CURRICULUM AND SYLLABUS
2017

KALASALINGAM SCHOOL OF ARCHITECTURE

Bachelor of Architecture

(B.Arch)

(Applicable for students admitted from the
academic year 2017 -18 onwards)

KALASALINGAM
Academy of Research and Education
Anand Nagar, Krishnankoil – 626126
Srivilliputtur (Via), Virudhunagar (Dt), Tamil Nadu

KALASALINGAM
ACADEMY OF RESEARCH AND EDUCATION

VISION

To be a Centre of Excellence of International Repute in Education and Research

MISSION

To Produce Technically Competent, Socially Committed Technocrats and Administrators through Quality Education and Research

KALASALINGAM SCHOOL OF ARCHITECTURE

VISION

To advocate a design philosophy that draws inspiration from the rich cultural heritage of India while simultaneously embracing the developments in science and technology to produce architects of international competence.

MISSION

To educate budding architects who will contribute to the socio economic and cultural development of India and the broader global community through responsible participation in the process of design and construction of the built environment.

B.Arch - PROGRAMME EDUCATIONAL OBJECTIVE

The 5-year rigorous Architecture degree programme enables a student with

1. **KNOWLEDGE PROFICIENCY:**
   Graduates are equipped with theoretical, technical, and technological proficiency to compete and excel in building industry and research.

2. **PROFESSIONAL ATTITUDE:**
   Graduates imbibe the spirit of quality attainment and intellectual enhancement through life long pursuits of skill training, higher education, research, and innovative creations.

3. **ORGANIZATIONAL AND ENTREPRENEURIAL SKILLS:**
   Graduates exhibit leadership qualities in an organization through team spirit, ethics, and winning spirit. As entrepreneurs their skills of motivation, responsibility, and innovation shall enable them to compete with fellow men of the industry.

4. **SOCIAL CONSCIOUSNESS:**
   As players in the building industry graduates are aware of their social and environmental responsibility and devote a part of their career towards sustainable social development.

B.Arch - PROGRAMME OUTCOME

1. Understanding of established concepts, theories and fundamentals that form the primary knowledge base of the architectural profession.
2. Demonstrating a meaningful analysis and application of the same towards solving various issues and problems of the built environment.
3. Training towards developing the various graphical communication skills of architecture such as architectural drawing, presentation techniques, and architectural drafting: both manual and computer aided.
4. Training in the usage of various techniques and tools of the different laboratories of climatology, building materials, model making, surveying, construction techniques and building services.
5. Demonstrate knowledge of architectural theory and design methodology in the solution of architectural design problems in a global society.
6. Understanding the structural concepts and behaviour of structural elements and relate the knowledge acquired to architectural design.
7. A sound knowledge base to enable the student to be industry/profession ready through courses on professional practice, urban economics, estimation and surveying and an opportunity to learn through apprenticeship.
8. Understanding of national traditions and the local/ regional heritage in architecture, landscape design, and urban design, including the vernacular tradition.
9. Ability to plan and prepare a comprehensive program for an architectural project and design assessment criteria.
10. Understanding of the principles of sustainability in making architecture and urban design decisions that conserve natural and built resources, including culturally important buildings and sites, and in the creation of sustainable buildings and communities.
11. Engage in the process of design and building in the discourse of social, ethical, and professional responsibility.

CURRICULUM STRUCTURE

S.No	Category		Credits
I	Basic sciences and Mathematics		7
II	Humanities and Social Sciences		11
III	Basic Architecture and Engineering		35
IV	Programme Core		111
	a) Core	80	
	b) Community Service Project	7	
	c) Practical Training	10	
	d) Architectural Thesis (Project Work)	14	
V	Elective		36
	a) Major Elective	22	
	b) Open Elective	6	
	c) Humanities Elective	6	
	d) Self Study	2	
	Total CGPA Credits (Minimum)		200

COURSES OF STUDY

I. BASIC SCIENCES AND MATHEMATICS

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R103	Architectural Mathematics	T	2	2	-	-	-
2.	ARC17R105	Environmental Science	T	2	2	-	-	-/ARC17R182
3.	ARC17R271	Climate and Built Environment	TL	3	2	1	-	ARC17R105

II. HUMANITIES AND SOCIAL SCIENCES

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R101	History of Architecture and Culture I	T	2	2	-	-	-
2.	ARC17R171	Communicative English	TL	3	2	1	-	-
3.	ARC17R104	History of Architecture and Culture II	T	2	2	-	-	ARC17R101
4.	ARC17R201	History of Architecture and Culture III	T	2	2	-	-	ARC17R104
5.	ARC17R205	History of Architecture and Culture IV	T	2	2	-	-	ARC17R201

III. BASIC ARCHITECTURE AND ENGINEERING

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R151	Architectural Graphics I	TS	3	2	-	2	-
2.	ARC17R172	Structures and Architecture I	TL	3	2	1	-	-
3.	ARC17R152	Architectural Graphics II	TS	3	2	-	2	ARC17R151
4.	ARC17R153	Materials and Construction I	TS	3	2	-	2	-/ ARC17R182
5.	ARC17R173	Structures and Architecture II	TL	3	2	1	-	ARC17R172
6.	ARC17R202	Building Services I	T	2	2	-	-	-/ ARC17R283
7.	ARC17R203	Design of Structures I	T	2	2	-	-	ARC17R173
8.	ARC17R204	Site Planning and Surveying	T	2	2	-	-	-/ ARC17R283
9.	ARC17R251	Materials and Construction II	TS	3	2	-	2	ARC17R153
10.	ARC17R206	Building Services II	T	2	2	-	-	ARC17R202
11.	ARC17R207	Design of Structures II	T	2	2	-	-	ARC17R203
12.	ARC17R252	Materials and Construction III	TS	3	2	-	2	ARC17R251
13.	ARC17R301	Estimation and Specification	T	2	2	-	-	ARC17R252
14.	ARC17R302	Building Services III	T	2	2	-	-	ARC17R206

IV. PROGRAMME CORE

a. CORE COURSES

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R102	Theory of Architecture	T	2	2	-	-	-
2.	ARC17R181	Basic Design and Visual Arts	S	8	-	-	16	-
3.	ARC17R106	Theory of Design	T	2	2	-	-	-/ARC17R182

4.	ARC17R182	Architectural Design I	S	7	-	-	14	-
5.	ARC17R283	Architectural Design II	S	7	-	-	14	ARC17R181
6.	ARC17R351	Professional Architectural Drawings	TS	3	2	-	2	ARC17R152/ ARC17R381
7.	ARC17R381	Architectural Design IV	S	8	-	-	16	ARC17R283
8.	ARC17R308	Human Settlements Planning	T	2	2	-	-	-/ARC17R382
9.	ARC17R309	Buildings Codes and Bye Laws for Practice	T	2	2	-	-	-/ARC17R382
10.	ARC17R382	Architectural Design V	S	8	-	-	16	ARC17R285
11.	ARC17R401	Project Management	T	3	3	-	-	ARC17R481
12.	ARC17R482	Seminar - Dissertation	S	3	-	-	6	ARC17R481
13.	ARC17R483	Architectural Design VI	S	8	-	-	16	ARC17R481
14.	ARC17R501	Urban Design	T	3	3	-	-	-/ARC17R581
15.	ARC17R581	Architectural Design VII	S	8	-	-	16	ARC17R481/ ARC17R501
16.	ARC17R506	Professional Practice	T	3	3	-	-	-/ARC17R582
17.	ARC17R551	Landscape Design	TS	3	2	-	2	ARC17R204/ ARC17R581

b. Community Service Project

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R285	Architectural Design III	S	7	-	-	14	ARC17R182

c. Practical Training

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R481	Practical Training	S	10	-	-	-	ARC17R381, ARC17R382

d. Architectural Thesis (Project Work)

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R582	Architectural Thesis	S	14	-	-	28	ARC17R483

V. ELECTIVE

a) Major Elective

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
Design Theory and History Stream								
1.	ARC17R208	Vernacular Architecture	T	2	2	-	-	ARC17R201
2.	ARC17R303	Traditional Indian Architecture	T	2	2	-	-	ARC17R205
3.	ARC17R304	Contemporary Architecture	T	2	2	-	-	ARC17R205
4.	ARC17R310	Environment Behaviour Studies	T	2	2	-	-	-/ARC17R382

5.	ARC17R311	Temple Architecture of India	T	2	2	-	-	ARC17R104/ ARCR17382
6.	ARC17R353	Interior Design	TS	3	2	-	2	-/ARC17R382
7.	ARC17R403	Architectural Writing and Research Methods	T	2	2	-	-	ARC17R481
Drawings and Presentations Stream								
8.	ARC17R281	Visual Arts and Model Making	S	2	-	-	4	-/ARC17R283
9.	ARC17R282	Computer Applications in Architecture I	S	2	-	-	4	ARC17R152
10.	ARC17R284	Computer Applications in Architecture II	S	2	-	-	4	ARC17R282
Building Materials, Construction, Structures and Services Stream								
11.	ARC17R305	Advanced Structures	T	2	2	-	-	ARC17R207
12.	ARC17R306	Alternate Building Materials and Construction	T	2	2	-	-	ARC17R252
13.	ARC17R312	High Rise Buildings	T	2	2	-	-	ARC17R302
14.	ARC17R371	Architectural Acoustics	TL	3	2	1	-	ARC17R302
15.	ARC17R402	Design of Built Environments for Disaster Mitigation	T	2	2	-	-	ARC17R481
16.	ARC17R404	Retrofitting for Buildings	T	2	2	-	-	ARC17R481
17.	ARC17R405	Advanced Building Services	T	2	2	-	-	ARC17R481
Environment and Energy Studies Stream								
18.	ARC17R372	Energy Efficient Architecture	TL	3	2	1	-	ARC17R271 / ARC17R382
19.	ARC17R406	Energy Audits	T	2	2	-	-	ARC17R372/ ARC17R483
20.	ARC17R505	Sustainable Architecture and Planning	T	2	2	-	-	ARC17R372/ ARC17R581
Urban Studies and Complex Systems								
21.	ARC17R502	Smart city systems	T	2	2	-	-	ARC17R308/ ARC17R581
22.	ARC17R503	Architectural Conservation	T	2	2	-	-	-/ARC17R581
23.	ARC17R552	Urban Housing	TS	3	2	-	2	-/ARC17R581
Allied Fields Stream								
24.	ARC17R209	Art Appreciation	T	2	2	-	-	ARC17R201
25.	ARC17R352	Graphic and Product Design	TS	3	2	-	2	-/ARC17R381
26.	ARC17R504	Intellectual Property Rights	T	2	2	-	-	-/ARC17R581

b) Open Elective *

S. No	Course Code	Course Name	Credits	L	P	S
1.	CIV17R325	Introduction to Remote Sensing	3	3	0	0
2.	CIV17R327	Environmental Management	3	3	0	0
3.	CIV17R420	Geographic Information systems	3	3	0	0
4.	CIV17R421	Ecological Engineering	3	3	0	0
5.	CIV17R422	Environmental Impact Assessment	3	3	0	0
6.	CIV17R423	Building Services	3	3	0	0

7.	CIV17R424	Modern Building Materials	3	3	0	0
8.	CIV17R425	Smart Structures	3	3	0	0
9.	CIV17R426	Valuation of Engineering Structures	3	3	0	0
10.	CIV17R427	Seismology and Earthquake Engineering	3	3	0	0
11.	CIV17R431	Transportation economics	3	3	0	0
12.	CIV17R432	Remote Sensing And GIS In Transport Development	3	3	0	0
13.	CSE17R306	Introduction to Software Engineering	3	3	0	0
14.	EEE17R310	Solar and Wind Energy Conversion	3	3	0	0
15.	EEE17R314	Smart Grid Technology	3	3	0	0
16.	EEE17R315	Electrical wiring Estimation and costing	3	3	0	0
17.	EEE17R417	Electrical Safety	3	3	0	0
18.	EEE17R418	Power Generation Systems	3	3	0	0
19.	EEE17R422	Energy Conservation and Management	3	3	0	0
20.	EEE17R425	Building Management System	3	3	0	0
21.	EIE17RXXX	Building Automation	3	4	0	0
22.	CSHM107	Food Production and Patisserie I	2	-	3	-
23.	FT17R360	Bakery and Confectionary Technology	4	3	0	1
24.	FT17R320	Foundation of Food and Nutrition	3	3	0	0
25.	FT17R322	Food Laws and Standards	3	3	0	0
26.	INT17R311	Web Programming	3	3	0	0
27.	INT17R316	Essentials of Information Technology	3	3	0	0
28.	MEC17R442	3D Printing	3	3	0	0
29.	MEC17R447	Smart Materials	3	3	0	0
30.	MEC17R450	Fundamentals of entrepreneurship	3	3	0	0
31.	VSC17R182	Photography	2	0	0	3
32.	VSC17RXXX	Semiotics and Visual Analysis	2	3	0	0
33.	VSC17RXXX	Communication for Social Change	2	3	0	0
34.	VSC17RXXX	Animation and 3 D modelling	2	0	0	3

c) Humanities Elective *

S.No	Course Code	Course Name	Course Type	Credits	L	T	P
2.	HSS17R001	Management Concepts and Techniques	T	3	3	0	0
3.	HSS17R002	Marketing Management	T	3	3	0	0
4.	HSS17R003	Organizational Psychology	T	3	3	0	0
5.	HSS17R004	Project Management	T	3	3	0	0
6.	HSS17R005	Stress Management and Coping Strategies	T	3	3	0	0
7.	HSS17R007	Human Resource Management and Labour Law	T	3	3	0	0
8.	HSS17R008	Entrepreneurship Development	T	3	3	0	0

9.	HSS17R010	Product Design and Development	T	3	3	0	0
10.	HSS17R012	Political Economy	T	3	3	0	0
11.	HSS17R013	Professional Ethics	T	3	3	0	0
12.	HSS17R014	Operations Research	T	3	3	0	0
13.	HSS17R015	Total Quality Management	T	3	3	0	0

d) Self Study

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R405	Advanced Construction Technology	T	2	-	-	-	ARC17R252 and ARC17R481
2.	ARC17R451	Computation and Design	TS	2	-	-	-	ARC17R481
3.	ARC17R452	Architectural Appraisal	TS	2	-	-	-	ARC17R481
4.	ARC17R453	Architectural Entrepreneurship	TS	2	-	-	-	ARC17R481

Open Electives offered to other Departments

S. No	Course Code	Course Name	Course Type	Credits	L	P	S	Pre requisite / Co requisite
1.	ARC17R221	Creativity and Design	T	2	2	-	-	Nil
2.	ARC17R222	Visual Arts	S	2	-	-	4	Nil
3.	ARC17R223	Product Design	T	2	2	-	-	Nil
4.	ARC17R224	Smart City	T	2	2	-	-	Nil
5.	ARC17R225	Introduction to Interior Design	T	2	2	-	-	Nil

T – Theory
TL – Theory cum Laboratory
TS – Theory cum Studio
S – Studio
L – Lecture
P – Practical
S – Studio

***** *Open and humanities elective courses are subject to change as per the courses offered by the other departments during each academic year.*

SYLLABUS

I. BASIC SCIENCES AND MATHEMATICS

ARC17R103 Architectural Mathematics	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Basic Sciences and Mathematics **Course Type**: Theory			

Course Objective(s):

To provide the basic knowledge in Mathematics required in understanding architectural space, form, and structure; to apply mathematical skills in various stages of design process and evaluation.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Ability to find the area and volume of simple, complex, and irregular geometrical shapes using various rules.

CO2: Ability to apply trigonometry in architectural designs and site context.

CO3: Ability to apply matrices for various building service satisfactory analysis.

CO4: Ability to analyze and interpret different types of data and representation of the distribution.

CO5: Awareness about various Proportions, Sacred Geometry, and Fibonacci Series.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	H	H				M					
CO2				H		M	M				
CO3		M							H		
CO4				M			L		M		
CO5	H	M							L		

H – High, M – Medium, L – Low

Unit 1: Areas and Volumes **6 Hours**

Surface areas and frustum of complex geometry consisting of primitives: cuboid, coin, pyramid and cylinder, practical application of calculating areas and building elements like floors, walls. Staircase - Volumes of complex geometry consisting of primitives: cuboid, coin, pyramid and cylinder - Practical application of calculating Volume: room, staircase, walls, roofs, etc - Mid ordinate rule, Trapezoidal rule, Simpson's rule, Volume of irregular solids, Prismoidal rule.

Unit 2: Analytical Geometry **6 Hours**

Direction cosines and ratios (30^0,45^0,60^o), Angle between two lines, Equation of planes and Equation of Line, Angle of elevation and depression - Practical application of trigonometry on staircase, ramps and different kinds of sloping roofs - Setting out of simple building sites, Bay window and curved brick works, checking a building for square corners, circular arches.

Unit 3: Matrices **6 Hours**

Elementary transformation inverse of the matrix, rank of a matrix, solution of simultaneous equations, characteristic equation, Eigen values and Eigen vectors, Caley - Hamilton theorem - Application in Building Service Satisfaction analysis.

Unit 4: Probability and Statistics **6 Hours**

Tally charts, Tables and graphs - Types of Data: Discrete, Continuous, Raw and group, Averages: Mean, mode, median and variance, statistical diagrams: Pictorial, bar, chart, pie chart and line graphs - Histograms, frequency distribution, standard probability models Binomial, Poisson.

Unit 5: Proportions and Fibonacci Series **6 Hours**

Golden mean ratio, algebraic relations, and its application in Egyptian pyramids, Fibonacci series, Fibonacci rabbit experiment, Sacred Geometry, Square root proportions, Modular proportions.

