4	-	-	-	3	2	-	-	-	-	-	-	2
Avg.	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23020 HISTORY OF NON-WESTERN ARCHITECTURE L T P/S C
3 0 0 3

OBJECTIVES

- To create awareness about the history of non-Western Architecture
- To give outline knowledge of various non-Western Architectural traditions.
- To inform about colonial influences on non-Western architecture.

UNIT I CHINESE, JAPANESE AND KOREAN ARCHITECTURE 11

China - Prehistoric history, regional architecture, dynasty architecture, architecture of the general public, imperial architecture, religious architecture, Horizontality, Enclosure, hierarchy, symmetry, influences of Chinese architecture on neighbouring regions, influence of neighbouring regions on Chinese architecture

Japanese - Prehistoric history, regional architecture and architecture of different periods, pagodas, shrines, temples, wooden structures, zen architecture, gardens, castles, imperial architecture, early minimalism, Japanese-Western eclectic architecture, colonial architecture, FLW, Corbusier, Tange's architecture in Japan.

Korea – Dolmens, Buddhist architecture, hanoks, semi-subterranean houses, Korean forts, pagodas, differences from Chinese and Japanese pagodas, tombs.

UNIT II SOUTH-EAST ASIAN ARCHITECTURE 11

Historic architecture of Thailand, Cambodia, Laos, Myanmar and Indonesia, Khmer architecture, Buddhist architecture, Dutch architecture of Indonesia, British colonial architecture of Singapore and Sri Lanka, French architecture of Vietnam, Spanish colonial architecture of Philippines, temple complexes, Angkor wat, Borobudur, Angkor thom, Luang Prabang, Preah Vihear.

UNIT III AFRICAN ARCHITECTURE 9

Early history – Egyptian, Phoenician, Nubian, Roman architecture, Aksumite architecture, Nigerian dry stone buildings, Islamic and Moorish architecture of north Africa- in the regions of Tunisia, Egypt, Morocco, Great Mosque of Djenné, Tomb of Aksia, Ibwami of Rwanda, Swahili architecture, Colonial architecture of Cape Town, Saint-Louis, Grand-Bassam, Gold Coast, etc.

UNIT IV RUSSIA AND MONGOLIA AND KOREA 7

Russia - Slav medieval forts, Christian architecture of Kievan Rus, Veliky Novgorod, Kiev, Murom. Muscovite architecture, Imperial architecture of Russia – castles, cathedrals and palaces, post-revolution architecture.

Mongolia – Stupas, Yurts, Imperial architecture at Karakorum, Buddhist monasteries.

UNIT V OCEANIA 7

Indigenous architecture of Oceania. Colonial Architecture of Australia and New Zealand.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO4 Familiarity with the architecture of non-Western traditions
CO5 Exposure to colonial influence on non-Western cultures
CO6 Broader awareness of historical processes across the world in the realm of architecture

TEXTBOOKS

1. Banister Fletcher, A History of Architecture, CBS 1999
2. Ching et Al, A Global History of Architecture, Wiley 2017

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	-	-	3	-	-	-	2
2	-	-	-	3	2	-	-	3	-	-	-	2
3	-	-	-	3	2	-	-	3	-	-	-	2
Avg.	**-**	**-**	**-**	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**2**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23021 **PRODUCT DESIGN** **L T P/S C**
1 0 2 3

OBJECTIVES

- To give understanding about the evolution of form and space in product design.
- To facilitate the interpretation of design concepts in different ways and layers.

UNIT I INTRODUCTION TO PRODUCT DESIGN 9

Concept of Form and Space. Form elements and their properties - Volume, Plane, Line, Point. Form: Dimensions, Proportions, 3-D Primary Geometric Forms. Movement and Forces Relationships: Axis, Axial Movement, Forces, Curves and their application in Form. Study of Form relationships – Order, Joined Forms, Transitional Forms, Evolution of Form. Organisation of form – Spatial, Matrix. Static, Dynamic and Organic. Symmetry and Asymmetry. Balance: Structural, Visual. Orientation of form: Direction, Position. Overall Proportion. Considerations of Colour, Pattern, Texture and Proportion in products and product environments. Relating Form to Materials and Processes of Manufacture. Use of Computers for Form generation.

UNIT II PRODUCT DESIGN 12

Selection of the projects is based on the possibility of user interaction leading to innovation. Projects end with a comprehensive presentation through working/ mock up models, design drawing and a report. The project is supported by detailed discussion on various stages in the design process emphasising the complementary nature of systematic and creative thinking. This is achieved by short supporting assignment in following topics: Creativity techniques like brain storming and synectics to develop creative attitude and open mind, design opportunity, problem perception , Idea Sketching ,clustering of ideas for concept development, exploratory mock up models for concept development, evaluation of concepts, final concept selection, concept development, refinement and detailing.

UNIT III PRODUCT DETAILING 12

Batch production and mass production of products. Technical considerations of internal subsystems of a product and their influence on product detailing. Selection of natural, synthetic and manmade materials and their processes for detailing products for manufacture. Detailing mechanisms for foldable, stackable and collapsible considerations of the product. Design detailing of components vis-à-vis considerations of manufacture, maintenance and assembly. Detailing of products to be manufactured in Plastics. Component design of electronic products. Detailing for conditions of use including knock-down systems and its joinery. Usability and Ergonomic issues in product detailing. Design assignments on detailing of a given product component.

UNIT IV PRODUCT DESIGN PROTOTYPING AND ADVANCED MANUFACTURING PROCESSES 12

Introduction to automation and Computer Aided Design (CAD), Principles of Basic Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM). Hardware and graphics software in CAD. CAD applications and integration with other software packages. Evolution of Numerically Controlled (NC) machines and Computer Numerically Controlled (CNC) machines, programming of CNC machine. Free form or generative manufacturing processes (Rapid Prototyping). Working Principles of Rapid Prototyping machines. Types of Rapid Prototyping machines with technology employed. Rapid Tooling (RT): Soft tooling, Vacuum casting, Room temperature vulcanisation (RTV). Input devices, Contact and non-contact type digitisers such as Co-ordinate measuring machines, Laser and White light scanners. Product Modeling using CAD software and Rapid Prototyping machine. Production using Rapid Tooling approach.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO4 An understanding of product design as a discipline.
CO5 Ability to interpret real life situation into design.
CO6 Knowledge about contemporary design process and manufacturing process of design.