Total: 30 Hours

Text Book(s):

1. Arumugam.S.Thangapandi - Engineering Mathematics, - John Wiley and Sons Ltd - Singapore – 2001(8th Edition)
2. Construction Mathematics - Surinder Singh Virdi and Roy T Baker - Elsevier - 2008.

Reference(s):

1. Venkataraman - M.K - Engineering Mathematics (First year) - The National publishing Company, Chennai – 2001 (2nd Edition)
2. Mario Livio - The Golden Ratio: The Story of Phi, the Extraordinary Number of Nature, Art and Beauty - Headline Review - 2003
3. Architecture and Mathematics in Ancient Egypt - Corinna Rossi - Cambridge University Press – 2003.

ARC17R105 Environmental Science	**L**	**P**	**S**	**Credit**
	2	0	0	2
Pre-requisite: Nil **Co - requisite:** ARC17R182, Architectural Design I	**Course Category:** Basic Sciences and Mathematics **Course Type**: Theory			

Course Objective(s):

To create awareness about the significance of the natural environment and the impact of human interventions on it; to sensitise students on the need for environmental management concepts.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend about the environment and to provide an overview about the various natural resources and to understand about their importance in today's context.

CO2: Knowledge about the structure and value of ecosystem and its characteristics and conservation of the biodiversity.

CO3: Understand about various pollutions and how it affects the environment and measures to control the pollution.

CO4: Know about the role of government and non government organization in environmental management and to gain knowledge about the waste management.

CO5: Analyse in detail about the various tools for the environmental management and to learn about the importance of environmental protection and sustainable development.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	M								M	H
CO2	M	M								H	M
CO3	M	L			L					H	H
CO4	M	L			L					L	H
CO5		L			L					H	H

H – High, M – Medium, L – Low

Unit 1: Natural Resources **4 Hours**

Definitions, Scope of Environmental Sciences - Forest Resource, Food Resource, Land Resource, Water and Mineral resources - Utilization of Natural Resource - Impact on Environment - Conservation of Natural Resources

Unit 2: Ecosystem and Biodiversity **6 Hours**

Concept, structure and function - energy flow in ecosystem, ecological succession, food chain, food web, ecological pyramids – biodiversity: definition, values, threats to biodiversity, conservation of biodiversity

Unit 3: Environmental Pollution **6 Hours**

Definition, causes, effects and control measures of air, water and soil pollution - thermal and nuclear pollution.

Unit 4: Management of Environmental Pollution **6 Hours**

Solid waste management - treatment methods adopted for municipal sewage and industrial effluent - hazardous and biomedical waste management.

Unit 5: Tools for Environmental Management **8 Hours**

Environment impact assessment - precautionary and polluter pay principle - constitutional provision (air, water, and forest) - waste minimization techniques, cleaner technology options, bioremediation.

Total: 30 Hours

Text Book(s):

1. Dhameja, S.K. - Environmental engineering and Management - S. K. Kataria and sons, New Delhi - 2004 (1st edition)

Reference(s):

2. Bharucha Erach - The Biodiversity of India - Mapin Publishing Pvt. Ltd., Ahmedabad - 2001 (1st edition)
3. Miller, T.G. Jr. - Environmental Science - Wadsworth Publishing Co. USA - 2004 (2nd edition)
4. Trivedi, R.K. - Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II - Enviro Media., New Delhi - 2004 (2nd edition)
5. Masters, G. M. - Introduction to Environmental Engineering and Science - Prentice Hall, New Delhi - 1997 (2nd edition)
6. Henry, J. G., Heike, G. W.,- Environmental Science and Engineering - Prentice Hall International Inc., New Jersey - 2005.

ARC17R271 Climate and Built Environment	**L**	**P**	**S**	**Credit**
	2	**1**	**0**	**3**
Pre-requisite: ARC17R105 Environmental Science	**Course Category:** Basic Sciences and Mathematics **Course Type**: Theory cum Laboratory			

Course Objective(s):

To build knowledge and develop skills for the design of climate responsive built environments in various climate zones.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the components of climate and factors determining the thermal comfort in different types of climates.

CO2: Develop basic knowledge on heat transfer in buildings, its importance, and principles and its applications in design.

CO3: Analyse climate using various techniques and design efficient shading devices.

CO4: Acquire knowledge and design skills in climate responsive design strategies for various climate zones in India.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	M		M							

CO2	H		M	H							
CO3	H	H		H							
CO4	H	H		H	M						

H – High, M – Medium, L – Low

Unit 1 Climate and Human Comfort **5 Hours**

Climate and Civilization - Factors that determine climate of a place - Components of climate- Climate classifications for building designers in tropics, Climate characteristics - Human body heat balance, Human body heat loss, Effects of climatic factors on human body heat loss - Effective temperature- Human thermal comfort – *Exercises involving use of C. Mahony's tables.*

Unit 2 Design of Solar Shading Devices **10 Hours**

Movement of sun- Locating the position of sun- Sun path diagram- Overhead period- Solar shading- Shadow angles- *Exercises in the design of appropriate shading devices.*

Unit 3 Heat Flow through Building Envelope concepts **9 Hours**

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 – Types of envelops with focus on glass - *Exercises involving software for design analysis.*

Unit 4 Air Movement Due to Natural and Built Forms **9 Hours**

The wind – The effects of topography on wind patterns – Air currents around the building – Air movement through the buildings – The use of fans – Thermally induced air currents – Stack effect, Venturi effect – Use of court yard - *Experiments as relevant.*

Unit 5 Climate and Design of Buildings **12 Hours**

Design strategies in warm humid climates, hot humid climates, hot and dry climates, and cold Climates – *Climate responsive design exercises for various contexts.*

Total: 45 Hours

Text Book(s)

1. O.H. Koenigsberger, T.G. Ingersoll, Alan Mayhew, SV. Szokolay - Manual of Tropical Housing and Building: Climatic Design - Universities Press - 2012.
2. IS 3792 - Hand book on Functional requirements of buildings other than industrial buildings, (Part I – IV) - Bureau of Indian Standards, New Delhi - 1987
3. B.Givoni - Man, Climate and Architecture - Elsevier Science Ltd -1976

Reference book(s)

1. Mark Dekay, G.Z.Brown - Sun Wind and light: Architectural Design Strategies - John Wiley and Sons - 2014
2. Galloe, Salam and Sayigh A.M.M - Architecture, Comfort and Energy - Elsevier Science Ltd., Oxford, - 1998
3. Donald Watson and Kenneth Labs - Climatic Design: Efficient Building Principles and Practices - McGraw Hill Book Company - 1983.
4. Martin Evans - Housing, Climate and Comfort - Architectural Press, London -1980

II. HUMANITIES AND SOCIAL SCIENCES

ARC17R101 History of Architecture and Culture I	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Humanities and Social Sciences **Course Type**: Theory			

Course Objective(s):

To understand the evolution and diversity of built environments as a response to context. To gain knowledge on the basic principles and concepts of world architecture from prehistoric to medieval period.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognise the significance of history of architecture and the role of various factors in shaping the built environment.

CO2: Understand the ancient civilizations of the world, their cultural and architectural developments.

CO3: Appreciate the unique features of oriental architecture.

CO4: Gain knowledge on the significance and principles of Greek and Roman architecture.

CO5: Comprehend the evolution and characteristics of Christian architecture.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M				L	L					
CO2	H	H	L		M	L					
CO3	H	H	L		M	L		M			
CO4	H	H	L		M	L					
CO5	H	H	L		M	L					

High – H, Medium – M, Low – L

Unit 1: Introduction to History of Architecture **2 Hours**

Purpose and need to understand history of architecture - Role of context such as social, cultural, religious, climate, economic, political, geography factors in shaping built environment and development of different styles in architecture with examples - Brief evolution of civilization and architecture.

Unit 2: Ancient World Architecture **7 Hours**

Context, Important events and early man made shelters from prehistoric to Iron Age, example - **Egypt:** Nile valley landscape and civilization, context, beliefs and architectural principles, characteristics and building typologies of ancient Egyptian civilization – evolution of Tomb and Temple architecture through examples such as Great Pyramid of Cheops and Temple of Ammon, Karnak - **West Asia :** Urbanization in the Fertile Crescent along Tigris and Euphrates rivers - Sumerian, Babylonian, Assyrian and Persian civilization and context, Architectural principles and characteristics through examples such as Ziggurat of Ur, Hanging Gardens of Babylon , Palace of Sargon, Palace of Persepolis.

Unit 3: Oriental Architecture **6 Hours**

Ancient China: Context, Architectural principles and features - Classification – residential, imperial, and religious buildings – examples such as Forbidden City and Great Wall of China - **Ancient Japan**: Context, Architectural principles and characteristics – Classification- residential, imperial and religious buildings – examples such as Zen and Shinto shrines - **Ancient Combodia**: Context of Khmer empire and architecture – examples such as Ankor Wat.

Unit 4: Greek and Roman Architecture **7 Hours**

Greece: Context and Evolution of city states, Architectural characteristics and principles, Orders, visual refinement, temples, urban spaces and public buildings through examples such as Acropolis and Agora, Parthenon, Erechtheion -**Rome:** Context, architectural principles and characteristics - public buildings and urban spaces – structural systems – examples such as Pantheon, Colloseum, Thermae of Caracalla.

Unit 5: Byzantine Architecture **8 Hours**

Early Christian and Byzantine architecture: Context, Birth and spread of Christianity, Evolution, principles and characteristics of Church planning - examples - Haggia Sophia, Constantinople and St. Mark's Basilica, Venice - **Romanesque architecture:** medieval period, context, architectural principles, vaulting, buttress, examples - Pisa Group of Buildings - **Gothic architecture:** Changes and Context, evolution of Gothic church plan. Characteristics and principles through examples - Notre Dame, Paris.

Total: 30 Hours

Text Book(s):

1. Sir Banister Fletcher - A History of Architecture - CBS -2002 (20th Edition)
2. Spiro Kostof - Gregory Castillo, Richard Tobias - The History of Architecture: Settings and Rituals – OUP, USA - 2015
3. Henri Stelerlin - The Pharaohs - Plerre Terrail - 2001.
4. Francis D.K. Ching and others - A global History of Architecture - John wiley and sons, Inc., - 2011(2nd edition).
5. G.K.Hiraskar - Great Ages of World Architecture - Dhanpat Rai and Sons, Delhi

Reference(s):

1. S.Lloyd and H.W.Muller - History of World Architecture - Series - Faber and Faber Ltd., London - 1986
2. Leland M Roth; Understanding Architecture: history and meaning. Craftsman House - 1994
3. Gosta - E. Samdstrp - Man the Builder - Mc.Graw Hill Book Company, New York - 1970.
4. Pier Luigi Nervi - General Editor - History of World Architecture -Series - Harry N.Abrams - Inc.Pub., New York - 1972
5. Marco Bussagli - Rome Art and Architecture - Konemann Publications - 2004.

ARC17R171 Communicative English	**L**	**P**	**S**	**Credit**
	2	1	0	3
Pre-requisite: Nil	**Course Category:** Humanities and Social Sciences **Course Type**: Theory cum Laboratory			

Course Objective(s):

To impart necessary technical and communicative English language skills in reading, writing, listening and speaking so as enable students to communicate with clarity and confidence.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Speak good English covering their day to day activities.

CO2: Understand the importance of listening in order to communicate well.

CO3: Make situational dialogues on emerging multiple situations.

CO4: Learn the importance of reading for mastery in language.

CO5: Compose effective error free composition.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M						M		L		M
CO2		L			L		H				
CO3							H				L
CO4							H		M		
CO5							H		M		

High – H, Medium – M, Low – L

Unit 1: Focus On Language and Communication **12 Hours**

What is Communication? Verbal and Non-verbal communication - Cloze reading, Skimming, Scanning- Letters: Leave , Permission, Apology and Informal Letters - Spoken English: Meeting; parting; Meeting at a train station: Asking questions at the train station, Meeting at the airport, getting information at the airport- Definitions for technical terms, Etymology of Scientific Terms - Parts of Speech – Tenses (Practical)- Preparing a short profile.

Unit 2: Listening Skills **8 Hours**

Listening Comprehension, Listening to an audio, Types of Listening and Tips for Effective Listening, Dialogue Writing, Telephonic Conversation - Major English Accents: British Accent (BBC), American Accent (CNN), Indian Accent (Doordharshan, NDTV, etc). Language Focus: Articles, Prepositions, Numerical Adjectives (Practical) - Listening to received pronunciation.

Unit 3: Speaking Skills **12 Hours**

Giving Instructions, Recommendations – Situational Conversations using the telephone; getting help in stores; going shopping, talking about shopping; shopping for clothes, asking about prices, Role plays - Communicating Politely, Oral Presentation Strategies, Organizing Contents - Language Focus, Verbs, transitive and intransitive, Active Voice and Passive Voice - Direct Speech, Indirect Speech (Practical), Narrating events /stories.

Unit 4: Reading Skills **8 Hours**

Converting newspaper headlines into sentences - Note-making: Outline/Linear Method of Note-making, Sentence Method of Note-making, Schematic/Mapping Method of Note-making - Creative Writing: Language Focus, Jumbled Sentences, Summary Writing, Replacing words with the noun forms of verbs, Conditional Clauses, (Practical) Guessing Meaning from context.

Unit 5:Writing Skills **5 Hours**

Dialogue Writing: Telephone conversation - Use of Abbreviations, Avoiding clichés, jargons and foreign words –Paragraph development: Kinds of Paragraphs, Effective Construction of Paragraphs - Process Description - Language Focus: Comparison of Adjectives (Practical) Story Writing, Anecdote.

Total: 45 Hours

Text Book(s):

1. M. Asraf Rizvi - Effective Technical Communication - Tata McGraw-Hill Publishers - 2005

Reference(s):

1. Meenakshi Raman and Sangeeta Sharma - Technical Communication: English Skills for Engineers - Oxford University Press, New Delhi – 2008
2. Oxford Advanced Learner's Dictionary – OUP - Latest Version.
3. Raymond Murphy - Murphy's English Grammar - Cambridge University Press- 2004
4. Kavitha Tyagi and Padma Misra - Advanced Technical Communication - PHI press, New Delhi - 2011.

5. Clegg, Brain - Personal Development - Kogan Page India Private Limited, New Delhi - 2009.
6. Taylor, Grant - English Conversational Practice - Tata McGraw Hill, New Delhi - 1975.

ARC17R104 History of Architecture and Culture II	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R101 History of Architecture and Culture I	**Course Category:** Humanities and Social Sciences **Course Type**: Theory			

Course Objective(s):

To inculcate the ability to holistically understand and analyse the history of Indian architecture and its context of evolution; to enable students to derive design insight from the study of the rich history of Indian architecture.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Appreciate the concepts of spatial, structural and aesthetic composition for various building typologies

CO2: Understand the various factors that contributed to the formation of different styles of architecture in India.

CO3: Comprehend on the evolution of Indian architecture through the study of architecture of Indus valley, Buddhist and Hindu architecture.

CO4: Appreciate the principles of visual and spatial composition in Hindu temple architecture.

CO5: Understand the impact of Islamic architecture in India through the numerous regional adaptations.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	M			M			H			M
CO2	M	M						H			M
CO3	M							H			
CO4	M			L				H			
CO5	M	M						H			M

High – H, Medium – M, Low – L

Unit 1: Ancient Indian Architecture **5 Hours**

Indus valley civilization: Context of Indus valley civilization, settlement and its features – Granary and Great bath - Vedic culture: rudimentary forms of architecture through significant examples such as Vedic village and rudimentary forms of bamboo and wooden construction - **Buddhist Architecture:** Buddhist religion and culture - Hinayana and Mahayana, principles and characteristics of architecture through examples such as Sanchi Stupa - Cave architecture - Chaitya hall in Ajantha-Ellora caves.

Unit 2: Early Hindu Architecture **4 Hours**

Revival of Hinduism and evolution of early Hindu temples – Symbolism, Principles, and characteristics through examples - Durga temple at Aihole, Papanatha, Virupaksha temple at Pattadakal, rock cut architecture - Kailasanatha temple at Ellora and rathas and Bas relief at Mamallapuram.

Unit 3: Temple Architecture in India **12 Hours**

Principles and characteristics of medieval temple architecture – types of temple architecture and its characteristics – Dravida, Nagara and Vesara. **Dravida architecture - Pallava architecture**: Over view of Architecture, contextual adaptations – Eg Vaikunthaperumal

temple at Kanchipuram - **Chola architecture**: Over view of refinement of temple Architecture in terms of scale and architectural detailing - significant architectural examples such as Brahadeswara temple at Thanjavur; **Nayak architecture**: Over view of Architecture, contextual adaptations - architectural example such as Meenakshi temple, Madurai - **Nagara Architecture**: Principles and characteristics with examples such as Sun Temple at Konark - **Vesara architecture** Principles and characteristics with examples of Chenakesava temple at Belur

Unit 4: Islamic Architecture in India **9 Hours**

Origin, sources and evolution of Islamic Architecture in India –Imperial style in New Delhi, Provincial style and Mughal style - Context, materials, techniques, principles and elements of various Islamic building typologies - mosque, madrasa and tomb - **Imperial style**: architectural characteristics with examples such as Qutub Minar and Alai Darwaza in Delhi, Tomb of Ghiyasuddin Tuqhlaq - **Provincial style**: Sources, contextual influences in Provincial Architecture of various regions such Punjab, Bengal, Gujarath, Jaunpur, Deccan – examples such as Jami Masjid at Ahmedabad, Charminar at Hydrebad and Golgumbaz at Bijapur - **Mughal Style**: Mughal architecture principles and characteristics during various period – examples such as City of Fatehpur sikri and Taj Mahal at Agra.