REFERENCES

1. H. G. Greet and R. R. Kostellow, ‘Elements of Design and the Structure of Visual Relationships’, Architectural Press, NY, 2002.
2. K. Critchlow, ‘Order in Space: A Design Source Book’, Thames and Hudson, 2000.
3. C. Akner-Koler, ‘Three-dimensional Visual Analysis, Institution for Industrial Design’, Konftfack, Sweden, 1994.
4. Mike Baxter, ‘Product Design: Practical Methods for the Systematic Development of New Products’, Chapman and Hall, 1995.
5. Roozenburg and Eekels, ‘Product Design: Fundamentals and Methods’, John Wiley and Sons Inc; New Ed edition, 1995.
6. Goodrich, Kristina, ‘Design Secrets: Products: 50 Real-Life Projects Uncovered’, Industrial Designers Society of America, Rockport Publishers, 2001.
7. Rouse, William B, ’Design for Success: A Human-Centered Approach to Designing Successful Products and Systems’, Wiley-Interscience, 1991.
8. J.M. Gordon Jr.,’ Industrial Design of Plastics Products’, John Wiley and Sons, 2003.
9. G. Boothroyd, ‘Product Design for Manufacture and Assembly’, 2nd Edition, Marcel Dekker Inc., 2002.
10. J.W. Priest, S. M. Jose, ‘Product Development for Manufacturing’, Marcel Dekker Inc., 2001.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	3	-	2	-	-	-	-	-	1	1
3	3	-	-	-	1	-	-	-	-	-	2	2
Avg.	**2**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23005 PROFESSIONAL SERVICE FIRM: MANAGEMENT AND EXCELLENCE L T P/S C
3 0 0 3

OBJECTIVES

- To introduce the idea of profession, professional and professional service firm.
- To introduce the key areas of attention involved in a professional service firm.
- To inform about ways to maximise the potential of human resource for individual, organisational and societal benefit.
- To give familiarity about the different ways to protect ideas and knowledge.
- To introduce the idea of reflective practice to enable lifelong learning and professional excellence.

UNIT I PROFESSION, PROFESSIONAL AND PROFESSIONAL SERVICE FIRM 9

Definition of profession and professional. Attributes of a profession- unique body of knowledge, standards of entry, code of ethics, service orientation to the profession, sanctioning organisation. Professional service firm. Differences between a professional service firm and business firm, manufacturing firm and other services firm. Brief outline of aspects involved in a professional service firm - ethical and professional vision of firm, legal foundation of firm, form of organisation, organisational structure, financial strategies, project implementation, client relationship, professional conduct, human resource practices, team work, leadership, nurturing of key competencies, innovation and excellence, perception of firm by clientele and public, future vision.

UNIT II EFFECTIVE PROFESSIONAL 9

Need to understand external environment and internal working. Client attraction, responding to clients needs, service and retention/relationship management. Conflicts of interest. Relational versus transactional services. Role of reputation/legitimacy. Professional values, attitude and skill development. Professional socialisation and acquiring of knowledge and values related to the profession. Role of mentorship. Managing career transitions. Global expansion of professional services. Managing across cultures. Multidisciplinary practices. Developing key competencies, creating value through innovation and excellence.

Literature and live case studies of architectural consulting firms to understand the above.

UNIT III HUMAN RESOURCE MANAGEMENT 9

Importance of skills and sensitivity in working as teams and organisations. Human performance and capabilities. Importance of human resources management at the individual, organisational and societal levels. Individual behaviour and organisational behaviour. Perception, attitude, values, morals, ethics, responsibilities. Communication process and information management. Group behaviour and teams. Role of effective leadership. Motivation concepts and processes. Conflict management. Stress management. Transactional analysis. Leadership in professional service firms. Challenges of building a high performance team of professionals.

UNIT IV KNOWLEDGE MANAGEMENT 9

Introduction to intellectual property rights (IPR). Processes involved in IPR. Introduction to patents and patent laws. Procedure for obtaining a patent licensing and assignment of patent. Infringement of Patents. Concept of Copyright. Assignment/ registration of Copyright. Copyright Infringement and Remedies. Concept of Industrial Designs. Registration of Designs. Piracy of registered designs and remedies.

UNIT V REFLECTIVE PRACTICE 9

Reflective practice as approach to enable professionals use their knowledge explicitly in practical situations, combine action and learning effectively, give flexibility and openness to innovate and evolve. Concept of Reflective Practice. Approaches to address problems. Theory in Use and Espoused Theory. Reflective practice as thinking in action. Ways of generating knowledge to solve issues and problems- Experimentation, Speculation, Imagination, Scientific Method, Statistical Analysis, cycle SECI, Modelling, Mental models and virtual worlds. Framing (tacit framing, Analysing and understanding assumptions and values, reframing, paradigm shifts), Conceptual innovation, Design. New democratic, collaborative and innovative approaches to reflective practice. Social enterprises and entrepreneurship.

Literature case studies and first hand studies of practices in different creative disciplines,

including architecture, in the above topics.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Knowledge about how to run and maximise the potential of professional services firm.
CO2 Knowledge about how to protect ideas.
CO3 Understanding of how to run a reflective practice

TEXTBOOKS

1. Ceasar McDowell, Claudia Canepa, and Sebastiao Ferriera, 'Reflective Practice: An Approach for Expanding Your Learning Frontiers'. MIT Course No. 11.965,As Taught in January IAP 2007, Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu. License: Creative Commons BY-NC-SA.
2. David H. Maister, 'Managing the Professional Service Firm', Free Press, 1997.
3. Donald A. Schon, 'The Reflective Practitioner: How Professionals Think In Action', Basic Books, 1984.
4. Reddy T.S. and Murthy, 'Financial Accounting', Margham Publications, Chennai, 2012

REFERENCES

1. Jagat Trivedi, 'IIM: Insights Into Managing: A Must Read for Leaders, Managers, Aspiring Managers, Students, and Entrepreneurs', Outskirts Press, 2013.
2. Familiarity with the basics of what a professional services firm is.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	3	-	-	-	-	-	-	2
2	-	-	-	-	-	-	-	-	3	1	-	2
3	-	-	-	-	-	-	-	-		3	-	2
4	-	-	-	-	-	-	-	-		2	-	3
Avg.	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**	**2**	**-**	**2**

'1' = Low; '2' = Medium; '3' = High

AR23023 BUILDING AUTOMATION AND CONTROL SYSTEMS L T P/S C
3 0 0 3

OBJECTIVES:

- To giveintroduction to automation and management systems in buildings.
- To give knowledge about specific systems in the field of fire safety, security, communication, HVAC, lighting, climate control, etc.,
- To give information about integration of systemswith each other and with building construction.

UNIT I INTRODUCTION TO BUILDING AUTOMATION AND CONTROL SYSTEMS9

Introduction to and History of Building Automation Systems (BAS). Building Types and Key Requirements. Different systems in BAS which includes HVAC, security and surveillance, communication, fire, lighting systems, climate control, etc. Ideas of intelligent buildings, Human Machine Interface (HMI), facilities management and life cycle costs. The fundamental concepts of building control, and building automation. Control Theory. Building automation topics include device technology (sensors, control elements), direct digital control, control applications, communication systems, and Building Automation Protocols.

Role of different stakeholders (Architect, contractor, consultant, application engineer and engineer) in BAS system design.

UNIT II FIRE SAFETY SYSTEMS 9

Statutory Standards and codes for fire safety. Objective and essential components and working of a Fire Alarm System. Type of detection technology in the Fire alarm system.Basic knowledge on working, design and installation of Fire alarm system. Fire suppression systems. Components, working and installation.

various types of technologies currently in use.

UNIT III SECURITY, SURVEILLENCEAND COMMUNCATION SYSTEMS 6

Introduction to Access Control, Intruder Alarm, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they work, are designed and installed. Introduction to CCTV, Perimeter protection system, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they work, are designed and installed.