Total: 30 Hours

Text Book(s):

1. Percy Brown - Indian Architecture (Buddhist And Hindu Period) - Read Books publishers - 2010.
2. Percy Brown - Indian Architecture (The Islamic Period) - Read Books publishers - 2010.
3. Satish Grover - Buddhist and Hindu Architecture in India - CBS Publishers and Distributors - 2013
4. Satish Grover - Islamic Architecture in India - CBS Publishers and Distributors - 2013
5. Christoper Tadgell - The History of Architecture in India from the Dawn of civilization to the End of the Raj - Longmon Group U.K. Ltd., London - 1990.
6. Spiro Kostof , Gregory Castillo, Richard Tobias - The History of Architecture: Settings and Rituals - OUP USA - 2015

Reference(s):

1. George Michell - Temple towns of Tamil Nadu - Marg Publications, Mumbai - 2008.
2. George Michell - The New Cambridge History of India – Architecture and Art of Southern India - Cambridge university press - 2000.
3. Sir Banister Fletcher - A History of Architecture - CBS – 2002 (20th Edition).
4. Yatin Pandya - Concepts of space in traditional Indian architecture - Mapin publishing - 2005
5. Satish Grover - Masterpieces Of Traditional Indian Architecture - Om Books - 2004
6. Adam Hardy - The Temple Architecture of India - Wiley - 2007.

ARC17R201 History of Architecture and Culture III	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R104 History of Architecture and Culture II	**Course Category:** Humanities and Social Sciences **Course Type**: Theory			

Course Objective(s):

Students will be aware of the paradigm changes in the architecture of postindustrial era. They will be sensitive to the profound influences, responses, and criticism to modern architecture across the world.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand world architecture during the renaissance and neoclassical periods and establish the link between classical and modern architecture.

CO2: Critically analyse the conditions of industrialisation and its implications leading to the search for an appropriate new style.

CO3: Appreciate the emergence of modern architecture, its significance, and influences on world architecture.

CO4: Comprehend the criticism towards modern architecture and the resulting architectural styles that emerged after modernism.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	H	M	-	-	H	L	-	-	-	-	-
CO2	H	H	-	-	H	M	-	-	-	-	-
CO3	H	H	-	-	H	-	-	-	-	-	L
CO4	H	H	-	-	H	-	-	-	-	-	L

H – High , M – Medium , L – Low

Unit 1 Renaissance Architecture **6 Hours**

Idea of rebirth, individualism, humanism, changes in socio - cultural, religious, technological and political context - Architectural principles of domestic and religious buildings - philosophies of Renaissance architects such as Leonardo da Vinci, Brunelleschi, Michael Angelo, Andrea Palladio, Christopher Wren and Inigo Jones; Examples such as St, Peters Rome and St.Pauls Cathedral – Baroque and Rococo: characteristics.

Unit 2 Emergence of Modern Architecture **3 Hours**

Neoclassicism: origin, context, principles and characteristics – works of Ledoux, Schinkel and Jefferson; Industrial revolution: technological, social and demographic changes – Urbanisation and its impact - new building materials, structures and building typologies such as railway stations, bridges, exhibition buildings; Response to industrialisation

Unit 3 Search for a new style **6 Hours**

Arts and crafts movement, Art nouveau, Expressionism, Futurism, Constructivism, Cubism, De Stijl – contribution of Adolf Loos - Early modernism: Chicago school and development of skyscrapers – Werkbund – Bauhaus, early works of Wright.

Unit 4 Modernism **10 Hours**

High Modernism: CIAM and the International Style - ideas and works of Walter Gropius, Le Corbusier, and Mies van der Rohe - Late Modernism: Concepts and important works of Alvar Aalto, Oscar Niemeyer, Eero Saarinen, Philip Johnson, Louis Kahn, Paul Rudolph, and Buckminster Fuller – later works of Wright.

Unit 5 After Modernism **5 Hours**

Critiquing modernism – Team X - philosophies and contributions of Jane Jacobs, Venturi, Aldo Rossi, Christopher Alexander; Post modernism – ideas and works of Graves, Venturi, Moore, Johnson, Sterling.

Total: 30 Hours

Text Book(s):

1. Francis D. K. Ching , Mark M. Jarzombek, Vikramaditya Prakash - A Global History of Architecture - John Wiley and Sons - 2007
2. Sir Banister Fletcher - A History of Architecture, 20th Edition - CBS -2002.
3. Marvin Trachtenberg, Isabelle Hyman - Architecture : From prehistory to post modernity - New York : H.N. Abrams – 2002
4. William J R Curtis - Modern Architecture Since 1900 - Phaidon Press - 1996
5. Kenneth Frampton - Modern Architecture: A Critical History - Thames and Hudson, London, 1994

Reference(s):

1. Catherine Slessor - Contemporary Architecture - Images Publishing - 2003
2. Leonardo Benevolo - History of Modern Architecture - 2 Vols - Routledge and Keganpaul, London - 1971
3. SigfriedGiedion - Space Time and Architecture: The Growth of a New Tradition - Harvard University Press -1978
4. Robert Venturi - Complexity and Contradiction in Architecture - The Museum of Modern Art, New York - 1977
5. Charles Jencks - The language of post Modern Architecture -1984
6. Jane Jacobs - The Death and Life of Great American Cities - Vintage; Vintage Books ed. – 1992
7. Christopher Alexander - A Pattern Language: Towns, Buildings, Construction – Oxford University Press – 1977
8. Aldo Rossi - The Architecture of the city - M.I.T Press, Massachusetts - 1982

ARC17R205 History of Architecture and Culture IV	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R201 History of Architecture and Culture III	**Course Category:** Humanities and Social Sciences **Course Type**: Theory			

Course Objective(s):

To gain basic knowledge on the pre independence and post independence trends in architecture in India and to be aware of international architecture of the 20th century.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Acquire knowledge on the colonial influence on India and the fusion of native foreign features architecture leading to emergence of unique architectural style.

CO2: Understand the post independence development in architecture in India.

CO3: Appreciate the influence of context in architecture through study of critical regionalism.

CO4: Critically analyse the modern architecture that developed in India during the 20th century.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	M			M	L		H			
CO2	H	H			H			H			
CO3	H	H			H	M				M	L
CO4	H	H			H			H		M	L

H – High , M – Medium , L – Low

Unit 1 Colonial Architecture in India **6 Hours**

Advent of colonialism and impact on India, Colonial architecture: Cantonments and Bungalows, Stylistic transformations: Neo classical, Gothic Revival - Indo Saracenic characteristics and important examples - PWD - New Delhi: City planning and Architecture: principles and important architectural examples.

Unit 2 Post Independence Architecture in India **4 Hours**

Architecture and Identity – Contrasting visions of Gandhi and Nehru and its implications in Architecture and urbanism –Works and contributions of International architects: Corbusier, Kahn, Joseph Allen Stein – Central and State government projects: Supreme Court, Vidhan Soudha, Bangalore – Building of new cities: Capitals like Chandigarh, Bhubaneswar, Gandhinagar and Industrial cities like Bhilai, Durgapur, Roukella

Unit 3 Critical Regionalism **6 Hours**

Tradition and context – Concept of critical regionalism, the need of reflective practices – influence of culture, climate, and local resources. Ideas and works of Hassan Fathy, Geoffrey Bawa, Tadao Ando, Laurie Baker, Luis Barragan, Jørn Utzon

Unit 4 Modernism in India **8 Hours**

First Generation Modernists: Habib Rahman, Achyut Kanvinde, Benett Pithavadian – Second Generation Modernists: Charles Correa, Raj Rewal, B V Doshi, Anate Raje, Uttam C Jain, Nari Gandhi, Christopher Benninger, Hasmukh Patel, Laxman Chitale, C.Narayana Rao, Hafeez Contractor – Urbanism and Housing: Case study of New Bombay, issues of appropriate technology- Regional Alternate Practices such as HUDCO, Auroville, Nirmithi Kendras, COSTFORD, Habitat.

Unit 5 Technology driven architecture **6 Hours**

Technology and Architecture - Works in Brutalism, Smithsons - Aldo Van Eyck - Ideas and important works in High Tech architecture: Works of Stirling, Rogers and Piano – Deconstructivism theory and works - Eisenmann, Hadid, Gehry, Libeskind, Tschumi - Ideas in urbanism: Archigram, Metabolism, Paolo Soleri - Digital technology and Architecture: Design and Computation - Geometry and surfaces: Fractal Geometry, Shape Grammar, Hyper Surface, Liquid Architecture, Responsive Architecture, Animation.

Total: 30 Hours

Text Book(s):

1. Francis D. K. Ching , Mark M. Jarzombek, Vikramaditya Prakash - A Global History of Architecture - John Wiley and Sons - 2007
2. Sir Banister Fletcher - A History of Architecture, 20th Edition - CBS -2002.
3. Marvin Trachtenberg, Isabelle Hyman - Architecture : From prehistory to post modernity - New York : H.N. Abrams – 2002
4. Liane Lefaivre And Alexander Tzonis - Critical Regionalism: Architecture and Identity in a Globalised World – Prestel – 2003
5. Jon T. Lang, Madhavi Desai, Miki Desai - Architecture and Independence – Oxford university Press - 2000
6. Jon Lang - Concise History of Modern Architecture in India - Permanent Black - 2010

7. Sarbjit Bahga, Surindar Bahga and Yashinder Bahga - Modern Architecture in India: Post-independence Perspective – Galgotia Publishing company – 2015
8. Klaus – Peter Gast – Modern Traditions: Contemporary Architecture in India – Birkhauser - 2007
9. Jagan Shah - Contemporary Indian Architecture - Roli Books – 2008

Reference(s):

1. Marvin Trachteberg and Isabelle Hyman - Architecture: From Pre history to Post Modernity – New York : H.N. Abrams – 2002
2. Peter Scriver, Vikramaditya Prakash - Colonial Modernities: Building, Dwelling and Architecture in British India and Ceylon – Routledge – 2007
3. Liane Lefaivre , Alexander Tzonis - Critical Regionalism: Architecture and Identity in a Globalised World - Prestel – 2003
4. Rahul Khanna – The modern Architecture of New Delhi (1928 – 2007) – Random House India - 2008
5. Raj Rewal - Raj Rewal : Innovative Architecture And Tradition - Om Books International – 2013
6. Charles Correa- Charles Correa - Thames and Hudson Ltd - 1997
7. M Masud Taj - Nari Gandhi - Foundation For Architecture, Art and Design Book Press - 2009

ARC17R151 Architectural Graphics I	**L**	**P**	**S**	**Credit**
	2	0	2	3
Pre-requisite: Nil	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Studio			

Course Objective(s):

To enable students to communicate architectural design through proficiency in fundamental concepts and techniques of architectural drawing.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the concepts and fundamentals of architectural drawing.

CO2: Develop representation skills and to nurture the understanding of the nature of geometrical forms and basic construction techniques in terms of projections.

CO3: Develop the skill of architectural drawing through measured drawing.

CO4: Technically create three-dimensional views of buildings.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M		H	M			L				
CO2	M	L	H	M	L		L				
CO3	M	M	H	H			H				
CO4	L		H		M		M				

H – High , M – Medium , L – Low

Unit 1: Introduction **10 Hours**

Purpose of architectural drawings, components of architectural drawings, drafting principles and techniques, scales, free hand and geometric construction of shapes, Basic rendering techniques, Basics of sheet presentation like IS code drawing, drawing instruments, sheet layout, architectural notations, lines, lettering, dimensioning etc – two dimensional geometric construction - Exercise in scales, construction of lines, shapes etc.

Unit 2: Projection **20 Hours**

Principles of orthographic projections, projection of lines, planes and solids - Drawings in projection of point, line, planes and solids.

Unit 3: Measured Drawing **16 Hours**

Study of plan, section and elevation of simple objects, simple building components and simple buildings through documentation exercises.

Unit 4: Isometric and Axonometric View **14 Hours**

Principles of Isometric and axonometric, views of simple objects, building components etc. Drawings on the above.

Total: 60 Hours

Text Book(s):

1. M.S.Kumar - Engineering Drawing - DD publications, Chennai - 2005.
2. Francis D.K.Ching - Architectural Graphics - John Wiley and Sons, USA - 2009
3. Douglas Cooper - Drawing and Perceiving - John Wiley and Sons - 2007.

Reference(s):

1. Francis D.K.Ching and Steven P Juroszek - Design drawing - John Wiley and Sons, USA – 1998.
4. Griffin, A.W. and Brunicardi, V.A. - Introduction to Architectural Presentation Graphics - Prentice Hall - 1998.
5. Carpo, M., - Perspective, Projections and Design: Technologies of Architectural Representation – Routledge - 2008.
2. I.H. Morris - Geometrical Drawing for Art Students - Orient Longman, Chennai - 2004.
3. Rayeuans - Drawing and Painting Architecture - Van Nostrand Reinhold Company, New York - 2002.
4. Ralph W. Liebing - Architectural Working Drawing - John Wiley and Sons - 2000.
5. Jim Leggitt - Drawing Short Cuts - John Wiley and Sons - 2010.

ARC17R172 Structures and Architecture I	**L**	**P**	**S**	**Credit**
	2	1	0	3
Pre-requisite: Nil	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Laboratory			

Course Objective(s):

To introduce the basic components and concepts of a structure and its simple analysis involving experiments.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Resolve forces acting on particles and visualize their behaviour.

CO2: Competency to categorize the geometric property of surface and solids.

CO3: Compute mathematical formulations for dynamic problems through energy equations.

CO4: Nurture the theory of stress-strain relationship and Elastic theory on bodies.

CO5: Determine the internal forces acting on frames and truss by method of joints and sections.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M		L			H					
CO2				M		H					
CO3				M		H					
CO4				M		H					
CO5		M		H	M	H					

H – High , M – Medium , L – Low

Unit 1: Forces and Structural Systems **9 Hours**

Introduction : Structural and Non-structural members – Foundation, Column, Walls, Beam, Roof –Functional requirements in a structure and their role in defining a structure - Fundamental principles and concepts, Newton's laws, gravitation, force external and internal, transmissibility - Couple-Moment about point and about axis - Varignon's theorem; **Practical:** Forces acting on a Particle / Frame / Truss model and their behaviour; **Analysis**: Free body diagram, reactions – Problem formulation in 2-D and 3-D statics.

Unit 2: Properties of Section **9 Hours**

Introduction: Centroids of lines - areas, volumes; **Practical:** Modelling – Various geometric sections using Foam Board / Cardboard; **Analysis**: Moment of Inertia- Section modules, Radius of gyration, Theorem of perpendicular axis - Theorem of parallel axis – area moment of Inertia - principal moment of inertia.

Unit 3: Dynamics of Particles **9 Hours**

Analysis: Displacements, velocity and acceleration, their relationship -Newton's law-work Energy equation of particles- impact of elastic bodies

Unit 4: Stress, Strain and Deformation in Solids **9 Hours**

Introduction: Tension, compression and shear stresses - Hooke's law; **Practical:** Stress-strain relationship for mild steel rod, Compressive and tensile strength of concrete block and TMT rod; **Analysis:** Ultimate stress and working stress - Elastic constants and relationships between them – Temperature stresses- Stresses due to suddenly applied load and impact load.

Unit 5: Trusses and Frames **9 Hours**

Introduction: Trusses - assumptions, rigid and non-rigid trusses; **Practical**: Modelling – Common type of roof truss using MDF / Balsa / Popsicle sticks and their application, Classification of Truss based on dimensional configuration, supports, determinacy; **Analysis** of truss by method of joints and by method of sections, Compound trusses – statically determinate, rigid, and completely constrained - analysis of frames.

Total: 45 Hours

Textbook(s):

1. Beer, F.P., and Johnson, E.R. - Vector Mechanics for Engineers – Statics and Dynamics - Tata McGraw Hill, New York - 2004.

Reference(s):

1. Merriam, J.L. - Engineering Mechanics, Volume I - Statics, and Volume -II, Dynamics 2/e - Wiley International -1998.
2. W.A.Nash - Strength of Materials – Schaums Series - McGraw HillBook Company - 1989.
3. R.K. Rajput - Strength of Materials - S. Chand and Company Ltd., New Delhi -1996.

ARC17R152 Architectural Graphics II	**L**	**P**	**S**	**Credit**
	2	0	2	3
Pre-requisite:ARC17R151 Architectural Graphics I	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Studio			

Course Objective(s):

To develop graphical presentation skills to efficiently convey design ideas; introduce the application of computer aided drafting techniques.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Develop representation skills in 3 dimensional drawings and sciography.

CO2: Develop the skill of architectural drawing through measured drawing of complex structures.

CO3: Understand and apply architectural rendering.

CO4: Basic knowledge and drafting skill in computer aided two dimensional and three dimensional drawings.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M	M	H		L						
CO2		M	H				M				
CO3		M	H	M	M						
CO4		M	H				H				

H – High , M – Medium , L – Low

Unit 1: Perspective Drawing **16 Hours**

Study of concepts, types and terminologies such as picture plane, station point, vanishing point, eye level, ground level, etc. Technical construction of one point, two point and three point perspective drawings through exercises on simple objects and buildings – interior and exterior views at various eye levels. Exercises and drawings on the above.

Unit 2: Sciography **8 Hours**

Principles of shade and shadow, sciography for simple objects and buildings – interior and exterior, reflections. Exercises and drawings on the above.

Unit 3: Architectural Rendering **16 Hours**

Techniques of rendering for various architectural drawings - plans, site plan, elevations, views etc, using mediums like pen and ink, water color, oil pastels etc. (plates only)

Unit 4: Computer Aided Drafting **20 Hours**

Basic commands for 2D construction, editing, hatching, lettering and dimensioning – Exercises, Basic commands in 3D construction, editing, rendering – Exercises.