Public Address System and other communication systems and their requirements.

UNIT IV HVAC, LIGHTING, CLIMATE CONTROL 12

Building Automation and Control Systems for HVAC, Lighting and Climate Control. Energy Conservation Control Strategies.

UNIT V INTEGRATED BUILDING MANAGEMENT SYSTEM 9

Overview of various components, technology, sensors, etc., that are common to more than one system. Integrated Building Management System IBMS.Integrated approach in design, maintenance and management system. Current trend and innovation in building automation systems. Impact of Information Technology.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO6 Outline the various building management systems.
CO7 Choose appropriate fire safety systems for buildings.
CO8 Categorise the various systems of security and surveillance for buildings.
CO9 Demonstrate the basics of HVAC, lighting and climate control.
CO10 Recall the use of integrated building management system.

TEXTBOOKS:

1. Building Automation Systems – A Practical Guide to Selection and Implementation, Maurice Eyke
2. National Building Code of India

REFERENCES

1. George Clifford , Modern Heating Ventilating and Air Conditioning
2. Vaughn Bradshaw , Building control Systems
3. Roger W. Haines, HVAC Systems Design Handbook, Fifth Edition by 5.
4. James E. Brumbaugh, HVAC Fundamentals
5. Herman Kruegle, CCTV Surveillance,
6. John L. Bryan, Fire Suppression Detection System
7. Vivian Capel, Security Systems and Intruder Alarm System,
8. Mike Constant & Peter Turnbull, The Principles and Practice of Closed Circuit Television.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	-	-	-	-	1	3	1	-	-	-	-
2	2	-	-	-	-	1	3	3	-	-	-	-
3	2	-	-	-	-	1	3	3	-	-	-	-
4	2	-	-	-	-	1	3	3	-	-	-	-
5	2	-	-	-	-	3	3	1	-	-	-	-
Avg.	**2**	**-**	**-**	**-**	**-**	**1**	**3**	**2**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23030 ADVANCED STRUCTURES L T P/S C
3 0 0 3

OBJECTIVES

- To give an understanding of the loss of pre- stress and design requirements for determinate pre-stressed concrete 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 plate

UNIT I PRESTRESSED CONCRETE 10

Losses of Prestress. Design requirements. Design of determinate beams.

UNIT II INDUSTRIAL STRUCTURES 8

Classification, planning and layout requirements, functional requirements. Types of industrial structures- power plants, bunkers and silos, cooling towers, containment structures, chimneys. Merits. Case studies.

UNIT III HIGH–RISE BUILDINGS 7

Introduction. Load action in high rise buildings. Various structural systems. Waffle slab. Approximate analysis of frames for gravity and horizontal loadings. Case studies.

UNIT IV TENSILE STRUCTURES 10

Concept, development, laws of formation, merits and demerits of pneumatic structures. Basic principles, forms, merits and demerits of cable structures. Case studies.

UNIT V SHELLS, DOMES AND FOLDED PLATES 10

Shells of translation. Shells of revolution. Classification of shells and different forms. Domes. Types of folded plates. Space frames. Case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO4 An understanding of concepts and applications of pre-stressed concrete.
CO5 An understanding of concepts and application of industrial structures and sky scrapers.
CO6 Familiarity with the theory and applications of tensile structures, grids, domes, shells and folded plates.

TEXTBOOKS

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.
7. Ramaswamy G.S, 'Design and Construction of Concrete Shell Roofs', CBS, 2005.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	-	2	3	-	-	-	-	-	1
2	-	-	-	-	2	3	-	-	-	-	-	1
3	-	-	-	-	2	3	-	-	-	-	-	1
Avg.	**-**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23025 DATA VISUALISATION AND ANALYSIS L T P/S C
2 0 1 3

OBJECTIVES

- To give exposure to the importance of understanding Information through visual thinking.
- Enabling skill in exploring the various ways of visualising and analysing data.
- To enable generating innovative diagrams from the collected data to discern and recognise patterns and phenomena.

UNIT I INTRODUCTION TO DATA VISUALISATION 9

Introduction to data visualisation. Principles of data visualisation. Conventional methods of visualisation.various applications. Types of Digital Data and Data structures. Terminologies Used in Big Data Environments. Various ways of Collection, Processing and Analysing the data. Classification of Data. Analytics frameworks. Open data platforms.

UNIT II OUTLINE OF DATA VISUALISATION TOOLS 12

Overview on Visual analysis languages. Interactive data visualisations. Multivariate visualisation. Geospatial visualisation. Data Visualisation platforms- Tableau,Polaris,GGplot2,Matplotlib,PowerBI, etc.
Exercises using some of the above platforms using sample datasets.

UNIT III DATA VISUALISATION IN ARCHITECTURE 12

Introduction to mapping and data visualisation in architecture. Types of visualisation tools - 2D/3D. Architectural design process outline. Various Data collection techniques. Basics sets of architecture and urban design data required. Quantitative and Qualitative data. Spatial and Non-Spatial data. Introduction to functional visualisation of various attributes of buildings -Activity, zoning, matrix, proximity chart, human behaviour, demographics, circulation patterns, etc.
Exercises related to above.

UNIT IV ANALYSIS OF ARCHITECTURAL AND URBAN DATA 12

Overview of recent design approach related to study and design for people and space with help of big data. Analysis and visualisation of data. Quantitative and Qualitative data. Programme, Micro climate, Geospatial Analysis, Energy modelling, Vegetation,User behaviour studies, Sensory analysis, Post occupancy studies, Participatory/Interactive approach etc.
Case studies of Data Visualisation as design process- Works of Rem Koolhaas, UN Studio, FOA etc.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO4 Knowledge about the importance of data visualisation.
CO5 Familiarity with different methods and techniques of data visualisation.
CO6 Skill in working out simple exercises related to data visualisation in the realm of architecture and urban design.

TEXTBOOKS

1. Winifred E. Newman, Data Visualisation for Design Thinking: Applied Mapping, Routledge 2017
2. C. J. Date, A. Kannan, S. Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
3. Andy Kirk, “Data Visualization: a successful design process”, Second Edition, Packt publishing limited,2012
4. Andy Kirk , “Data Visualisation: A Handbook for Data Driven Design”,Second Edition,SAGE Publication Ltd,2019
5. David McCandless ,”Knowledge is Beautiful”,William Collins,2014
6. David McCandless ,”Information is wealth”,William Collins,2012
7. Anthony Vidler, ‘Diagrams of Diagrams: Architectural Abstraction and Modern Representation’, Representations, No. 72. (Autumn, 2000), pp. 1-20
8. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.

9. Iain Fraser and Rod Henmi, ‘Envisioning Architecture – An Analysis of Drawing, 1991’,John Wiley and Sons, 1993.

REFERENCES

1. Robert S. Wegant, ‘BIM Content Development: Standards, Strategies, and Best Practices’, John Wiley, 2011.
2. Chuck Eastman et al, ‘BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors’, John Wiley, 2011.
3. Joseph Clarke, ‘Energy Simulation in Building Design’, Routledge, 2007
4. BIM Handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors (second edition) by Chuck Eastman, Paul Teicholz, Rafael Sacks, and Kathleen Liston Available online (e.g. $55 on Amazon) - please use the second edition ISBN-13: 978-0470541371 ISBN-10: 0470541377

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1			1									
2			2									
3	3		3									
4												
Avg.	**3**		**2**									

1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23026 HERITAGE CONSERVATION L T P/S C
3 0 0 3

OBJECTIVES

- To introduce the need for heritage and rationale for architectural conservation and to provide familiarity with the history of conservation.
- To give familiarity about various agencies involved in the field of conservation worldwide.
- To give an overview of conservation of architecture and heritage towns of India.
- To give detailed information about the materials and methods of heritage preservation.
- To give an overview of conservations practice and strategies in India.

UNIT I INTRODUCTION TO HERITAGE AND CONSERVATION 12

Importance of heritage. Need, debate and purpose of conservation. History of conservation movement. International agencies like ICCROM, ICOMOS, UNESCO and their role in conservation. Charters. principles and ethics of conservation. Scope and approaches to conservation - material based, value based, living heritage. Issues of historicity, authenticity, preservation, restoration, transformation, conservation. Conservation, preservation and adaptive reuse.

UNIT II CONSERVATION IN INDIA 7

Museum conservation. Monument conservation and the role of ASI, SDA, INTACH. Central and state government policies and legislations. Inventories and projects. Selected case studies of sites such as Hampi, Golconda, Mahabalipuram. Craft Issues of conservation.

UNIT III CONSERVATION MATERIALS, METHODS AND STRUCTURAL SYSTEMS10

Investigation techniques and tools. Behaviour of historic materials and structures. Problems with masonry, foundation. Repair methods, traditional and modern methods. Seismic retrofit, services additions and disabled access to historic buildings. Moisture and pollution problems.

UNIT IV CONSERVATION PRACTICE 7

Listing of monuments. Documentation of historic structures. Assessing architectural character. Historic structure report. Guidelines for preservation, rehabilitation and adaptive re-use of historic structures. Case studies of palaces in Rajasthan, dwellings in Chettinad and Swamimalai. Heritage site management.

UNIT V URBAN CONSERVATION STRATEGIES 9

Understanding the character and issues of historic towns. Cultural landscapes. Selected case studies. Historic districts and heritage precincts. Conservation through planning. Heritage economics. Financial incentives and planning tools such as TDR. Heritage tourism. Community based approach to conservation. Conservation management. Case studies of sites like Cochin, Pondicherry French town.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO5 An understanding of the importance of heritage and scope of conservation.
CO6 Familiarity with issues and practices of conservation through case studies.
CO7 Knowledge about methods for preserving and repairing historic buildings.
CO8 Familiarity with conservation strategies through principles and project case studies.

TEXTBOOKS

1. Bernard Fielden, 'Conservation of Historic Buildings', Architectural Press, 2003.
2. Bernard Fielden, 'Guidelines for Conservation - A Technical Manual', INTACH, 1989.
3. MS Mathews, 'Conservation Engineering', University at Karlsruhe, 1998.
4. J. Kirk Irwin, 'Historic Preservation Handbook', McGraw Hill, 2003.
5. Donald Appleyard, 'The Conservation of European Cities', M.I.T. Press, Massachusetts, 1979.
6. Publications of INTACH

REFERENCES

1. James M. Fitch, ‘Historic Preservation: Curatorial Management of the Built World’, University Press of Virginia, Reprint Edition,1990.
2. Robert E. Stipe, 'A Richer Heritage: Historic Preservation in the Twenty-First Century’, University of North Carolina Press, 2003.
3. B.P. Singh, 'India's Culture- The State, The Arts and Beyond', Oxford University Press, 2009
4. A.G. K. Menon (Ed), 'Conservation of Immovable Sites', INTACH Publication, N. Delhi.
5. John H. Stubbs and Emily G Makas. ‘Architectural Conservation in Europe and the Americas’, John Wiley and Sons, 2011.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	2	2	-	-	-	1	-	1
2	-	-	-	3	2	2	-	-	-	1	-	1
3	-	-	-	3	2	2	-	-	-	-	-	1
4	-	-	-	3	2	2	-	-	-	-	-	1
Avg.	**-**	**-**	**-**	**3**	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**1**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23024 HUMAN SETTLEMENTS PLANNING L T P/S C
3 0 0 3

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.

UNIT I INTRODUCTION TO HUMAN SETTLEMENTS 9

Introduction to planning as a discipline and brief evolution of the profession. Elements of human settlements. Human beings and settlements. Nature, shells and net works- their functions and linkages. Anatomy and classification of human settlements- locational, resource based, population size and occupational structure.

UNIT II FORMS OF HUMAN SETTLEMENTS 9

Structure and form of settlements - linear, non- linear and circular, combinations. Reasons for development. Advantages and disadvantages. Case studies. Factors influencing the growth and decay of human settlements.

UNIT III RURAL AND REGIONAL DEVELOPMENT IN INDIA 9

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 IV URBAN PLANNING AND URBAN RENEWAL 9

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 V ASPECTS IN CONTEMPORARY URBAN PLANNING IN INDIA 9

Globalisation 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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

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.

TEXTBOOKS

1. C.L. Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson, London, 1968.
2. Thooyavan K R, 'Human Settlements- A Planning guide to Beginners', M.A. Publications, 2005.
3. Ministry of Urban affairs and Employment, Government of India, New Delhi, ‘UrbanDevelopment Plans: Formulation and Implementation-Guidelines’, 1996.
4. Andrew D Thomas, ‘Housing and Urban Renewal', Harper Collins, 1986.

REFERENCES

1. S. B. Golahit, 'Rural Development Programmes In India', Neha Publishers and Distributors, 2010.
2. 'CMDA Second Master Plan for Chennai Metropolitan Area 2026: Vision, Strategies and Action Plans (Vol.I, II and III)', Chennai, India, 2008.

3. V. Nath, 'Regional Development And Planning In India', Concept Publishing Company, 2011.
4. Government of India, 'Report of the National Commission on Urbanisation', 1988.
5. Hansen N., 'Regional Policy and Regional Integration', Edward Elgar, UK, 1996.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	3	-	-	-	2	-	-	-	2
2	-	-	-	3	-	-	-	-	-	-	-	3
3	-	-	-	3	-	-	-	2	-	-	-	3
Avg.	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23027 TECHNIQUES OF DIGITAL ART L T P/S C
1 0 2 3

OBJECTIVES

- To give introduction to digital art as a domain.
- To give exposure to different types of and media for digital art.
- To develop skills in basic techniques of digital art.

UNIT I INTRODUCTION TO DIGITAL ART 9

Definition of digital art. Origin and history of digital art. Classification of different types of digital art – photography, photopainting, digital collage, Digital painting, 3D Digital painting, vector drawing, algorithmic art, mixed media, video art, interactive digital installations. Critical theories of digital art. Famous digital art works. Elements and principles of art as applicable to digital art- as light, colour, texture, scale, motion, etc., through examples.