Total: 60 Hours

Text Book(s):

1. Robert W.Gill - Basic Perspective - Thames and Hudson, London - 1974.
2. C.Leslie Martin - Architectural Graphics - Macmillan Company, New York - 1964.
3. Francis Ching - Architectural Graphics - Van Nostrand and Reinhold Company, NewYork - 1975

Reference(s):

1. Clande Batley - Indian Architecture - D.B.Taraporevale Sons and Co., Ltd., Bombay
2. William Kirby Lockard - Drawing as a Means to Architecture - Van Nostrand, Reinhold Company, New York.
3. Carpo, M., - Perspective, Projections and Design: Technologies of Architectural Representation – Routledge - 2008.
4. Rober W.Gill - Advanced Perspective - Thames and Hudson, London - 1974.
5. George A.Dinsmore - Analytical Graphics- D.Van Nostrand, Company inc., Canada.
6. John M.Holmes - Applied Perspective - Sir lsaac, Piotman and Sons Lt., London - 1954.
7. Interiors: Perspective in Architecture Design Graphic - SMA Publishing Co.Ltd. Japan - 1967.
8. Emest Norling - Perspective drawing - Walter Foster Art Books California - 1986.
9. Bernard Alkins-147 - Architectural Rendering - Walter Foster Art Books - 1968.

ARC17R153 Materials and Construction I	L	P	S	Credit
	2	0	2	3
Pre-requisite: Nil **Co-requisite:** ARC17R182, Architectural Design I	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Studio			

Course Objective(s):

Introduce students to various building materials and primary building components; Acquire knowledge on the properties of basic building materials, their principles of construction and its application.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Acquire knowledge on various building materials and construction techniques.

CO2: Comprehend the basic components of a building and their functions.

CO3: Understand the usage of bricks and various methods of brick construction.

CO4: Know the application and types of clay products used in building industry.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M		L	M		L					
CO2	M			H		L		M		L	
CO3	M		L	H		M					
CO4	M		L	H		M				M	

H – High , M – Medium , L – Low

Unit 1: Introduction **10 Hours**

Overview of various building materials such as rural materials, industrial materials, alternate materials etc, their properties and use. Components and functions of various building components – sub structure and superstructure - their functions and representation. Concept of load bearing and framed structures, Types of Foundations – *Drawings of components of buildings, types of foundations etc*.

Unit 2: Soil **6 Hours**

Classification of soil, its properties and application in building construction. Appropriate foundations for various types of soil. Mud as a building material – Soil stabilization: Need for soil stabilization – Stabilized mud blocks, compressed mud block, adobe construction etc.

Unit 3: Brick and Clay Products **24 Hours**

Properties, types and various sizes of brick. Selection of good brick and application in various building components. Brick bonding – principles and types of brick masonry –Properties and use of clay products in buildings as roofing flooring, sanitary ware etc. *Exercises and drawings on types brick bonding*.

Unit 4: Stone **20 Hours**

Properties, types, criteria for selection of stone, types of finishes, protection of stone and application in various building components. Types of stone masonry work – Exercises and drawings.

Total: 60 Hours

Textbook(s):

1. Varghese, P.C. - Building Materials, Prentice Hall of India - 2010.
2. Rangwala, S.C. - Engineering Materials - Character Publishing House – 2008.
3. Francis D.K Ching - Building Construction illustrated - John Willey and Sons -2000

REFERENCE

1. Don A. Watson - Construction Materials and Processes - McGraw Hill -1972.
2. W.B. McKay - Building Construction, Vol, 1 and 2 - Longmans, UK - 1981.

3. S.K.Sharma - A Text book of Building Construction - S.Chand and Co Ltd., New Delhi - 1998.
4. Barry - Construction of Buildings, Volume 1 and 2 - Blackwell Publishing Ltd., Oxford - 2005.
5. Allen, E. and Iano, J. - Fundamentals of Building Construction: Materials and Methods – Wiley - 2004.
6. Publications from Auroville Earth Institute - Auroville Building Center.
7. Building With Compressed Earth – BMTPC

ARC17R173 Structures and Architecture II	**L**	**P**	**S**	**Credit**
	2	1	0	3
Pre-requisite: ARC17R172 Structures and Architecture I	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Laboratory			

Course Objective(s):

To comprehend the basic concepts of different structural components of a building and their behaviour through simple analysis and experiments.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the shear force and bending moment diagram of beams under various loading conditions.

CO2: Analyze the shear stresses in composite beam sections.

CO3: Apply various methods to determine the deflection of beams.

CO4: Evaluate the load carrying capacity of the columns under various end condition.

CO5: Analyze the statically indeterminate structures by theorem of three moments.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M				H					
CO2				M		H					
CO3				M		H					
CO4				M		H					
CO5				H		H					

Unit 1: Shear Force and Bending Moment **9 Hours**

Basic concepts: Types of beams - Types of supports - Types of loads; **Modelling**: Types of beams, support and loadings using cardboard / Foam board; **Analysis:** Shear force and bending moment diagrams for beams (Simply supported, Cantilever, Overhanging) subjected to various types of loadings.

Unit 2: Stresses in Beams **9 Hours**

Theory of simple bending – Analysis for bending stresses - Bending stress distribution; **Analysis:** Shearing stress distribution in beam sections.

Unit 3: Deflection in Beams **9 Hours**

Modelling: Simply supported, Cantilever beams subjected to various loading conditions; **Analysis**: Governing differential equation - Slope and deflection at a point – Macaulay's method.

Unit 4: Columns **9 Hours**

Short and long columns – Concept of Elastic stability – Euler's theory – Assumptions and Load carrying capacity of Columns with different end conditions – Concept of Effective length – Slenderness ratio – Limitations of Euler's theory – Rankine's formula; **Modelling**: Spatial columns using Foamboard / MDF Stick, Behaviour of long and short column subjected to eccentric loading

Unit 5: Static Indeterminancy **9 Hours**

Static and Kinematic indeterminacy; **Modelling**: Continuous beam using MDF Sticks under static determinancy; Theorem of three moments - Analysis of continuous beams - Shear force and bending moment diagrams for continuous beams.

Total: 45 Hours

Text Book(s):

1. Negi, L.S., and Jangid, R.S. - Structural Analysis, Tata McGraw-Hill Publications, New Delhi -2003(6th Edition).
2. R.K. Bansal - Strength of Materials - Laxmi Publications, New Delhi - 2002.
3. B.C. Punmia - SMTS-I, Strength of Materials - Laxmi Publications, New Delhi - 1994.

Reference(s):

1. Timoshenko, S.P. and D.H. Young - Elements of Strength of Materials – EastWest Press -1993(5th Edition).
2. A.R. Jain and B.K.Jain - Theory and analysis of structures, Vol. 1 - Nemchand and Bros, Roorkee -1987.
3. R.K. Rajput - Strength of Materials - S.Chand and Company Ltd., New Delhi - 1996.

ARC17R202 Building Services I	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: Nil **Co-requisite:** ARC17R283 Architectural Design II	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory			

Course Objective(s): To cultivate basic knowledge of plumbing and sanitation services and to understand its influence in architectural space planning parameters.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Ability to understand the importance of water supply system and its operation in buildings.

CO2: To develop comprehensive knowledge of design and construction of drainage systems in buildings and built environment

CO3: Ability to understand the process of solid waste management and hence develop strategies for effective waste management in buildings and built environment

CO4: To develop the comprehension of basic planning principles involved in the integrated design of water supply and drainage systems

CO5: To develop comprehensive knowledge of architectural space planning for water supply components and integration of systems in built forms

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	M		M	L				M		L
CO2	H	H		M	L				H	L	
CO3	H	H		M	L				H	L	
CO4	H	H		M	L				M		
CO5	H	H		L	M				M	L	

H – High , M – Medium , L – Low

Unit 1 Water Supply **6 Hours**

Introduction to Building Services - Importance of water supply in buildings and built environment - Water requirement for different building typologies - Typical water supply flow chart: source to consumption in a specific building as prescribed by NBC 2016 - Types of water supply systems: gravity and pressure pumps - Potential service connection from mains, sump and other storage tanks, sizing of sump and overhead water tanks - Various types and sizes of pipes, various components, fixtures and fittings of a contemporary bathroom and kitchen – Taps: types and sizes, Jacuzzi, bath tub, bottle trap, floor trap, shower, diverter, hot water mixer, solar water heater etc - Typical layout of a water treatment plant - Case study, Examples.

Unit 2 Drainage **6 Hours**

Shape and sizes of drains and sewers, storm water over flow chambers, methods of laying and construction of sewers Traps - shapes, sizes, types, function, Invert chambers, Inspection chambers - sizes and construction, Ventilation of House drainage - Anti siphonage pipe, system of plumbing - single stack, one pipe system, one pipe partially ventilating system and two pipe system, Various components, fixtures and fittings of toilet, bathroom and kitchen - Sinks, water closets, flushing cisterns, urinals, sinks , wash basins, bidet, etc. Typical layout and components of sewage treatment plant, Design of Septic tank, Oxidation pond, Dispersion trench and soak pits. Case study – Examples.

Unit 3 Solid Waste Management **3 Hours**

Approach towards solid waste management, Solid wastes collection, and removal from buildings, On-site processing and disposal methods, guidelines for municipal solid waste management, e-waste management, Sanitary land filling, Composting, Vermi-compost, Incineration, Pyrolysis - Case studies of various sites in India and abroad.

Unit 4 Planning principles of water supply and drainage systems **6 Hours**

Water saving practices including rain water harvesting types, water recycling, reuse, ground water recharge and simple methods of removing impurities, Water balancing chart and analysis, EIA requirements of water supply and drainage systems for large scale infrastructure development, Case studies of various building typologies, large scale township, institutional buildings and industries that explains different principles of water supply and drainage systems

Unit 5 Space Planning **9 Hours**

Spatial requirements for over head water tank, sump, sewage treatment plant, water treatment plant, plumbing shaft types – ventilation shaft, shaft for different types of pipes, and their location, integration in different building typologies.

Text Books:

1. Bureau of Indian standards - National building code of India - New Delhi - 2016
2. AFE Wise, JA Swaffied - Water, Sanitary and Waste Services in buildings – V Edition - Mitchell Publishing Co. Ltd. – 2002
3. Manual of water supply and treatment - Second edition - CPHEEO, Ministry of works and housing, New Delhi - 1999
4. S.C.Rangwala - Water supply and Sanitary engineering - Chartar publishing house – 2016.

References:

1. G.M. Fair, J.C. Geyer and D.Okun - Water and Waste water engineering: Volume II - John Wiley and Sons, Inc. New York - 2010
2. Manual on sewerage and sewerage treatment, CPHEEO – Ministry of works and housing, New Delhi - 2013

ARC17R203 Design of Structures I	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R173, Structures and Architecture II	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory			

Course Objective(s)

To recognize the design philosophies of reinforced concrete structures and apply the principles, procedures, and current code requirements to the analysis and design of RC components.

Course Outcome(s)

After completing this course, the student will be able to:

CO1: Comprehend the diverse approaches for suitable planning of a framed structure
CO2: Explore an appropriate section by safeguarding check against shear and torsion
CO3: Analyse the critical strength of flexure member for various loading conditions
CO4: Examine and adapt an appropriate design of Columns and Footings
CO5: Design special RC components

Mapping of Course Outcome(s):

CO/ PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1		M									
CO2						H					
CO3	H				M	H					M
CO4	M				M	H					H
CO5						H					L

H – High, M – Medium, L – Low

Unit 1 Introduction to R.C.C. framed structures **8 Hours**

Structural systems and planning, structural patterns: patterns of support, spanning systems, structural grid etc. Introduction to RCC design, characteristics of RCC, assumptions, nominal mix, Design mix. Neutral axis; balanced, under and over reinforced sections –Basic Concepts of different types of slabs, beams, columns, footings

Unit 2 Limit State Design of RC Slabs **6 Hours**

Design of RC Section - Check for Ultimate Shear and Torsional Strength – Design of One-way and Two-way Slabs

Unit 3 Limit State Design of RC Beams **6 Hours**

Transfer of Load from Slab to Beam, Design of Simply Supported Beam – Ultimate Flexural Strength of Singly and Doubly Reinforced Sections

Unit 4 Limit State Design of RC Columns and Footings **6 Hours**

Effective Length of Column, Slenderness Ratio – Design of Axially Loaded Column – Types of Foundation, Problems based on Design of Isolated Footings

Unit 5 Design of Staircase **4 Hours**

Geometrical configuration and structural classification of staircases - Design of Dog Legged Staircase

Total: 30 Hours

Text Books

1. Francis D.K Ching, Barry S. Onouye, Douglas Zuberbuhler – Building Structures Illustrated: Patterns, systems and design – John Wiley and Sons - 2009
2. Unnikrishna Pillai S and Devdas Menon - Reinforced Concrete Design - Tata McGraw-Hill Publications, New Delhi - 2003

References

1. Bandyopadhyay J - Design of Concrete Structures - PHI Learning Pvt. Ltd, New Delhi - 2008
2. Krishna Raju N, Pranesh R N - Reinforced Concrete Design Principles and Practice - New Age International - 2003
3. Varghese P C - Limit State Design of Reinforced Concrete - PHI Learning Pvt. Ltd, New Delhi - 2002
4. IS 456 – 2000, Plain and Reinforced Concrete – Code of Practice - Bureau of Indian Standards, New Delhi
5. Design Aids for Reinforced Concrete to IS 456 – 1978, Special Publication – SP 16
6. Structure in Architecture – Salvadon and Heller

ARC17R204 Site Planning and Surveying	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: **Co-requisite:**ARC17R283 Architectural Design II	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory			

Course Objective(s):

To understand the basic principles of site planning and surveying as the preliminary tools for site planning, design and development.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognise the basic terminologies, documentation techniques and the need for site planning and surveying.

CO2: Comprehend the significance of Surveying and levelling and contour mapping.

CO3: Develop knowledge on the various regulations and standards that govern site selection and planning.

CO4: Critically analyse and evaluate on site and off site factors and prepare site analysis diagrams

CO5: Acquire knowledge on site planning principles and design skills in efficient site planning.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	L	H		L		L				
CO2	M	M	H	H	M		H				
CO3	H	H			H				M		
CO4	H	L	H	M	H				M	M	
CO5	H	L		M	H					M	

H – High , M – Medium , L – Low

Unit 1 Introduction to Site **3 Hours**

All related Nomenclatures like Plot, Region, Altitude, Baseline, Benchmark, Contours, Contour Interval, its measurement units - Need for Site planning and surveying - Site related Graphic documentation techniques.

Unit 2 Surveying and levelling **8 Hours**

Introduction, fundamentals, principles and methods of surveying - Modern surveying Instruments and their application such as EDMs and Total: Stations- Leveling: Terms, instruments and adjustments –levelling methods – Contours: intervals, horizontal characteristics, methods of locating contours: direct and indirect method, radial line method,

method of squares and cross-section - method of interpolation: arithmetic and graphic method – preparation of contour maps - uses of contours.

Unit 3 Site Context and regulations **5 Hours**

Context of the site - land use, development control rules - Impact of proposed developments on the surroundings - Aspects such as increase in traffic, noise and pollution to surroundings - Site Selection, Reconnaissance, Site selection criteria and standards for housing development, commercial and institutional projects - Study through notable examples

Unit 4 Site Analysis **6 Hours**

Importance of site analysis - Site Inventory- On site and off site factors -Analysis of natural, cultural and aesthetic factors: Viz, topography, hydrology, geology, vegetation, climate, surface drainage, accessibility, Plot size and shape, infrastructures available and visual aspects - Study on fundamentals of land form: Preparation of site analysis diagrams: maps of matrix analysis and composite analysis methods - Case Studies

Unit 5 Site Planning **8 Hours**

Introduction to Site planning, Site Planning Process – Design considerations - Introduction to Elements of Site such as circulation, road systems, parking and their design standards - Basics of Setting out of building plan on site - Organization of Buildings, neighbourhood design as Case example - Study on basics of microclimate: vegetation, landforms and water as modifiers of microclimate.

Total: 30 Hours

Text Book(s):

1. Kevin Lynch – Site Planning – MIT Press, Cambridge - 1984.
2. B.C.Punmia - Surveying Vol.I – Standard book house, New Delhi – 2006
3. John Ormsbee Simonds, Barry W.Starke - Landscape Architecture, A manual of Environmental Planning and Design (Fourth Edition) - McGraw-Hill Publishing - 2013
4. National Building Codes – Bureau of Indian Standards - 2015

Reference(s):

1. John I. Motloch - Introduction to Landscape Design , John Wiley and sons, Inc., - 2000
2. Joseph De Chiarra, Lee Coppleman – Planning Design Criteria – Van Nostrand Reinhold Company, New York – 1975.
3. Edward.T.White.- SiteAnalysis - Architectural Media - 1983
4. Development Control Rules – CMDA - 2004

ARC17R251 Materials and Construction II	**L**	**P**	**S**	**Credit**
	2	**0**	**2**	**3**
Pre-requisite: ARC17R153 Materials and Construction I	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Studio			

Course Objective(s):

To develop a comprehensive understanding of concrete, its types, construction techniques and applications in building.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the properties and applications of cement and concrete as a building material.

CO2: Acquire proficient knowledge on simple framed RCC structure, its principles, and details of various components of the building frame.

CO3: Understand use and construction details of various concrete elements in building such as staircases, sunshades etc.