UNIT II 2D ART 12

Software and techniques for raster image editing. Editing and creating digital raster images through various kinds of manipulation based on elements and principles for a selected theme. Creating 2D vector art based on elements and principles for a selected theme.

UNIT III 3D ART 12

Software and techniques for3D drawing and video. Creating 3D art based on elements and principles for a selected theme.

UNIT IV MIXED MEDIA 12

Introduction to different types of mixed media in digital art. Project involving mixed media on any theme.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Awareness of digital art as a domain.
CO2 Knowledge about the types and media for digital art.
CO3 Skill in basic techniques for digital art.

TEXTBOOKS

1. Thomson-Jones, Katherine and Shelby Moser, "The Philosophy of Digital Art", The Stanford Encyclopedia of Philosophy (Spring 2021 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/spr2021/entries/digital-art/>.

REFERENCES

1. Mark Von Wodtke, ‘Mind over Media: Creative Thinking Skills for Electronic Media’, McGraw-Hill, New York, 1993.
2. Noah Wardrip-Fruin and Nick Montfort, Eds, ‘The New Media Reader’, MIT Press, 2003.
3. Zalanski and Fischer, ‘Shaping Space: The Dynamics of Three-Dimensional Design’, Cengage, 2006.
4. Ocvirk, Stinson, Wigg, Bone and Cayton, ‘Art Fundamentals: Theory and Practice’, McGraw-Hill Education, 2012
5. Mary Stewart, ‘Launching the Imagination: A Comprehensive Guide to Basic Design’, McGraw Hill 2011.
6. Catherine Elwes, ‘Video Art: A Guided Tour’, Tauris, 2004.
7. Peter Ratner, ‘3-D Human Modeling and Animation’, Wiley, 2009.
8. Jaejin Choi, ‘Maya Character Animation’, SybexInc; Bk and CD-Rom Edition, 2002.
9. Nikos Sarris and Michael G. Strintzis, ‘3D Modeling and Animation: Synthesis and Analysis Techniques for the Human Body’, IRM Press, 2004.
10. 3DTotal.com, ‘Digital Art Masters’.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	-	3	-	1	-	-	-	-	-	-	-
2	2	-	3	-	1	-	-	-	-	-	-	-
3	2	-	3	-	1	-	-	-	-	-	-	-
Avg.	**2**	**-**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23031 ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY L T P/S C
2 0 1 3

OBJECTIVES

- To give an overview of the domain of journalism, its various aspects and strategies.
- To give particular exposure to architectural journalism.
- To give knowledge about aspects and techniques of architectural photography.

UNIT I INTRODUCTION TO JOURNALISM 9

Introduction to journalism, key concepts and objectives of journalism. Overview of different types of specialised journalism.Outline of journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism. Introduction to copyright, code of ethics, press laws, Press Council of India.

UNIT II ASPECTS OF JOURNALISM 12

Journalism and public realm. Issues in public realm related to various domains, including architecture. Reading, investigation, interviewing, argument and debate as a techniques in the investigation of problems in different realms of society. Evidence, proof, refutation, persuasion. Training in argumentative speaking. Role of the editor. Editing in the context of different media. Text preparation, mode of presentation, standards and guidelines for documentation.

Introduction to software needed in journalism and photography, video coverage. Understanding the individual demands in the context of newspapers, radio, film, and television. Multimedia/ online journalism and digital developments.

UNIT III ARCHITECTURAL PHOTOGRAPHY AND VIDEOGRAPHY 12

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, photo- finishing and editing digital images. Perspectives- single point, two- point, three- point and methods of correcting distortions. Lighting - external and interior.

UNIT IV ARCHITECTURAL JOURNALISM 12

Outline to the history of architectural journalism. Types of architectural journals. Works of key architectural journalists. Issues and themes related to contemporary architectural journalism at local, national and global levels. Public discourse on the internet. Mass media and public opinion. Analysing selected pieces of journalism. Individual architectural journalism exercises on a particular theme.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Exposure to the domain of journalism and architectural journalism in particular.
CO2 Skills with respect to architectural photography.
CO3 Knowledge about important themes and works of architectural journalism.
CO4 Ability to critically think, analyse and write about architecture.

TEXTBOOKS

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

REFERENCES

1. 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.

2. S. J. A.Ward, 'Philosophical Foundations of Global Journalism Ethics', Journal of Mass Media Ethics, Vol. 20, No. 1, 3-21, 2005.
3. M. Heinrich, 'Basics Architectural Photography', Bikhauser Verlag AG, 2008.
4. Gerry Kopelow, 'Architectural Photography: The Professional Way', Princeton Architectural Press, 2007.

CO-PO Mapping

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	1	2	2	3	-	-	-	-	3	2	3
2	1	1	3	2	2	-	-	-	-	2	2	3
3	1	1	3	3	2	-	-	-	-	1	2	3
4	1	1	2	3	3	-	-	-	-	1	3	3
5	1	1	3	3	3	-	-	-	-	3	3	3
Avg.	**1**	**1**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**2**	**3**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

EMERGING TECHNOLOGY COURSES (ETC)

AR23E02	ARTIFICIAL INTELLIGENCE IN DESIGN PROCESS	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To give knowledge and understanding about the discipline of Artificial Intelligence as a totality and its potential in Architectural Design.
2. To give understanding about the relationship between architecture and computing within methodological design process.

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE 6

Overview of Automation, Data analytics, pattern recognition and Algorithms. Introduction to Artificial Intelligence - Evolution from early fundamental concepts to modern applications - Machine Learning concepts, Neural network and its types. Introduction to data types and data acquisition methods. Impact of AI in all industries. Ethical considerations of AI in design. Authorship of digital design in age of AI.

UNIT II AI IN ARCHITECTURE 12

AI in Architecture - Impact, Applications, Challenges and its relevance. Overview of various AI tools and data sets involved at different stages of the architectural design process - Early-stage, Design Development, Construction phase, Post Occupancy. Application of AI in Energy efficient design, Sustainability, project management. Case studies.

UNIT III AI IN URBAN DESIGN AND URBAN PLANNING 12

Overview of AI tools and its relevant data sets in Urban design and Urban planning - Big data Urbanism, urban analytics, Data driven Design decisions. Data mapping tools and techniques. Applications, Benefits, Challenges and impact of AI in Urban design and Urban planning. Case studies.

UNIT IV AI DRIVEN VISUALISATION 6

Overview of 2D and 3D architectural Visualisation, Rendering and illustration using AI tools. Application of AI tools in creating virtual walkthroughs, real- time rendering and interactive presentations using Internet of Things (IoT), VR, AR, XR, digital twin technologies.

UNIT V FUTURE TRENDS AND INNOVATION 9

Overview of Future trends and Innovation in Architecture - AI enhanced sustainability, performance optimization, Hybrid Design Approach. AI towards Human-centric approach - Prediction analysis, face recognition, Social Behavior analysis. Case studies.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Knowledge about artificial intelligence as a domain and ethics of its usage.
2. Use AI tools across design stages for energy efficiency, sustainability, and project management.
3. Evaluate AI tools for urban design and planning, focusing on big data urbanism and data-driven decisions.
4. Apply AI in 2D/3D architectural visualisation,
5. Explore future trends and innovations in architecture using A.I..