CO4: Identify the need and methods of water and damp proofing for buildings.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M			H		L					
CO2	M		H	H		H					
CO3	M		H	H		H					
CO4			M								

H – High , M – Medium , L – Low

Unit I Cement and Concrete **4 Hours**

Cement: Types and grades of cement, composition, properties, manufacturing process, and tests for cement - Concrete: Components of cement concrete such as aggregates, water cement, admixtures - mix ratios - Concreting process: formwork, proportioning, mixing, batching, transporting, placing, compacting and curing - Quality control test for concrete - Various applications of concrete in buildings - Cast in Situ and pre cast - Types of concrete: RCC, PCC, pre stressed concrete, Lightweight aggregates, aerated concrete, no fines concrete, polymer concrete, RCC, fibre-reinforced concrete, ready-mixed concrete etc - Concrete finishes.

Unit II Concrete Foundations **16 Hours**

Introduction to framed structure - concrete in foundation - Wall and column foundation – Structural principles and design considerations, safe bearing capacity - Types of shallow and deep foundations – Types of footings: stepped, isolated, combined, continuous, strap – Pile, Raft, Grillage and Special Foundations. *Drawings on foundation, types, and typical details*

Unit III Concrete Columns, Walls, Slabs and Beams **20 Hours**

Concrete beams: Definitions such as minimum cover, bar bending, anchorage, stirrups, Types of beams like simple supported, cantilevered, continuous, inverted beams etc – Types of reinforcements - classification of reinforcement: singly and doubly reinforced. Slabs – One way and two way slabs with details – Principles of coffer, waffle, flat, continuous, post tension slab etc- Concrete Columns: Principles, types, reinforcements and details - Reinforced Concrete walls and partitions. *Columns, beams, and slabs – Drawings of types, and typical details*

Unit IV Other Concrete Elements **12 Hours**

Components of staircase design, Types of staircase - straight flight, quarter turn, Dog legged, open well, bifurcated, helical and spiral etc. RCC details for various types of staircase. Finishes and detailing out of handrails and balusters – ramps - Details of Concrete lintels, sunshade, chajjas, curtain walls, arches – precast concrete elements. - *Drawings and typical details for Stair case, sunshade, lintels etc.*

Unit V Damp and Water Proofing **8 Hours**

Causes and effects of dampness – Principles and Purpose of Water proofing and Damp Proofing - various materials and methods of damp proofing – Damp proofing for Basement floors, swimming pools, terraces etc., - techniques and details - *Drawings of construction detail and applications of damp and water proofing*

Total: 60 Hours

Text Book(s):

1. Francis D.K. Ching - Building Construction Illustrated – John Wiley and Sons - 2014B. C. Punmia - Building Materials and Construction - Laxmi Publications Pvt Ltd, New Delhi -2016
2. R. Chudley and R. Greeno - Building Construction Handbook – Elsevier - 2008
3. McKay, J. K and McKay, W. B - Building Construction - Vol. 1- 4 - Pearson Education - 2013

4. Harold King, Alan Everett - Components and Finishing - Mitchell`s Building Construction - HarperCollins Distribution Services - 1971
5. Stephen Emmitt, Christopher A. Gorse - Barry's Introduction to Construction of Buildings - Wiley - 2014
6. N.L.Shinha and S.K.Roy - Fundamentals of Reinforced Concrete - S.Chand and Company, New Delhi, 1983.

Reference(s):

1. Arora, S.P. and Bindra - A Text Book of Building Construction - S.P.Dhanpat Rai and Sons,New Delhi - 1999.
2. Roland Ashcroft - Construction for Interior Designers – Routledge - 2015.
3. Christopher Gorse, David Johnston and Martin Pritchard - A Dictionary of Construction, Surveying, and Civil Engineering – Oxford University Press- 2012
4. Derek Osbourn and Roger Greeno - Introduction to Building (Mitchells Building Series) - Prentice Hall - 2006

ARC17R206 Building Services II	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R202 Building Services I	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory			

Course Objective(s):

To cultivate basic knowledge of electrical services, electromechanical services, lighting design and to understand its influence in architectural space planning parameters.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Ability to understand the importance of electrical systems and its operation in buildings

CO2: To develop comprehensive knowledge on various power backup systems and integration of photovoltaic's in buildings

CO3: To develop comprehensive knowledge on lighting principles and design

CO4: Ability to understand design strategies involved in planning and sizing of elevators, escalators, and travelators

CO5: To develop comprehensive knowledge of Electronic devices in buildings and architectural space planning for electrical systems and power backup equipments

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	M	M	L					M		L
CO2	H	H		L					H	L	
CO3	H	H							H	L	
CO4	H	H							M		
CO5	H	H							H	L	

H – High , M – Medium , L – Low

Unit 1 Electrical Systems **6 Hours**

Sources of power supply - Power supply network diagram, Source to demand -Types of power supply based on consumer demand - Basic terminologies and units, Electrical system components - Estimation of power demand for different building typologies - Architectural spaces for electrical systems: Sub stations, electrical rooms, Transformer yard - Single/Three phase supply - Earthing for safety, types of earthing – ISI specifications - Electrical wiring systems in domestic and commercial buildings: Conduits, Types of wiring - Diagram for

connection Electrical distribution inside buildings –introduction to electrical drawings - space planning, Selection and sizing of components based on application and function of building as per standards recommended by NBC - Case studies and examples

Unit 2 Power Backup Systems **5 Hours**

Needs and types of power backup systems: Diesel gensets, Uninterruptible power supply systems, Photovoltaic cells - Architectural spaces for DG's and UPS - Design standards from NBC - Integration of photovoltaic cells in buildings – Space planning, Selection and sizing of components based on application and function of building as per standards recommended by NBC - Case studies and examples.

Unit 3 Lighting Design Principles **4 Hours**

Basic terminologies and units – visual tasks and factors affecting visual tasks – Luminous flux, candela , solid angle illumination – utilisation factors, depreciation factor and laws of illumination – modern theory of light – special features and minimum level of illumination for various tasks - Lighting systems: Indoor and Outdoor - Lighting principles, classification of lighting based on activity, source and fixture - Design requirements for different building typologies such as residential, commercial institutional spces etc - Recommendation from NBC - Case studies.

Unit 4 Electromechanical Conveyance Systems **5 Hours**

Types of conveying systems: Elevators, Escalators, Travelators – Elevators: Types, Components, Design criteria, Estimation of no. of lifts required for different building typologies as prescribed by NBC – Escalators: Types, components, Design standards and specification from NBC – Travelators: Types, components, Range – Minimum and maximum distance to be covered, Design standards and specification as per NBC.

Unit 5 Electronic communication systems **2 hours**

Electronic and Communication systems: Communication and data systems- communication spaces, pathways, cabling systems, voice and data, communication, Electronic security systems, computer labs/server, Rooms

Total: 30 Hours

Text Book(s):

1. Bureau of Indian standards, New Delhi - National building code of India – 2016
2. Derek Philips - Lighting in Architectural Design – Architectural Press - 2000
3. Hervé Descottes, Cecilia Ramos - Architectural Lighting: Designing with Light and Space (Architecture Briefs) – Princeton Architectural press- 2011
4. M.Y.H. Bangash - Lifts, Elevators, Escalators and Moving Walkways/Travelators - CRC Press, 1st edition - 2007.

Reference(s):

1. C.S. Solanki - Solar Photovoltaic Technology and Systems, A Manual for Technicians, and Engineers - Prentice Hall India Learning Private Limited, 1st edition – 2013
2. Aly. S. Dadras - Electrical systems for Architects - McGraw Hill - 1995.

ARC17R207 **Design of Structures II**	**L**	**P**	**C**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite:ARC17R203 Design of Structures I	**Course Category:** Basic Architecture and Engineering **Course Type:** Theory			

Course Objective(s)

To encompass basic knowledge in design of Steel components for building construction.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Design of Bolted connection for steel members

CO2: Evaluate the behaviour and load carrying capacity of Tension members
CO3: Evaluate the behaviour and load carrying capacity of Compression members
CO4: Design flexure member with adequate sectional property to meet the standards
CO5: Comprehend the application of Alloy members in the industry

Mapping of Course Outcome(s):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						M					
CO2	H				M	H		M			
CO3	H	M				H					
CO4	H				M	H					
CO5	M	M				H					

(S – Strong, M – Medium, L – Low)

Unit 1 Steel Structures - Introduction to LSD **6 Hours**

Stability, Strength and Stiffness - Sectional Properties, Types of Joint and Connections – Advantages and Disadvantages, Design of Bolted Connections - Strength and Efficiency

Unit 2 Limit State Design of Steel Tension Members **6 Hours**

Gross and Net Sectional Area, Design of axially loaded Tension Member for Yielding, Rupture and Block Shear – Lug Angle, Tension Splices

Unit 3 Limit State Design Of Steel Compression Members **6 Hours**

Buckling Strength Curves, Effective Length Concepts – Design of Laced and Battened Columns – Column Bases

Unit 4 Limit State Design Of Steel Flexure Member **6 Hours**

Behaviour of Steel Beams – Section Properties – Design of Laterally Supported Beam

Unit 5 Alloy Members **6 Hours**

Quality, Fabrication and Erection of Light Metal Alloys used in Building Construction - Design Concepts of Aluminium Connection.

Total: 30 Hours

Text Books

1. Krishna Raju N, Pranesh R N - Reinforced Concrete Design Principles and Practice - New Age International -2003
2. Subramanian N - Steel Structures: Design and Practice - Oxford University Press, USA – 2011

References

1. Bandyopadhyay J - Design of Concrete Structures - PHI Learning Pvt. Ltd, New Delhi, - 2008
2. Dr Ram Chandra and Virendra Gehlot - Limit State Design of Steel Structures - Scientific Publishing Services Pvt. Ltd - 2010
3. IS 800: Code of Practice for Use of Structural Steel in General Building Construction - BIS, New Delhi - 2007
4. Arthus Lyons - Materials for Architects and Builders: An Introduction-Arnold, London - 2001

ARC17R252 Materials and Construction III	L	P	S	Credit
	2	0	2	3
Pre-requisite: ARC17R251 Materials and Construction III	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory cum Studio			

Course Objective(s):

Students will gain knowledge on the various applications of timber, steel, and aluminium in buildings.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend timber as a building material and its application in building components

CO2: Identify the properties, varieties of components and use of steel in building construction

CO3: Acquaint with construction practices pertaining to Aluminium and its market forms.

CO4: Study the different types of finishes in buildings and their properties.

CO5: Gain knowledge on glass as a building material and its varieties and uses.

Mapping of Course Outcome(s):

CO / PO	PO 1	2	3	4	5	6	7	8	9	10	11
CO1	H		H	H		L					
CO2	H		H	H		L					
CO3	H		H	H							
CO4	M		H	H							
CO5	M		L	H		L					

H – High, M – Medium, L – Low

Unit I Timber Construction **12 Hours**

Timber – Physical properties, Defects, process, preservation, and treatment of timber, types of timber joinery - Types of timber truss: Lean to, close couple, King post, queen post - Timber floor – Types of timber doors, windows and ventilators , Detailing of window, doors and ventilators - Timber partition: fixed partition, Sliding, Folding, top hung etc- false ceiling – *Drawings of windows, doors, ventilators, partitions and joinery*

Unit 2 Steel **16 Hours**

General principles and terms, standard sections: beams, joists, sections, angles, channels, tees - Plate girder, lattice or warren girder, details of jointing, steel trusses for various spans - Stanchions, main and secondary beams, details of connections by welding, bolts, rivets and nuts - Tubular steel roof truss, monitor roof, north light truss, lantern light, dome light, structural practice and drawings as per IS code - Steel Columns - Steel Doors and Windows: Types and details, Collapsible gate and rolling shutters – Steel staircases: Types and support, handrails, balusters and finishes - Constructional details of various structures in steel - Portal frame, folded plates, stadium stands etc - *Drawings of Steel truss, doors, windows and staircase with detailing.*

Unit 3 Aluminium **16 Hours**

Aluminium products: market forms of aluminium, aluminium extrusions - Aluminium doors: Types such as openable, sliding, pivoted and fixed with design details - Aluminium windows: Types such as openable, sliding, fixed, louvered with details – Aluminium Ventilators: Types such as top hung, pivoted and louvered - Aluminium roofing: roofing sheets, construction with details – Aluminium doors and windows: types and details - Aluminium partitions: Types such as fixed partitions, movable, shop front construction - Aluminium handrail - *Drawings and details of Aluminium doors, windows, partitions*

Unit 4 Finishes **8 Hours**

Flooring: Types, methods of laying, different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles, timber etc - Special consideration for rubber, Linoleum and PVC flooring, Flag Stone Flooring, parquet flooring – Different type of resilient and vibration resistive floor - Structural glazing, aluminium composite panel cladding - Thermal and sound insulation materials. *Drawings and details of floorings, structural glazing and cladding.*

Unit 5 Glass **8 Hours**

Manufacture in its various types like plate, tinted, decorative, reinforced, laminated glass, block, fibre glass, glass murals, partially coloured glass, etching of glass and its applications in building industry for both exteriors and interiors - frameless glass doors and windows and partitions - Glass fabrication techniques, fibre reinforced composite materials and products.
Assignments as product portfolio

Total: 60 Hours

Text Book(s):

1. Francis D.K. Ching - Building Construction Illustrated – John Wiley and Sons - 2014
2. B. C. Punmia - Building Materials and Construction - Laxmi Publications Pvt Ltd, New Delhi -2016
3. R. Chudley and R. Greeno - Building Construction Handbook – Elsevier - 2008
4. McKay, J. K and McKay, W. B - Building Construction - Vol. 1- 4 - Pearson Education - 2013
5. Harold King, Alan Everett - Components and Finishing - Mitchell`s Building Construction - HarperCollins Distribution Services - 1971
6. Stephen Emmitt, Christopher A. Gorse - Barry's Introduction to Construction of Buildings - Wiley - 2014

Reference(s):

1. Arora, S.P. and Bindra - A Text Book of Building Construction - S.P.Dhanpat Rai and Sons,New Delhi - 1999.
2. Roland Ashcroft - Construction for Interior Designers – Routledge - 2015.
3. Christopher Gorse, David Johnston and Martin Pritchard - A Dictionary of Construction, Surveying, and Civil Engineering – Oxford University Press- 2012
4. Derek Osbourn and Roger Greeno - Introduction to Building (Mitchells Building Series) - Prentice Hall - 2006

ARC17R301 Estimation and Specification	**L**	**P**	**C**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R252 Materials and Construction III	**Course Category:** Basic Architecture and Engineering **Course Type:** Theory			

Course Objective(s):

To comprehend detailed report on specification, estimation and be able to evaluate the cost and prepare a detailed rate analysis for buildings.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Construct acuity in preparation of specifications for various items of work
CO2: Be aware of estimation procedures and best practices
CO3: Estimating the detailed quantities for works item wise
CO4: Critically analyse rates for item wise work and preparing Bill of Quantities
CO5: Comprehensively assess a structure or property.

Mapping of Course Outcome(s):

CO/PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	H						H				M
CO2											
CO3	H						M				
CO4	L	L	M	L			H				
CO5	H	H					H				H

H – High , M – Medium , L – Low

Unit 1 Specifications **4 Hours**

Objectives, Types of Specification, Writing Specifications for Civil /Architectural Works such as Earthwork, Concreting, Brickwork, Plastering, Reinforcement and Interior Works Etc. terms and conditions for specifications - Tender

Unit 2 Introduction to Estimation **4 Hours**

Units of Measurement, Types of Estimate, Methods of Estimate, Problems based on Brief Estimate – Plinth Area Method, centre line method

Unit 3 Detailed Estimation **10 Hours**

Detailed Estimate – Quantity Take off for items of Work – Earthwork, Concrete, Reinforcement, Brick, Plastering Works, Flooring, Joinery, Painting and Finishes - Introduction to estimation for other building works such as interior works and building services (Only Concepts)

Unit 4 Rate Analysis **7 Hours**

Schedules of Rates – Lead Statement – Material, Manpower, Calculation for Earthwork, Concrete, Reinforcement, Brick, Plastering Works, Flooring, Joinery, Painting, Finishes and preparation of BoQ

Unit 5 Valuation **5Hours**

Market Value, Book Value, Scrap Value, Salvage Value, Sinking Fund, Depreciation – Value Engineering, Life Cycle Costing – Demolition and Replacement Cost, Post Occupancy Evaluation- Statement of valuation.

Total: - 30 Hours

Text Book(s):

1. Dutta B N - Estimating and Costing - S.Dutta and Co., Lucknow - 2006
2. Rangwala S C - Elements of Estimating and Costing - Charoter Publishing House - 1996

Reference(s):

1. King W H and Esson D M R - Specification and Quantities for Civil Engineers -The English University Press Ltd.
2. T.N.Building Practice - Vol.1, Civil - Govt. Publication.
3. CPWD Standard specifications - Govt. Publication and Schedule of Rates Bill of Quantities
5. IS 1200 – Methods of Measurement (Part 1 – 28)

ARC17R302 Building Services III	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R206 Building Services II	**Course Category:** Basic Architecture and Engineering **Course Type**: Theory			

Course Objective(s):

To cultivate basic knowledge of air conditioning, mechanical ventilation systems and fire safety systems and to understand its influence in architectural space planning parameters.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the importance of Air conditioning systems and its operation in buildings

CO2: Develop comprehensive knowledge on various types of Air conditioning systems and expertise on selection of appropriate system for a specific building typology

CO3: Develop comprehensive knowledge on fire behaviour, principles of fire fighting and its importance in space planning.

CO4: Develop comprehensive knowledge on various types of fire detection system and its integration with fire fighting system, and expertise on selection of appropriate detection / fighting system for specific building typology

CO5: Develop comprehensive knowledge of architectural space planning for Air conditioning systems and fire fighting systems with the application of life safety codes

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M	M	M	L					M		L
CO2	H	H		L					H	L	
CO3	H	H							H	L	
CO4	H	H							M		
CO5	H	H							H	L	

High – H, Medium – M, Low – L

Unit 1 Introduction to Air Conditioning Systems **6 Hours**

Introduction to A/C conditions: basic of refrigeration systems, components of refrigeration system, compressor, condenser, control devices, evaporator, filters cooling tower, Vapour compression cycle - Concepts of cooling load: calculation of cooling load, conductivity, heat load transmission, internal heat gain - concepts of zoning based on building typology, Air distribution,types of outlets

Unit 2 Air Conditioning Systems: Types and Its Applications **6 Hours**

Air conditioning system for small buildings: window types, packaged and terminal units, through the wall split system -Systems for large buildings: Chilled water plant, All Air system, variable air volume, All water system Configuring/ sizing of mechanical equipment, equipment spaces and sizes for chiller plant, cooling tower, Fan room, Air handling units, Circulation Pumps, Pipes, ducts.

Unit 3 Fire safety, Design and General Guidelines **5 Hours**

Principles of fire behaviour, Fire safety design principles, NBC Planning considerations in buildings: Life safety codes, Travel distance, refuge areas - General guidelines for egress design of Auditoriums, concert halls, theatres, other building types - Accessibility for disabled – Design of Fire escapes stairways and ramps

Unit 4 Fire Detection and Fire Fighting Installation **4 Hours**

Heat and smoke detectors, MCP's, sprinkler systems - Fire fighting pump room layout and design - water requirements for fire fighting: Wet risers, Dry rises, Fire extinguishers, and cabinets - Fire protection system: CO2 and Halon system, Fire alarm system, snorkel ladder. Fire equipment access, spatial requirement, and location of installation

Unit 5 Space Planning **9 Hours**

Space planning for various air conditioning Systems - Selection and sizing of components based on application and function of building -Space planning for different fire fighting equipments and its installation.

Total: 30 Hours

Text Book(s):

1. William H.Severns and Julian R Fellows - Air conditioning and Refrigeration - John Wiley and Sons, London - 1988
2. Andrew H Buchanan - Design for fire safety - John Wiley and Sons Ltd., New York.

Reference(s):

1. Bureau of Indian standards - National building code of India - 2016
2. A.F.C. Sherratt - Air conditioning and Energy conservation -The Architectural Press, - 1980

II. PROGRAMME CORE

a) Core Courses

ARC17R102 Theory of Architecture	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Programme Core **Course Type**: Theory			

Course Objective(s):

To introduce the basics of architectural vocabulary; to impart knowledge on the elements and principles of architecture as the foundation for conception of spatial design.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the fundamentals of architecture required for the design of built environments.

CO2: Acquire knowledge on elements and principles of visual and spatial composition.

CO3: Understand the types and influencing factors of spatial organization.

CO4: Analyse and comprehend architectural experience as a relationship between space, function, structure and aesthetics

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	H	M			H	M					M
CO2	H	M									
CO3	H				L	M					L
CO4	H	H			M	H					L

High – H, Medium – M, Low – L

Unit 1: Introduction to Architecture **3 Hours**

Definition and scope of Architecture, Role and responsibilities of an architect, Purpose of Architecture as satisfying human needs – objective and subjective, functional, structural and aesthetical. Components of the built environment, factors shaping built environment – manmade and natural such as climate, site, social, cultural, technological etc.

Unit 2: Primary Elements of Space **8 Hours**

Primary elements - Point, line, plane and volume – properties. Primary elements of space and form. Modifying elements of architecture, properties, spatial quality - degree of enclosure, Openings. Light and shade in architecture - Quantity and quality, light and space, perception of color and texture in the context of light – effects with examples.

Unit 3: Principles of Spatial Composition **8 Hours**

Visual Perception - Basic principles of visual perception in architecture. Principles of order and disorder – coherence and disruption, complexity and simplicity, regularity and irregularity, axis, hierarchy, rhythm in architecture. Measure and Balance in architecture – Scale- human scale and generic scale – anthropometrics (static and dynamic), proxemics – Proportion (introduction, various proportioning systems and theories of proportion) - Balance (symmetrical and asymmetrical) in architecture with examples.

Unit 4: Spatial Organisation **6 Hours**

Spatial relationship – types, juxtaposition and interpenetration, 2 Dimensional and 3Dimensional spatial linkages with examples. Organization of space – linear, centralized, radial, cluster, grid; circulation – Attributes of circulation in built environment, Transition and Hierarchy with examples.

Unit 5: Architecture as an Experience **5 Hours**

Understanding architecture in Total:ity in terms of various aspects studied. Expression, symbolism and communication through architecture. Relationship between space, form and function through case studies, interpretations and analysis of buildings through the works of architects such as F L Wright, Tadao Ando, Frank Gehry, Alvar Aatlo, Steven Holl, Geoffrey Bawa, Charles Correa.

Total: 30 Hours

Text Book(s):

1. Francis D.K.Ching - Architecture - Forms - Space and Order - John Wiley and Sons - 1996.
2. Pramar.V.S - Design fundamentals in architecture - 1973 - Sowmiya publications pvt.ltd - New Delhi.
3. Simon Unwin - Analysing Architecture - Routledge - London - 2003.
4. Yatin Pandya - Elements of space making - Mapin Publishing Pvt. Ltd. - 2007

Reference(s):

1. Ernest Burden - Elements of Architectural Design - A visual resource - Van Nostrand Reinhold - 1994.
2. Leland M. Roth - Understanding Architecture: Its Elements - History and Meaning - Westview Press - 2007
3. Steen Eiler Rasmussen - Experiencing Architecture - MIT Press - 1964
4. James C.Snyder - Anthony J.Catarex - Introduction to Architecture - McGraw Hill Inc. - 1979.
5. Pierre Von Meiss - Elements of Architecture – From form to place + tectonics - EPFL Press - 2013.
6. Tom Porter - The Architect's eye - visualization and depiction of space in architecture - E and FN Spoon - Chapman and Hall - 1997.
7. Bryan Lawson - The Language of space - Architectural Press - 2001
8. Joan Zunde and Hocine Bougdah - Integrated Strategies in Architecture - Taylor and Francis - 2006.
9. Francis D.K.Ching - James F.Eckler - Introduction to Architecture - John Wiley and Sons - 2013.

ARC17R181 Basic Design and Visual Arts	**L**	**P**	**S**	**Credit**
	0	0	16	8
Pre-requisite: Nil	**Course Category:** Programme Core **Course Type**: Studio			

Course Objective(s):

To introduce students to various ideas and techniques of creative thinking and communication; To provide students with a foundation in design through the comprehension of elements and principles of composition; To develop designers with aesthetic sensitivity and skill in visual arts.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Ability to understand and appreciate the qualities of different design element.

CO2: Ability to adopt the principles of design and create desired qualities and effects in two dimensional and three dimensional compositions.

CO3: Apply and demonstrate creativity in problem solving.

CO4: Enhancing the skill to present and express the design ideas through various mediums/ techniques like sketching , painting, model making, sculpturing etc.,

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	L			L						
CO2	H	M	H	M	L						
CO3	M	H	H	H	M						
CO4	H		H	H							

Elements of Design **80 Hours**

Exploring the design elements of the visual composition such as points, lines, planes, forms, colours etc and study its characteristics through various 2dimensional and 3 dimensional works.

Principles of Design **90 Hours**

Understanding the Principles of design such as Repetition, Rhythm, harmony, Contrast, Dominance, Balance, Dynamism, Texture etc., through Design Compositions, Collage works and murals; Demonstrating the application of various Design elements and principles through comprehensive visual composition exercises like Poster design, Brochure Design, Logo Design, sculpture/ Memorial Design etc.,

Visual Arts **70 Hours**

Exercise involving Indoor and outdoor sketching – Spot sketching - Drawing from imagination – Study of 3 D effects through light and shade from nature – Tools and materials – Illustration – Study of human being and mobiles; Exploring visual effects due to colour application such as depth, light , shade and texture using various painting media like water colour, poster colour, oil pastels, water soluble colour pencils, crayons, pen and ink etc., through the study of natural element and city scape; Study of design elements through model making using various materials like POP, wires, match stick, paper, bamboo split, snow white board, mount board, clay etc.

Total: 240 Hours

Text Book(s):

1. V.S.Pramar - Design fundamentals in Architecture - Somaiya Publications Pvt. Ltd., New Delhi - 1973.
2. Francis D. K. Ching - Architecture - Form Space and Order - Van Nostrand Reinhold Co., Canada - 1979.

Reference(s):

1. Paul Zelanski and Mary Pat Fisher - Design Principles and Problems - Thomson and Wadsworth, USA - 1996.
2. Owen Cappleman and Michael Jack Jordon - Foundations in Architecture: An Annotated Anthology of Beginning Design Project - Van Nostrand Reinhold New York - 1993.
3. I.H.Morris – Geometrical drawing for Art Students, Orient Longman – Madras1982.
4. Albert. O.Halse - Architectural Rendering Techniques McGraw - Hill Books Co. New York 1972
5. Charles Wallschlacgerm and Cynthia Busic-Snyder - Basic Visual Concepts and Principles for Artists, Architects and Designers - McGraw Hill, New York - 1992

ARC17R106 Theory of Design	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil **Co-requisite:** ARC17R182, Architectural Design I	**Course Category:** Programme Core **Course Type**: Theory			

Course Objective(s):

To promote creative thinking, exposure to different approaches of design process and hence enhance the students design capacity through a multi dimensional approach to problem solving.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the different types of thinking and understand the process of creative thinking.

CO2: Apply the different techniques of creative thinking in design problem solving.

CO3: Perceive architecture as one of the many fields under the broader ambit of design as a fundamental human activity.

CO4: Acquire knowledge on design process, its types and strategies.

Mapping of Course Outcome(s):

CO / PO	PO 1	2	3	4	5	6	7	8	9	10	11
CO1	H	M			M				L		L
CO2	M	H			M				M		
CO3	M				H				M		
CO4	H	M			H				M		

Unit 1: Thinking **4 Hours**

Theories of thinking, thinking process and types of thinking like convergent, divergent thinking, directive thinking, visual thinking, lateral and vertical thinking –Concept of 'creativity' – blocks in creative thinking.

Unit 2: Creative Thinking Techniques **10 Hours**

Need for creative thinking, various creative thinking and lateral thinking techniques like checklists, brainstorming, synectics, mind mapping and exercises on problem solving - role of creativity in design with examples.

Unit 3: Design Process **12 Hours**

Design process – various theories - types such as linear, cyclic etc - stages such as program, concept, scheme, design development etc - analysis of design problems - Various approaches and strategies to design problem solving. Design ideas and concepts, types such as analogy, metaphor, essence etc with examples - Design traps.

Unit 4: Creativity and Design **4 Hours**

Application of creativity in various fields of design such as product design, industrial design, architecture etc - Creative process of architectural design through case examples of architects such as Zaha Hadid, Santiago Calatrava, Shigeru Ban, Philip Johnson, Herzog, Moshe Safdie, BIG architects.

Total: 30 Hours

Text Book(s):

1. Bryan Lawson - How Designers Think- Architectural Press, London - 1980.
2. Edward De Bono - Lateral Thinking- Penguin, UK- 2010
3. Edward De Bono – Serious Creativity: Using the power of lateral thinking to create new ideas – Profile Boks Ltd - 2005
4. Anthony Antoniades - Poetics of architecture: Theory of design - Wiley – 2008
5. John Chris Jones - Design Methods - John Wiley and Sons - 1992

6. Geoffrey Broadbent - Design in Architecture: Architecture and the human sciences - John Wiley and Sons, New York - 1981

Reference(s):

1. Morgan, T., and Clifford - Introduction to Psychology - Tata Mc Graw - Hill Publications, New York- 1983.
2. Keyam, S.M. - Psychology in relation to design - Dowden, Hutchinson and Ross - 1973.
3. Hall, E.T. - The Hidden Dimension - Doubleday, New York - 1996.
4. Donna Duerk - Architectural Programming - Information Management for Design - Wiley, John and Sons, Incorporated - 1993.
5. Tom Heath - Method in Architecture - John Wiley and Sons, New York - 1984.
6. Nigel Cross - Developments in Design Methodology - John Wiley and Sons - 1984.
7. Evans, Helen Marie, Dumesnil, Carla Davis - An Invitation to Design - Macmillan Publishing Co., New York - 1982.

ARC17R182 Architectural Design I	**L**	**P**	**S**	**Credit**
	0	0	14	7
Pre-requisite: Nil	**Course Category:** Programme Core **Course Type**: Studio			

Course Objective(s):

Students should gain the capacity to solve simple design problems involving single and multi spaces through a systematically evolved design process and learn to incorporate creative techniques in problem solving.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understanding of design process, the various stages of design.

CO2: Recognize the relationship between user, activity, and space.

CO3: Acquire proficiency to design simple built environments.

CO4: Creatively understand the relationship between form, space and structure.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	H			H				L		
CO2	H	H			M						
CO3	H	H	M		H						M

H – High , M – Medium , L – Low

Project 1: Single Space Design **126 Hours**

Anthropometry: Study of anthropometry and application in simple design exercises like product and furniture design; **Single Space Design**: Understanding user activity, anthropometry and space (circulation, furniture layout etc) through documentation and study - Design of single user, single space like bedroom, kitchen, etc;

Project 2: Multi space Design **84 Hours**

Design of simple multi user, multi space built environments such as residence, cottage, cafeteria etc with exposure to factors influencing design and design process with a focus on application of concept of creativity and techniques of creative thinking.

Total: 210 Hours

Text Book(s):

1. De Chiara and Callender -Time-Saver Standards for Building Types - Mc Graw Hill Co., New York -1973.
2. Nufert Ernst, Architects Data - Blackwell Science Ltd., Britain – 1980.

3. Julius Panero, Martin Zelick - Human Dimension and Interior Space -Whitney Library of Design, Canada -1979.

Reference(s):

1. Sam F. Miller - Design Process: A Primer for Architectural and Interior Design - Van Nostrand Reinhold - 1995
2. James C.Snyder, Anthony J.Catarex – Introduction to Architecture - McGraw Hill Inc. -1979.
3. Peter Zumthor - Thinking Architecture – Birkhauser – 2006.
4. Ching, F.D.K. - Design Drawing - Van Nostrand Reinhold - 1998.
5. Agkathidis, A., Hudert, M. and Schillig, G. - Form Defining Strategies: Experimenting Architectural Design - Wasmuth – 2007.

ARC17R283 Architectural Design II	**L**	**P**	**S**	**Credit**
	0	0	14	7
Pre-requisite: ARC17R181 Basic Design and Visual Arts	**Course Category:** Programme Core **Course Type**: Studio			

Course Objective(s):

Students will develop proficiency to respond to site and climatic context in design and understand the significance of open space in built environments.

Course Outcome(s):

After completing this course, the student will be able to:

CO5: Identify and analyse design problems and evolve architectural program to address it.
CO6: Efficiently plan and design at the site level involving multiple units
CO7: Understand the role and significance of climate in design of built environment.
CO8: Sensitively design open spaces in correlation to built form and space.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO4	H	M	M		H				M		
CO5	H	H	H	H	M	M					
CO6	H	H	L	H	H					M	M
CO7	H	H	H		M						

H – High , M – Medium , L – Low

Major Project: Multi user, Multi units Design **175 Hours**

Multi User, Multi span, multi unit, horizontal and simple vertical circulation – Spatial Standards - Focus: Context and built environment - Site planning and climate responsive - Design process: Simple architectural programming - Identify and solving design problems - Examples: Residential buildings, Institutional buildings, banks, nursery or primary schools, primary health center, school for children with learning disabilities, neighborhood market, etc.

Minor Project: Design of outdoor spaces **35 Hours**

Design of small open space for outdoor activity - Exploring the Relationship between built form and open spaces – degree of enclosure and various characteristics of open spaces. Examples: outdoor cafeteria, OAT, courtyards, residential multi activity spaces etc.