TEXT BOOKS

1. Architecture in the Age of Artificial Intelligence: An Introduction to AI for Architects, Neil Leach, Bloomsbury Visual Arts.

2. The Routledge Companion to Artificial Intelligence in Architecture, Imdat As, Prithwish Basu, Routledge;
3. Artificial Intelligence and Architecture, From Research to Practice, Stanislas Chaillou, Birkhäuser.
4. Artificial Intelligence for Architects, Phil Bernstein
5. Designing Intelligence: The Application of AI in Design, Stephen Munson
6. Machine Hallucinations: Architecture & Artificial Intelligence: Architecture and Artificial Intelligence
7. Artificial Intelligence and Architecture: From Research to Practice, Stanislas Chaillou.

REFERENCES

1. The Routledge Companion to Artificial Intelligence in Architecture, Imdat As, Prithwish Basu, 2021
2. Architectural Design: Special Issue: Machine Hallucinations: Architecture and Artificial Intelligence, 2022
3. Graph machine learning classification using architectural 3D topological models, Abdulrahman Alymani, Wassim Jabi, and Padraig Corcoran, 2023
4. Qian, C., Liu, X., Ripley, C., Qian, M., Liang, F., & Yu, W. (2022). Digital Twin— Cyber Replica of Physical Things: Architecture, Applications and Future Research Directions. Future Internet, 14(2), 64.
5. Rafsanjani, H. N., & Nabizadeh, A. H. (2023). Towards digital architecture, engineering, and construction (AEC) industry through virtual design and construction (VDC) and digital twin. Energy and Built Environment, 4(2), 169-178.
6. Quan, S. J., Park, J., Economou, A., & Lee, S. (2019). Artificial intelligence-aided design: Smart Design for sustainable city development. Environment and Planning B: Urban Analytics and City Science.
7. Abbasabadi, Narjes, and Mehdi Ashayeri, eds. Artificial Intelligence in Performance-Driven Design: Theories, Methods, and Tools. John Wiley & Sons, 2024.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	2	2	-	-	-	1	-	-	2	-	-	-
2	2	2	-	-	-	1	-	-	2	-	-	-
3	2	2	-	-	-	1	-	-	2	-	-	-
4	2	2	-	-	-	1	-	-	2	-	-	-
5	2	2	-	-	-	1	-	-	2	-	-	-
Avg.	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23E01	ADVANCED CONSTRUCTION TECHNOLOGY	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. Understand smart materials and nanotechnology in construction.
2. Learn about robotics and automation in construction.
3. Understand digital fabrication and 3D printing in construction.
4. Learn principles and benefits of modular and prefabricated construction.
5. Understand IoT applications in construction management.

UNIT I SMART MATERIALS AND NANOTECHNOLOGY 9

Overview of construction technology evolution. Key emerging technologies in construction. Impact of emerging technologies on the construction industry. Case studies and current trends. Definition and types of smart materials. Applications of smart materials in construction. Introduction to nanotechnology in building materials.

UNIT II AUTOMATION AND ROBOTICS IN CONSTRUCTION 9

Role of robotics in construction. Types of construction robots. Benefits and challenges of automation. Applications in building, demolition, and inspection.

UNIT III DIGITAL FABRICATION AND 3D PRINTING 9

Principles of digital fabrication. Types of 3D printing technologies. Applications in construction. Advantages and limitations of 3D printing in construction.

UNIT IV MODULAR AND PREFABRICATED CONSTRUCTION 9

Principles of modular construction. Benefits and challenges of prefabrication. Types of modular systems. Case studies of prefabricated projects.

UNIT V INTERNET OF THINGS (IOT) IN CONSTRUCTION 9

IoT applications in construction management. Smart building systems and sensors. Data collection and analysis for construction optimization. Case studies of IoT-enabled construction projects

TOTAL : 45 PERIODS

OUTCOMES

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

1. Identify and evaluate applications of smart materials and nanotechnology through case studies.
2. Assess robotic technologies that can be applied for building, demolition, and inspection tasks.
3. Assess 3D printing technologies in construction projects.
4. Evaluate modular construction projects using case studies.
5. Assess IoT solutions to enhance construction efficiency.

TEXT BOOKS

1. Torgal, F., Diamanti, M., Nazari, A., Granqvist, C., Pruna, A., Amrikhanian, S., (2019). Nanotechnology in Eco-efficient Construction Materials, Processes and Applications. Woodhead Publishing.
2. Jebelli, H., Habibnezhad, M., Shayesteh S., Asadi S., Lee, S., (2022). Automation and Robotics in the Architecture, Engineering, and Construction Industry. Springer.
3. Rangel, B., Ana Sofia Guimarães, A., Lino, J., Santana, L., (2023). 3D Printing for Construction with Alternative Materials.

REFERENCES

1. Smith, R., (2011). Prefab Architecture: A Guide to Modular Design and Construction. Wiley.
2. Smeenk, H., (2023). Internet of Things for Smart Buildings: Leverage IoT for smarter insights for buildings in new and built environments. Pakt Publishing.

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	1	-	-	-	-	2	-	-	-	-	-	-
2	1	-	-	-	-	3	-	-	-	-	-	-
3	1	-	-	-	-	3	-	-	-	-	-	-
4	1	-	-	-	-	3	-	-	-	-	-	-
5	1	-	-	-	-	3	-	-	-	-	-	-
Avg.	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR23E03	SMART CITIES	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To give exposure related to the latest concepts and approaches in smart cities.
2. To give exposure about critical urban systems and data driven planning
3. To provide knowledge about state of the art practices in planning, service delivery, management, monitoring and evaluation of urban systems
4. To provide comprehension about smart cities through national and global case studies

UNIT I INTRODUCTION TO SMART CITIES 9

Origin and evolution of the term smart cities. Different interpretations of smart cities. Introduction to systems approach and data driven planning. 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., Introduction of ICT, GIS and remote sensing as tools to enable smart cities.

UNIT II URBAN MOBILITY 9

Understanding of public transport and freight systems and their optimisation for improved service delivery; and delivery of pedestrian infrastructure, green mobility and intermodal integration through data driven planning and smart technology integration. Case studies as teaching aid.

UNIT III WATER MANAGEMENT SYSTEMS 9

Understanding of water supply, distribution, sewerage management, stormwater management at the city level. Introduction to hydro ecology and urban water resilience. Introduction to advanced systems and technologies for planning, service delivery, management, monitoring and evaluation as well as risk assessment and mitigation. Case studies as teaching aid.

UNIT IV ENERGY SYSTEMS 9

Understanding of alternate energy sources and their lifecycle covering production, supply and distribution. Optimization of the life cycle for improved efficiency and sustainability. Integration with waste management systems. Waste to energy concept and technologies for enhancing the same. Case studies as teaching aid.

UNIT V SMART CITIES AROUND THE WORLD 9

Learning from the experience of cities around the world and their interpretations and applications of the concept of smart cities. Detailed case studies with focus on technology integration as an enabling mechanism for creating improved built environments.

TOTAL: 45 PERIODS

OUTCOMES

1. Familiarity with the latest concepts and approaches in smart cities.
2. Exposure to urban mobility infrastructure and data driven planning.
3. Exposure to smart urban water management systems.
4. Knowledge about advanced practices and technologies in the domain of smart cities
5. Exposure to smart city practices in India and around the world.

TEXT BOOKS

1. Rajeswari Ray, GIS for Smart Cities, Ane Books 2017
2. Binti Singh and Manoj Parmar, Smart City in India, Routledge 2020
3. Mike Barlow and Cornelia Levy-Bencheton, Smart Cities Smart Future, Wiley 2019
4. Charanjit Singh Shah, Redefining Indian Smart and Sustainable Cities, I K International Publishing House 2017
5. Antoine Picon, Smart Cities: A Spatialised Intelligence, Wiley 2015
6. Kumar, K., Saini, G., Nguyen, D. M., Kumar, N., & Shah, R. (2022). Smart cities: Concepts, Practices, and Applications. Wireless Communications and Networking Technologies.
7. Kim, H. M., Sabri, S., & Kent, A. (2020). Smart cities for technological and social innovation: Case Studies, Current Trends, and Future Steps. Academic Press.
8. Anthopoulos, L. (2019). Smart City emergence: Cases From Around the World. Elsevier.
9. Aurigi, A., & Odendaal, N. (2020). Shaping smart for better cities: Rethinking and Shaping Relationships between Urban Space and Digital Technologies. Academic Press.
10. Nicholas de Monchaux, Local Code: 3659 Proposals About Data, Design, and the Nature of Cities, Princeton Architectural Press, 2016
11. Arnab Jana, Advances in Urban Planning in Developing Nations: Data Analytics and Technology, Taylor & Francis, 2021
12. Guangwei Huang, Zhenjiang Shen, Urban Planning and Water-related Disaster Management

REFERENCES

1. Mohammad S. Obaidat and Petros Nicopolitidis, Smart Cities and Homes, Morgan Kaufmann 2016.
2. Poonam Sharma, Swati Rajput, Sustainable Smart Cities in India, Springer 2019
3. Ricardo Armentano, Parag Chatterjee et al, The Internet of Things, CRC Press, Taylor and Francis 2018
4. Smart Cities Mission publications
5. Streets For People, ITDP India with the support of the Faculty of Urban Design, SPA Delhi
6. Healthy Streets Design Workbook, ITDP India and NIUA
7. DataSmart Urban95 THiNK CASES, Van Leer Foundation and NIUA
8. Placemaking Marathon, Smart cities Mission
9. EatSmart, Smart cities Mission
10. Carlo Ratti, Matthew Claudel, The City of Tomorrow – Sensors, Networks, Hackers, and the Future of Urban Life (THE FUTURE SERIES), Yale University Press 2016
11. Hugo Rodrigues, Tomohiro Fukuda, Simon Elias Bibri, Resilient and Responsible Smart Cities: Second Edition, springer Nature Switzerland AG; 2nd ed. 2022

CO - PO MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	-	-	-	1	-	2	3	3	2	-	2	3
2	-	-	-	2	-	2	3	3	2	-	2	3
3	-	-	-	2	-	2	3	3	2	-	2	3
4	-	-	-	2	-	2	3	3	2	-	2	3
5	-	-	-	1	-	2	3	3	2	-	2	3
Avg.	**-**	**-**	**-**	**2**	**-**	**2**	**3**	**3**	**2**	**-**	**2**	**3**

‘1’ = Low; ‘2’ = Medium; ‘3’ = High

OPEN ELECTIVE COURSES (OEC)

AR23901	INTRODUCTION TO ART & DESIGN	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To explore and analyse foundational principles of art and design
2. To understand practical concepts and understanding in their practical work.
3. To apply principles through hands-on projects and exercises.
4. To develop critical thinking skills in evaluating visual compositions.
5. To understand the historical and cultural contexts of various art movements.

UNIT I FUNDAMENTALS OF ART 9

Art in World: What is Art, Art is Communication, The Purposes of Art, Art as a Lifelong Pursuit, Why Do Artists Create, and The Language of Art. Two-Dimensional Mediums: Drawing, Shading Techniques. Painting, Printmaking. Three-Dimensional Mediums: Sculpture, Sculpting Techniques. The Processes of Crafts. Architecture. Technological Medium: Photography, Film, Video, Computer Art, Multimedia Art, Animation.

UNIT II ART MOVEMENTS AND STYLES 9

The Art of Greece and Rome, Byzantine Art, Romanesque Style, Gothic Style, Renaissance, Baroque Art, Dutch Art, Rococo Style, Neoclassicism, Romanticism, Realism, Impressionism, Post-Impressionism, European Art, North American Art, Abstract Expressionism, Pop and Op Art, Minimalism.

UNIT III INDIAN ART MOVEMENT AND STYLES 9

Appreciating art through the study of art production in India over history. Important works from the following art traditions will be studied and analysed in terms of their form, content and context. Indus Valley Art - Hindu Buddhist and Jain art - Mughal and Rajput miniatures - art during the colonial period - modern Indian Art.

UNIT IV ELEMENTS OF ART & DESIGN 9

Introduction to design, Definition of elements of Art, Definition of Line. Kinds of Lines, Line Variation, The Expressive Qualities of Line, Contour Drawing, Gesture Drawing, Calligraphic Drawing. Shape & Form – Geometric shapes. Colour- Hue, Value, and Intensity, Colour Schemes, The Expressive Effects of Colours. Tone and Value. Texture - Tactile texture, Visual texture. Space- Positive and Negative Spaces, Space in Three Dimensional Art, The Illusion.

UNIT V PRINCIPLES OF ART & DESIGN 9

Definition of Principles of Visual Art, Rhythm & Pattern - Types. Visual Movement. Balance- Formal Balance, Informal Balance. Proportion - The Golden Mean, Golden Rectangle, Scale, Human Proportions. Unity & Verity, Simplicity, Repetition, Proximity. Emphasis, Harmony.

TOTAL: 45 PERIODS

OUTCOMES

1. Students will be able to identify, explain, and apply fundamental elements of art.
2. Students will develop the ability to apply theoretical concepts of art and design to solve visual communication challenges effectively.
3. Students will be able to perform some of common & unique values/knowledge of Composition Painting taught during the course simultaneously to meet professional requirements.
4. Students will be able to produce original artworks and design projects that reflect a synthesis of elements, principles, and theories learned throughout the course.
5. Students will be able to analyze major art movements and styles, including their historical context, key characteristics, and influential artists.

TEXT BOOKS

1. An Illustrated Field Guide to the Elements and Principles of Art + Design, By Joshua Field, 2018.
2. Gerald F. Brommer, Illustrated Elements of Art and Principles of Design, Crystal Productions, 2010.
3. Deborah Gustlin Art Appreciation· Cognella, Incorporated, 2017.