Total: 210 Hours

Text Book(s):

4. Joseph De Chiara – Time Saver Standards for Building Types - McGraw Hill Education -2017
5. Ernst Neufert, Peter Neufert - Architects Data – Wiley Blackwell– 2012

Reference(s):

1. Kevin Lynch – Site Planning – MIT Press, Cambridge -1967.
2. John I. Motloch - Introduction to Landscape Design , John Wiley and sons, Inc., -2000

ARC17R351 Professional Architectural Drawings	L	P	S	Credit
	2	0	2	3
Pre-requisite: ARC17R152, Architectural Graphics II **Co - requisite:** ARC17R381, Architectural Design IV	**Course Category:** Program Core **Course Type**: Theory cum Studio			

Course Objective(s):

To be proficient in comprehending various architectural technical drawings. To be equipped with the skill of making Professional Architectural Drawings

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the Significance and stages of Professional Architectural Drawing Production

CO2: Recognize and Comprehend the anatomy of various Architectural Drawings

CO3: Prepare the Approval Drawings for various types of buildings

CO4: Prepare the Working drawing or Construction Drawings for various types of buildings

CO5: Understand the application various software tools in making presentation drawings

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	L		H				M				M
CO2			H								
CO3			H				M				
CO4			H				M				
CO5			H								

Unit 1 Stages in Architectural Drawing Production **4 Hours**

Introduction to Architectural Drawings - Need and relevance of drawing sets- Stages of Design Process - Schematic Stage, Design Development, and presentation, Statutory Approval of Building, Bidding or Tender and Construction -Type of drawings required for each stage of design process

Unit 2 Understanding the Anatomy of Architectural drawings **4 Hours**

Various Sheet Sizes and Layouts, Various notations , Symbols and Contents of Floor Plans, Elevations, Sections, Perspectives , Site Plans, Contour Plan, Landscape Plan, Roof Plan and Details of Specifications - *Exercise on the Reading of Technical drawings*

Unit 3 Preparation of Approval Drawing **10 Hours**

Introduction to the significance of approval drawings – Checklist and Information to be furnished in approval drawing - *Exercise on the preparation of Approval Drawings for a Residence*

Unit 4 Preparation of Working Drawings or Construction Drawings **36 Hours**

Drawing programming- Planning the working drawing set, Maintenance of Drawing Registers, Contents of Various working drawings , Status coding, Issue of drawings, Comprehending drawings of other consultants and Integrating the same in architectural working drawing - *Exercise on the preparation of working drawing set for Residence and a Multi Storey Building/ previous semester architectural design project using computers. The set of drawings should include following:* Center Line Plan, Foundation Plan , Structural Grid Plan, Ground Floor Plan, typical Floor Plan, All Elevations, All Sections, Terrace floor Plan,

Toilet layout and Plumbing drawing, Electrical Layout, Carpentry Details for Doors and windows, Grill and Gate Details, Detailed drawings for special rooms such as kitchen , toilet, staircase etc.,

Unit 5 Introduction to Techniques of Presentation Drawings **6 Hours**

Demonstration of Photoshop, Adobe Illustrator, Prezi - Exploded perspectives exploded isometric views, Presentation of photo realistic illustration - V Ray, Mental ray, Indigo Render, Rhino etc- Importance and Applications

Total: 60 Hours

Text Book(s):

1. Francis D.K .Ching, - Building Construction Illustrated - 3rd ed - John Wiley, New York - 2003.
2. Osamu A Wakitia, Richard M Linde, Nagi R Bakhoum - The Professional Practice of Architectural Working Drawings - 4th Edition - John Wiley and Sons - 2011

Reference(s):

1. Stan Allen, Practice- Architecture, Technique and Presentation- Taylor and Francis, 2008
2. Stephen Emmiitt, John olie, Peter Schmidt- Principles of Architectural detailing - Blackwell Publishing - 2004.
3. Edward Allen - Architectural Detailing: Function, Constructionability, Aesthetics - John Wiley and Sons, Inc., - 1992.

ARC17R381 Architectural Design IV	**L**	**P**	**S**	**Credit**
	0	**0**	**16**	**8**
Pre-requisite: ARC17R283 Architectural Design III	**Course Category:** Program Core **Course Type**: Studio			

Course Objective(s):

To develop aptitude in designing complex built environments integrating building services and development regulations in urban areas.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Design multi functional, multi storied, multi bay built environments and solve complex design problems

CO2: Analyse and apply integration of building services in multilevel planning in the design of service intensive buildings.

CO3: Understand the importance of spatial planning within the constraints of Development Regulations in urban areas.

CO4: Study various materials and explore design of appropriate forms and structures.

Mapping of Course Outcome(s):

CO/PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	H			M				M		
CO2	H	H	M			M					
CO3	H	H									
CO4	M	M	H	L	M						

H – High , M – Medium , L – Low

Major Project: Multi storied Service Intensive Architecture **189 Hours**

Design of multi functional, multi storied, Service intensive complex built environments with complex horizontal and vertical circulation solving large scale architectural issues and integrating appropriate structural systems such as hospitals, Office and commercial,

apartments, mixed use developments etc – design responding to limitations of development regulations and standard - Activity analysis, Service layouts, and conceptual structural layout – Exploration of computer aided drawings and presentation.

Minor Project: Exploration of materials **21 Hours**

Exercises to explore materials and develop design focusing on visual form and structural characteristics in simple spaces such as pavilions and other structures – Use of 3 dimensional computer based tools.

Text Book(s):

1. Joseph De Chiara – Time Saver Standards for Building Types - McGraw Hill Education -2017
2. Ernst Neufert, Peter Neufert - Architects Data – Wiley Blackwell– 2012
3. Bureau of Indian standards - National building code of India - 2016

Reference(s):

1. Rolan Knauer - Transformation-Basic Principles and Methodology of Design - Birkhauser - 2008.
2. Andrew H Buchanan - Design for fire safety - John Wiley and Sons Ltd., New York.
3. Joseph De Chiara, Michael J Crosbie - Time Saver Standards for Building Types - McGraw Hill Professional – 2001
4. Development Control Rules – CMDA - 2004

ARC17R308 Human Settlements Planning	**L**	**P**	**S**	**Credit**
	2	0	0	2
Pre-requisite: Nil **Co-requisite:** ARC17R382 Architectural Design V	**Course Category:** Program Core **Course Type**: Theory			

Course Objective(s):

To provide an insight of the complex elements and factors that constitutes human settlements and to understand the concept and significance of planning for holistic development.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognise the components and the variety of factors that shape human settlements.
CO2: Understand the issues in planning and the contributions of various planning concepts.
CO3: Infer the critical role of land - use and transportation in development of settlements
CO4: Proficiently know the planning mechanism and planning processes in India.
CO5: Critically analyse issues in contemporary development process in India.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	M									H
CO2		H									L
CO3					L					M	L
CO4					H						H
CO5										H	L

H – High , M – Medium , L – Low

Unit 1 Introduction to Human Settlements **4 Hours**

Introduction to planning as a discipline – Elements of human settlements - Factors such as economical, geographic, political and social affecting settlements – Evolution of settlements with examples - contemporary urban issues - Classification of settlements based on

Location, Function and Population size - Types of settlements: Linear, non-linear, Combinations with case studies.

Unit 2 Determinants of planning **7 Hours**

Definition, significance, determinants, and classification of land use – land value - Land use models – urban density and growth - Transportation: definitions and significance, modes, classification of roadways, mass transport systems – international best practices in transportation systems –Influence of land use and transportation on Urban Form, structure, and economy - resources and infrastructure such as water, finance, energy, health and education, safety, communication etc: their role, types and impact – Case studies

Unit 3 Planning in India **8 Hours**

Classification of settlements in India - Planning system in India –organisation set up in Central, state, district and local planning - legislations town and country planning Act - Objectives, planning process, and monitoring – types of plans – perspective plan, development plan, local area plan, PUD, special plans – regional and master plan: scope and content, DCR – Guidelines and standards for planning such as UDPFI – Planning tools like CRZ, SEZ etc - Schemes and programmes such as IDSMT, IUDP, BSUP, MUDP, Sustainable cities program, JNNURM.

Unit 4 Theories and Concepts of Planning **6 Hours**

Theories such as central place theory, Rank Size, Metropolitan primacy, etc - Origin, Purpose and impacts of planning concepts - Concepts of planning: Ebenezer Howard, Doxiadis, Patrick Geddes, C.A. Perry, Radburn, Raymond Unwin, Tony Garnier, Le Corbusier, Soria y Mata, Michael Batty, sustainable cities, healthy cities, urban agriculture concept, Smart Cities, vertical cities etc

Unit 5: Issues in planning in India **5 Hours**

Development Indexes such as HDI, GDP, Quality of Life etc comparative studies – Demographics, Economics and planning –impact of globalisation – rural urban divide - contrasts in urbanisation, economic opportunities, income and its issues – housing demand – challenges in sanitation – safety and security in urban areas – ecological impacts of urbanisation.

Total: 30 Hours

Text Books(s):

1. Rangwala - Town Planning - Charotar Publishing House - 2003.
2. G.K.Hiraskar - Fundementals of Town Planning - Dhanpat Rai publications - 2005.
3. John Ratcliffe - An Introduction to Town and Country Planning - 2000.
4. Dr.H.D.Kopardekar - Urban and Regional planning: Principles practice and the Law - Sudhanwa.H.Kopardekar -Talegaon Dabhade -1994.
5. Thooyavan K R - Human Settlements, A Planning guide to beginners - M.A.Publications - 2005.
6. Ministry of Urban Affairs and Employment, Government of India, New Delhi - Urban Development Plans: Formulation and Implementation Guidelines - 1996.

Reference(s):

1. C.L.Doxiadis - Ekistics - An Introduction to the Science of Human Settlements - Hutchinson - London - 1968.
2. Government of India - Report of the National Commission on Urbanisation - 1988.
3. Ministry of Urban Affairs and Employment - Government of India - New Delhi - Urban Development Plans: Formulation and Implementation - Guidelines - 1996.
4. Hansen N. - Regional Policy and Regional Integration - Edward Elgar, UK - 1996.
5. Andro D.Thomas - Housing and Urban Renewal - George Allen and Unwin - Sydney - 1986.

6. United Nations Centre for Human Settlements (Habitat) - Cities in a globalizing world global report on human settlements - Earthscan, London, and Sterling -2001.

ARC17R309 Building Codes and Bye laws for Practice	L	P	S	Credit
	2	0	0	2
Pre – requisite: Nil **Co-requisite:** ARC17R382 Architectural Design V	**Course Category:** Program Core **Course Type**: Theory			

Course Objective(s):

To get acquaintance with the prevailing Building Codes and Byelaws in India for better understanding of the Context and Design Feasibility. To be aware of the building permission procedure and role of various statutory bodies in development and building activities.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognize the significance of Building codes of Practices and Bye laws

CO2: Understand the NBC norms for various Building practices

CO3: Apply appropriate building standards and codes in Building design.

CO4: Prepare necessary Plans and Documents for Building approval from statutory authorities

CO5: Appreciate Regulations to be followed for Development and Building design in various context

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M						M		L		M
CO2	H	M					M				M
CO3	H	L					H				H
CO4	H		M				H		L		H
CO5	H						H				H

H – High, M – Medium , L – Low

Unit 1 Introduction to Building codes of practices in India **4 Hours**

Definition of terms- Acts, Rules, Bye laws and Regulations - Role of BIS in developing Codes and publishing Standards to govern the Quality of Architecture and Construction in terms of specification, codes of practices and hand books

Unit 2 Salient features of NBC 2016 **8 Hours**

Definitions, contents, specifications, applications, DCR and General Building Requirements- IS codes for Interiors - Code for Architectural and Building drawing, Code for Building services- plumbing services, Code for construction Practices and safety, Code for fire and life safety and Code for Landscaping

Unit 3 Building Bye laws **6 Hours**

Various controlling norms: Setback, FAR, Plot Coverage, Height Restriction, Parking norms - Minimum standards for habitable spaces: it's Definition, Meaning, and Purpose.

Unit 4 Procedure for Building Permission **6 Hours**

Stages- Documents, Plans and forms to be submitted to statutory authorities to obtain permission for residential and non residential buildings- Jurisdiction of statutory authorities in sanctioning building permission

Unit 5 Regulations **6 Hours**

Regulations stipulated by various statutory bodies to govern the Development and Building acclivities - Salient features of Coastal Zone Regulations, Airport Area Regulations,

Environmental Impact Assessment, Hill Area Regulations and Heritage Area Regulation

Total: 30 Hours

Text Book(s):

1. Bureau of Indian standards - National building code of India - New Delhi - 2016
2. Krishnamurthy, K.V. and Ravindra S.V. - Professional Practice, (Eastern Economy Edition) - Prentice Hall India, New Delhi - 2014.
3. Model Building Byelaws - MHUD, Govt. of India - 2016

Reference(s):

1. Summaries of Indian Standards for building materials
2. Handbook on Functional Requirements of Buildings (Other than Industrial Buildings)
3. Handbook on Functional requirements of Industrial Buildings (Lighting and Ventilation)
4. Handbook on Building Construction Practices
5. Handbook on Methods of Measurement of Building Works

ARC17R382 Architectural Design V	**L**	**P**	**S**	**Credit**
	0	**0**	**16**	**8**
Pre-requisite: ARC17R285 Architectural Design III	**Course Type**: Program Core **Course Category:** Studio			

Course Objective(s):

This course shall offer students opportunity to understand the complex relationship between user experience and built environment in large scale campus design.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Design large scale campus environments with efficient circulation and understanding the significance of user experience in built environments.

CO2: Evolve design focusing on form generation and appropriate structural system.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	H	H		H				M		
CO2	M	L	H	M		M					

H – High , M – Medium , L – Low

Major Project

Projects with a focus on understanding the built environment as an experience – multi user, multi function and multi unit design involving large scale site planning incorporating design considerations for disabled and elderly – projects such as Campus level design institutional, office, museum complexes etc.

Minor Project

The exercise shall explore design process in evolving innovative forms and designing structural systems such as large span structures.

Text Book(s):

1. Joseph De Chiara – Time Saver Standards for Building Types - McGraw Hill Education -2017
2. Ernst Neufert, Peter Neufert - Architects Data – Wiley Blackwell– 2012
3. Steen Eiler Rasmussen, Experiencing Architecture; MIT Press; 1959.

4. Kevin Lynch, Site planning, MIT Press, Cambridge, 1967.
5. Thomas F Saarinen - Environmental planning: Perception and Behavior - Houghton Mifflin Company Boston -1976
6. J Douglas Porteous - Environment and behaviour: Planning and Everyday Urban life - Addison Wesley Publishing -1977

Reference Book(s)

1. Richard P. Dober, Campus Planning - Reinhold Book Corporation, 1963
2. Carmona, Matthew; Heath, Tim; Oc, Taner; Tiesdell, Steven - Public Places-Urban Spaces: The Dimensions of Urban Design - Architectural Press, Oxford - 2003
3. Kevin Lynch - The Image of the City - MIT Press - 1960.
4. Geoffrey Broadbent - Emerging Concepts in Urban Space Design - Taylor and Francis - 2003.

ARC17R401 Project Management	L	P	S	Credit
	3	0	0	3
Pre-requisite: ARC17R481 Practical Training	**Course Category:** Programme core **Course Type**: Theory			

Course Objective(s):

The objective of this course is to realize the importance of project management methodology that will allow us to initiate and manage projects efficiently and effectively

Course Outcome(s):

After completing this course, the student will be able to:

CO1: To understand project management, design, principles, development, and deployment

CO2: Comprehensive knowledge on application of project management tools, techniques and skills to design projects

CO3: To comprehend the strategies involved in successful risk and quality management of projects

CO4: To understand strategies involved in successful delivery of an architectural project in terms of quality, cost, and time.

CO5: To impart knowledge on digital tools of project management and process.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1							H		H		M
CO2							H		H		M
CO3							H		H		M
CO4							H		H		M
CO5							H		H		M

H – High , M – Medium , L – Low

Unit 1 Project Management – Basics **9 Hours**

Introduction, Need for Project Management, Project Management Knowledge Areas and Processes, The Project Life Cycle, The Project Manager (PM), Phases of Project Management Life Cycle, Project Management Processes, Impact of Delays in Project Completions, Essentials of Project Management Philosophy, Project Management Principles, Project Identification Process, Project Initiation, Architectural project feasibility studies.

Unit 2 Project Scheduling - PERT and CPM **12 Hours**

Introduction, Resource Allocation, Scheduling, Project Cost Estimate and Budgets, Cost Forecasts Development of Project Network, Time Estimation, Determination of the Critical Path, PERT Model, Measures of variability, CPM Model, Network Cost System.

Unit 3 Project Risk Management and Quality Management **8 Hours**

Risk, Risk Management, Role of Risk Management in Overall Project Management, Steps in Risk Management, Risk Identification, Risk Analysis, Reducing Risks, Value Engineering : Quality, Quality Concepts, Value Engineering

Unit 4 Project Execution, Control and Performance Evaluation **8 Hours**

Project Execution, Purpose of Project Execution and Control, Project Control Process, Performance Measurement, Productivity, Project Performance Evaluation, Benefits and Challenges of Performance Measurement and Evaluation

Unit 5 Project Management Softwares and Case Studies **8 Hours**

Introduction, Advantages of Using Project Management Software, Common Features Available in Most of the Project Management Software, Case studies in Architectural project management

Total: 45 Hours

Text Book(s):

1. Prasanna Chandra - Projects: Planning, Analysis, Selection, Financing, Implementation, and Review, Eighth edition- Mc Graw Hill Education, New Delhi - 2012
2. S. Choudhary - Project management - Mc Graw Hill Education, New Delhi - 2004

Reference(s):

1. Garry R Heerkans - Project management - McGraw-Hill New York - 2001.
2. Vasant Desai - Project management and entrepreneurship - Himalaya publications, New Delhi - 2013.

ARC17R482 Seminar - Dissertation	**L**	**P**	**S**	**Credit**
	0	**0**	**6**	**3**
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Program Core **Course Type**: Studio			

Course Objective(s):

This course shall expose students to comprehend architectural through study and research.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the importance of research in Architectural context.

CO2: Undertaking a research topic and progressing through different stages in research process.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	H			M						
CO2	L	H		L	M						

H – High , M – Medium , L – Low

Students are expected to choose topics of special interest to them and conduct an in depth study/analysis. The topic shall be approved by the dissertation committee. The topics can be chosen based on the students interest and inclination. However the chosen topic shall be independently well researched on covering aspects such as data collection, case study, critical analysis and critical appraisal along with a conclusion.

Methods of analysis should have a scientific basis and thorough investigative research is required from primary and secondary sources- through library research and literature review; documentation; etc.

The credibility of dissertation study must allow for the topic to evolve into a potential major research project/ thesis if needed. The study shall conclude in an oral-visual presentation at the end of the semester.