REFERENCES

1. Joshua Field, Elements and Principles of Art + Design, Hot Iron Press.
2. Gerald F. Brommer, Illustrated Elements of Art and Principles of Design.
3. Rosalind Ragans · ArtTalk, Student Edition, McGraw-Hill Education, 2004.

AR23902	INTRODUCTION TO LANDSCAPE AND LANDSCAPE DESIGN	L	T	P/S	C
		3	0	0	3

OBJECTIVES

1. To give introduction to landscapes in history and enable their appreciation.
2. To give familiarity about the elements in landscape design.
3. To give knowledge about the urban landscape.
4. To give familiarity with plant material in local areas.

UNIT I LANDSCAPES IN HISTORY I 9

Human civilisations and attitude to nature and landscapes across history and cultures. Outline of Japanese, Italian Renaissance and English gardens.

UNIT II LANDSCAPES IN HISTORY II 9

Outline of landscape and garden design in Indian history. Gardens depicted in Sanskrit literature, Nandhavanam and residential gardens of South India. Mughal gardens. Public parks and residential gardens of the colonial period.

UNIT III ELEMENTS IN LANDSCAPE DESIGN 9

Introduction to hard and soft landscape elements in the design of landscapes. Different types of hard landscape elements. Plant materials, water and landform.

UNIT IV URBAN LANDSCAPE 9

Urban open spaces and principle of urban landscape. Street landscaping, landscape design for waterfront areas and functional areas in urban centres. Sustainable principles in urban and regional landscapes.

UNIT V INTRODUCTION TO PLANT MATERIAL 9

Introduction to flora of regions. Outline of flora of Chennai and local neighbourhoods. Understanding of their characteristics and context of use. Relationship between Flora & Fauna.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Understand the history of landscape design around the world.
2. Understand the history of landscape design in India.
3. Understand the landscape elements and features.
4. Decipher the characteristics of urban open spaces and principles of landscape design.
5. Knowledge about basics of planting design.

TEXT BOOKS

1. Boults, Elizabeth and Chip Sullivan, ‘Illustrated History of Landscape Design’, Hoboken, John Wiley and Sons, New Jersey,2010.
2. Tobey George. ‘History of Landscape Architecture, ’The Relation Of People To Environment’, Elsevier And Co, New York, 1973
3. Motloch, J.L., 'An Introduction to Landscape Design', US: John Wiley and Sons,2001.
4. Rahoul B Singh, 'Gardens of Delight- Indian Gardens through the Ages', Lustre Press, Roli Books, 2008.

REFERENCES

1. Matthew Carmona, Tim Heath, ‘Public Places – Urban Spaces’, Routledge, 2012
2. Graphic–sha, Ed ‘Elements and Total Concept of Urban Landscape Design’, Graphic-Sha Publishing Co, 2001.

UC23E01 ENGINEERING ENTREPRENEURSHIP DEVELOPMENT

L	T	P	C
2	0	2	3

COURSE OBJECTIVES:

1. Learn basic concepts in entrepreneurship, develop mind-set and skills necessary to explore entrepreneurship
2. Apply process of problem - opportunity identification and validation through human centred approach to design thinking in building solutions as part of engineering projects
3. Analyse market types, conduct market estimation, identify customers, create customer persona, develop the skills to create a compelling value proposition and build a Minimum Viable Product
4. Explore business models, create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture ideas & solutions built with domain expertise
5. Prepare and present an investible pitch deck of their practice venture to attract stakeholders

MODULE – I: ENTREPRENEURIAL MINDSET **4L,8P**

Introduction to Entrepreneurship: Definition – Types of Entrepreneurs – Emerging Economies – Developing and Understanding an Entrepreneurial Mindset – Importance of Technology Entrepreneurship – Benefits to the Society.

Case Analysis: Study cases of successful & failed engineering entrepreneurs - Foster Creative Thinking: Engage in a series of Problem-Identification and Problem-Solving tasks

MODULE – II: OPPORTUNITIES **4L,8P**

Problems and Opportunities – Ideas and Opportunities – Identifying problems in society – Creation of opportunities – Exploring Market Types – Estimating the Market Size, - Knowing the Customer and Consumer - Customer Segmentation - Identifying niche markets – Customer discovery and validation; Market research techniques, tools for validation of ideas and opportunities

Activity Session: Identify emerging sectors / potential opportunities in existing markets - Customer Interviews: Conduct preliminary interviews with potential customers for Opportunity Validation - Analyse feedback to refine the opportunity.

MODULE – III: PROTOTYPING & ITERATION **4L,8P**

Prototyping – Importance in entrepreneurial process – Types of Prototypes - Different methods – Tools & Techniques.

Hands-on sessions on prototyping tools (3D printing, electronics, software), Develop a prototype based on identified opportunities; Receive feedback and iterate on the prototypes.

MODULE – IV: BUSINESS MODELS & PITCHING **4L,8P**

Business Model and Types - Lean Approach - 9 block Lean Canvas Model - Riskiest Assumptions in Business Model Design – Using Business Model Canvas as a Tool – Pitching Techniques: Importance of pitching - Types of pitches - crafting a compelling pitch – pitch presentation skills - using storytelling to gain investor/customer attention.

Activity Session: Develop a business model canvas for the prototype; present and receive feedback from peers and mentors - Prepare and practice pitching the business ideas- Participate in a Pitching Competition and present to a panel of judges - receive & reflect feedback

MODULE – V: ENTREPRENEURIAL ECOSYSTEM **4L,8P**

Understanding the Entrepreneurial Ecosystem – Components: Angels, Venture Capitalists, Maker Spaces, Incubators, Accelerators, Investors. Financing models – equity, debt, crowdfunding, etc, Support from the government and corporates. Navigating Ecosystem Support: Searching & Identifying the Right Ecosystem Partner – Leveraging the Ecosystem - Building the right stakeholder network

Activity Session: Arrangement of Guest Speaker Sessions by successful entrepreneurs and entrepreneurial ecosystem leaders (incubation managers; angels; etc), Visit one or two entrepreneurial ecosystem players (Travel and visit a research park or incubator or makerspace or interact with startup founders).

TOTAL: 60 PERIODS

COURSE OUTCOMES:

Upon the successful completion of the course, students will be able to:

CO1: Develop an Entrepreneurial Mind-set and Understand the Entrepreneurial Ecosystem Components and Funding types

CO2: Comprehend the process of opportunity identification through design thinking, identify market potential and customers

CO3: Generate and develop creative ideas through ideation techniques

CO4: Create prototypes to materialize design concepts and conduct testing to gather feedback and refine prototypes to build a validated MVP

CO5: Analyse and refine business models to ensure sustainability and profitability Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders

REFERENCES:

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition
2. Bill Aulet (2024). Disciplined Entrepreneurship: 24 Steps to a Successful Startup. John Wiley & Sons.
3. Bill Aulet (2017). Disciplined Entrepreneurship Workbook. John Wiley & Sons.
4. Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business
5. Blank, S. G., & Dorf, B. (2012). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch
6. Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons
7. Marc Gruber & Sharon Tal (2019). Where to Play: 3 Steps for Discovering Your Most Valuable Market Opportunities. Pearson.