Text book(s)

1. Linda N. Groat and David Wang - Architectural Research Methods, Second Edition - Wiley and Sons - 2013
2. Sattrup, P. A - Architectural Research Paradigms: an overview and a research example- Accessed from orbit.dtu.dk – 2012
3. Iain Borden, Katerina Rüedi Ray - The Dissertation: A Guide for Architecture Students – Routledge - 2013

Reference(s)

1. Edward Jay Friedlander and John Lee Feature - Writing for Newspapers and Magazines, 4th edition - Longman - 2000
2. Fuller, David, Waugh, Patricia eds - The Arts and Sciences of Criticism - Oxford University Press – 1999
3. Foust, James - Online Journalism: Principles and Practices of News for the Web - Holcomb Hathaway Publishers, Scottsdale, AZ – 2005

ARC17R483 Architectural Design VI	L	P	S	Credit
	0	0	16	8
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Program Core **Course Type**: Studio			

Course Objective(s):

This course shall impart experience on research based design process and explore design solutions in relation to the urban context.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Conduct simple architectural research as the basis for architectural design projects

CO2: Develop skills to design large urban level built environments and perceive future needs.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M	H	M	M	M				M		
CO2	M	H	M	L	M				M	M	M

H – High , M – Medium , L – Low

Minor Project

Research through documentation, survey, holistic understanding, and analysis of architectural issue at the site level or part of urban fabric such as neighbourhoods and to develop architectural problem, program, and design strategies as the basis of design.

Major Project

Research based design in the settlement context, responding to the surrounding urban fabric - Design of large urban level built environments such Housing, mixed use developments, large campuses with Master Planning complexities of large scale.

Text Book(s):

1. Joseph De Chiara – Time Saver Standards for Building Types - McGraw Hill Education -2017
2. Ernst Neufert, Peter Neufert - Architects Data – Wiley Blackwell– 2012
3. Bureau of Indian standards - National building code of India - 2016

Reference Book(s)

5. Richard P. Dober, Campus Planning - Reinhold Book Corporation, 1963
6. Carmona, Matthew; Heath, Tim; Oc, Taner; Tiesdell, Steven - Public Places-Urban Spaces: The Dimensions of Urban Design - Architectural Press, Oxford - 2003
7. Kevin Lynch - The Image of the City - MIT Press - 1960.
8. Geoffrey Broadbent - Emerging Concepts in Urban Space Design - Taylor and Francis - 2003.

ARC17R501 Urban Design	L	P	S	Credit
	3	0	0	3
Pre-requisite: Nil **Co -requisite:ARC17R581** Architectural Design VII	**Course Category:** Program Core **Course Type**: Theory			

Course Objective(s):

To introduce students to the concept of urban space: its types, components and the various issues and problems related to the current urban world.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Introduce students to the practice of Urban Design and its significance in the current global urban order.

CO2: Appreciation of the various urban forms and types of urban morphology through a evolutionary reading in historical case examples.

CO3: Critically enhance the knowledge base of students in the various theories and techniques used for urban analysis and studies through case examples and the works of noted theorists.

CO4: Analytical and critical study of the current urban issues: their reasons and possible remedial strategies through appropriate case examples

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M				L			L		L	L
CO2	M							H		L	L
CO3	M	M			M			H		H	L
CO4		M			L			H		H	L

H – High , M – Medium , L – Low

Unit 1 Introduction to Urban Design **3 Periods**

Urban design as a discipline - scope and objectives; Components of urban space and their terms: Urban Structure, Urban Form, Grain, Texture, Density, Enclosure, Scale etc,

Unit 2 Urban Form and Morphology: Case Studies in History **10 Periods**

World Scenario: Early cities- Greek agora- Roman forum- Medieval towns- Renaissance place making- ideal cities- Industrialization and city growth- American grid planning- anti urbanism and the picturesque- cite industrielle-Suburbs-Ideal City forms-popular theories by Wright, Corbusier,Doxiadis - Indian Context: Temple towns,Medieval cities,Mughal city form, Shahjanabad,Colonial city form-New Delhi-Pondicherry- Modern cities: Chandigarh, Bhuvaneshwar and Gandhi Nagar

Unit 3 Critical Readings of Urban Space **5 Periods**

The Visual, Socio-cultural and Perceptual Aspects of Urban Space: theories on Imaegability-Cullen and Lynch – theories on social aspects –Jacobs and Whytte – Theories on good city form – Lynch – Theories on humane and safe public realms – Responsive environments, Place-making and identity.

Unit 4 Contemporary Issues of Urban Space **5 Periods**

Urban Sprawl, Generic Form, Urban Incoherence, Privatized public realm- effects/ role of real estate, Transportation, Zoning, Affordable Housing, Loss of Heritage, Urban Safety and Surveillance, Transformation of Historic urban form in Inner cities. Appropriate case studies for each issue.

Unit 5 Contemporary Trends and Strategies in Urban Development 7 Periods

Factors for Identifying Area of Intervention – Strategies – Urban Renewal, Urban redevelopment, Urban Conservation and rehabilitation - Urban Inner City Regeneration - Approaches to Urban Development – Transit Oriented Development, Community Participation, Ecologically Sustainable Communities and Smart City concepts - The concepts shall be explored through appropriate case studies of Auroville, Sabarmati River Front Development, Heritage city development etc

Text Books:

1. The Urban Design Handbook: Techniques and Working Methods (Second Edition) by Urban Design Associates - 2013.
2. Alexandros Washburn - The Nature of Urban Design - Island Press, Washington, D.C. - 2013
3. Carmona, Matthew; Heath, Tim; Oc, Taner; Tiesdell, Steven - Public Places-Urban Spaces: The Dimensions of Urban Design - Architectural Press, Oxford - 2003
4. Kevin Lynch - The Image of the City - MIT Press - 1960.
5. Geoffrey Broadbent - Emerging Concepts in Urban Space Design - Taylor and Francis - 2003.
6. Edmund Bacon - Design of Cities - Penguin -1976
7. Good City Form, Kevin Lynch, M.I.T Press, 1981

References:

1. Hank Dittmar (Editor), Gloria Ohland (Editor) - The New Transit Town: Best Practices in Transit-Oriented Development 1st Edition - Island Press - 2003
2. Charles C. Bohl - Place Making: Developing Town Centers, Main Streets, and Urban Villages 1st Edition - Urban Land Institute - 2002
3. Relph, Edward - Place and Placelessness - Pion Ltd. , London - 1976
4. Peter Newman,Isabella Jennings - Cities as Sustainable Ecosystems: Principles and Practices - Island Press - 2008
5. Gordon Cullen - The Concise Townscape - The Architectural Press - 1978
6. Timothy Beatley - Green Urbanism: Learning From European Cities 4th ed. Edition - Island Press - 2000

ARC17R581 Architectural Design VII	**L**	**P**	**S**	**Credit**
	0	**0**	**16**	**8**
Pre-requisite: ARC17R481, Practical Training **Pre-requisite:** ARC17R501, Urban Design	**Course Category:** Program Core **Course Type**: Studio			

Course Objective(s):

The students will be able to perceive and design buildings as part of the urban fabric, which could either be contextual or contrasting. They will develop ability towards making architecture inclusive, both in ideation and in response from society.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the continuity and dynamics of urban form with a thrust on the interrelationships between the disciplines of architecture, urban design, and town planning.

CO2: Identify and comprehend the various components and aspects of the urban environment such as public spaces, physical infrastructure, socio- cultural aspects such as heritage, gender, class, dynamics of urban growth through study.

CO3: Take design decisions in a comprehensive manner understanding their implications in the larger urban context by engaging in collaborative study incorporating ideas and opinions of the society in design projects and making design solutions more inclusive.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	H	M				M	H			
CO2	L	H			M			H	H		L
CO3	M	M	M		M			H		M	

H – High , M – Medium , L – Low

Minor Project: Urban Study **48 Hours**

A study in the form of documentation, surveys, and holistically analyses of an urban area or settlement resulting in identifying specific urban issues and evolving comprehensive urban design and specific architectural solutions that is inclusive.

Major Project: Complex Urban level Architectural Projects **192 Hours**

Capability to solve urban level issues evolved as a result of the urban study with a thrust on understanding interdependencies and formulating appropriate design directions - large scale urban development, multi site and multi unit scale architectural projects that also focus on relationship between building and larger context – projects such as revitalization and renewal of urban fragments, evolving guidelines for heritage areas, adaptive reuse, urban waterfront development, transportation nodes, new communities, urban nodes, multi-use urban complexes –choice of two design projects can be given for students.

Text Books

1. Jonathan Barnett, An Introduction to Urban Design, Harper and Row; 1982
2. Michelle Provoost et al., Dutchtown, NAI Publishers, Rotterdam, 1999.
3. Jan Gehl, Life between Buildings- Using Public Space, Arkitektens Forleg 1987.
4. Time Savers Standard for Urban Design, Donald Watson, McGraw Hill, 2005.
5. Malcolm Moore and Jon Rowland Eds, Urban Design Futures, Routledge, 2006.

References

1. Edmund Bacon, Design of Cities , Penguin, 1976.
2. Gordon Cullen, The Concise Townscape, The Architectural Press, 1978.
3. Lawrence Halprin, Cities, Reinhold Publishing Corporation, New York, 1964.
4. Gosling and Maitland, Urban Design, St. Martin's Press, 1984.
5. Kevin Lynch, Site Planning, MIT Press, Cambridge 1967.

ARC17R506 Professional Practice	**L**	**P**	**S**	**Credit**
	3	**0**	**0**	**3**
Pre-requisite: Nil **Co-requisite:** ARC17R582, Architectural Thesis	**Course Category:** Programme core **Course Type**: Theory			

Course Objective(s):

Comprehensive introduction to architectural professional practice, office and project management, construction documentation, contracts, regulations, standards of ethical and professional activity and specialization in architectural practice.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: To understand the role of architects in shaping the built environment, by assimilating the Principles and Organisational structure of an architectural practice
CO2: To understand the influence of statutory and Professional bodies in conduct of professional practice
CO3: To develop ccomprehensive knowledge on standard procedures involved in the functioning of an architect's office
CO4: To understand strategies involved in successful financial, risk and resource management.
CO5: To impart knowledge on Architectural competitions and various specializations involved in the profession of Architecture

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M						H		H		H
CO2	M						H		H		H
CO3	L						H		H		H
CO4	L						H		L		H
CO5	L						M		L		H

Unit 1 Introduction – Practice of Architecture 9 Hours

Introduction - Roll of Architects in society – A paradox. The practice of architecture as an art, a service and a business. Traditional and Contemporary practice of Architecture, Desirable attributes of an architect. Registration of Architects. Developing an architectural practice. Types of practice – LLB, Partnership, Proprietorship. Architects office and its management - organization structure, responsibility towards employees, consultants, contractors and associates.

Unit 2 Professional Ethics and Code of Conduct 8 Hours

Role of 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 (Council of Architecture guide lines) – Code of conduct for architects as prescribed by Council of Architecture, punitive action for professional misconduct of an architect.

Unit 3 Project Management - Tender and Contract 8 Hours

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 - its necessity – Contents (Articles of Agreement, Terms and Conditions, Bills of Quantities and specifications, Appendix) – Certification of Contractors Bills at various stages. New trends in project formulation and different types of execution (BOT, DBOT, BOLT, BOO, etc.) - Role of Architect in Project execution stage (A visit to major project site and interaction with Project managers).

Unit 4 Services of an Architectural Practice and financial management 8 Hours

Mode of engaging an architect – Comprehensive services, partial services and specialized services – Scope of works of an architect – Schedule of services – Scale of fees (Council of Architecture norms) – Mode of payment – Terms and conditions of engagement. Negotiation of scope of works, fees and contract finalisation. Project scheduling and management - Financial management: Tax liabilities of an Architectural practice – GST, TDS, Income Tax under various slabs and types of services rendered. Risk and resource management, liability insurance.

Unit 5: Architectural Competitions and Specializations in Architecture 12 Hours

Importance of Architectural competitions – Types of competitions (open, limited, ideas competition) – Single and two stage competitions – Council of Architecture guidelines for conducting Architectural competitions –International Competitions (case studies). Specialization – Landscape designers, Facility management, Project management, Building products engineering and marketing, Real estate, Energy Auditors – Leed, GRIHA, etc., accredited professionals, Collaboration with international architects.

Total: 45 Hours

Text Book(s):

1. Architects Act 1972.
2. Publications of Handbook on Professional practice by IIA.
3. Publications of Council of Architecture - Architects (Professional conduct) Regulations 1989, Architectural Competition guidelines
4. Roshan Namavati - Professional practice - Lakhani Book Depot, Mumbai - 1984.

Reference(s):

1. J.J.Scott - Architect's Practice - Butterworth, London - 1985.
2. Ar. V.S. Apte - Architectural Practice and Procedure - Padmaja Bhide, Pune - 2008.

ARC17R551 Landscape Design	**L**	**P**	**S**	**Credit**
	2	**0**	**2**	**3**
Pre-requisite: ARC17R204, Site planning **Co - requisite:** ARC17R58, Architectural Design VII	**Course Category:** Program Core **Course Type**: Theory cum Studio			

Course Objective(s):

To understand and to comprehend the design perception on Landscape, that shall help in bringing analytical approach to landscape design.

Course Outcome(s):

After completing this course, the student will be able to:

- **CO1:** Recognize the basics of landscape architecture, Site Planning, microclimate, ecology and shall get awareness towards eco sensitive approach.
- **CO2:** Understanding the elements and basic components of landscape design and recognize its application according to design and theme.
- **CO3:** Understanding the history of garden design with examples which would help in recognizing the evolution of design from yesteryears to today.
- **CO4:** Recognize the basic parameters of site planning, its elements and spatial organization patterns on different case examples, which shall help in application on – site development layout.
- **CO5:** Understand the application of landscape design in functional areas through principles, design aspects and examples.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	H	L	L							M	H
CO2	H	M		M	H	M			M		
CO3	H	M		L	H			H			
CO4	H	H	M	L	M	M			H	M	H
CO5	H	H	L		M			L	M	H	H

H – High , M – Medium , L – Low

Unit 1 Introduction **10 Hours**

Introduction to landscape architecture, Definition and importance of ecology, ecological balance, Biosphere reserve, landscape conservation and landscape reclamation. Site planning and micro climate thoughts, Circulation, Organization of built form and open spaces - *Exercise on Site planning through case studies and drawings*

Unit 2 Elements in Landscape Design **16 Hours**

Hard and soft landscape elements. Water, Pavement, Lighting and Landform in Landscape design. Plant materials - classification, characteristics, use and application in landscape design - *Exercise on Landscaping a courtyard / Entrance Porch / Small Garden through case studies and drawings*

Unit 3 History of Garden Design **12 Hours**

A brief on Landscape and garden design in history till 19th Century– Detailed study on Japanese, Italian Renaissance and Mughal gardens in India, with study of notable examples with their Spatial development in landscape design - *Exercise related to historical elements and detailing through Literature case study and drawings*

Unit 4 Landscaping of Functional Areas **18 Hours**

Site planning Principles and Elements for Housing Development, neighborhood parks, children's play area, campus development and waterfront areas - *Exercise on the above with case studies and drawings*

Unit 5 Urban Landscape **6 Hours**

Landscape Design Principles with study on project examples for Urban Open space, urban plaza and Street landscaping. Study on Interiorscaping, Green Roofs and Vertical walls - *Exercise on the above with case studies and drawings*

Total: 60 Hours

Text Book(s)

1. T S S for Landscape Architecture - Mc Graw Hill, Inc - 1995
2. Grant W Reid - From Concept to Form in Landscape Design - Van Nostrand Reinhold Company -1993.

Reference(s):

1. Brian Hacket - Planting Design - Mc Graw Hill, Inc - 1976
2. Cliff Tandy - Handbook of urban landscape - Architectural press - 1973
3. T.K. Bose and Chowdhury - Tropical Garden Plants in Colour - Horticulture and Allied Publishers, Calcutta, 1991.
4. Michael Laurie - An Introduction to Landscape Architecture - Elsevier, 1986.
5. Geoffrey and Susan Jellico - The Landscape of Man - Thames and Hudson - 1987.

b) Community Service Project

ARC17R285 Architectural Design III	L	P	S	Credit
	0	0	14	7
Pre-requisite: ARC17R182 Architectural Design I	**Course Category:** Programme Core **Course Type**: Studio			

Course Objective(s):

Students will have a holistic understanding of the built environment as a complex entity shaped by social, economic and geographical factors.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehensively analyse and infer the built environment through the study of a rural settlement.

CO2: Analyse, organise, interpret, and present information and data collected through studies.

CO3: Design buildings as a response to both tangible factors such as geography and intangible factors such as culture.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	H	M		H	L		H	L		
CO2	H	H			M			H	M	M	
CO3	H	H	M		H			H	M	M	M

H – High , M – Medium , L – Low

Major Project: Study and documentation of Rural Settlement **182 Hours**

Survey, Study, documentation and analysis of rural settlements to understand the influence of geography, resources, climate, culture, social and economic aspects on the rural settlement pattern, design and construction of built environments -preparation of report and presentation of design solutions for housing and community facilities.

Minor project: Context based Design **28 Hours**

Design of rural based projects such as noon meal centre, market, community centre, local buildings for economic activities, primary health centre; small community/ need oriented projects

Total: 210 Hours

Text Book(s):

1. Jayashree Deshpande, Aneerudha Paul, Priyal Mote - Rural Studio Project - NIASA - 2015
2. Amos Rapoport, House - Form and Culture; Prentice hall - 1969.
3. Joseph De Chiara – Time Saver Standards for Building Types - McGraw Hill Education -2017
4. Ernst Neufert, Peter Neufert - Architects Data – Wiley Blackwell– 2012
5. Laurie Baker – Rural House Plans – COSTFORD.

Reference(s):

1. Bernard Rudovsky - Architecture without Architects; Cost reduction; Architectural Press - 1964.
2. Ramachandran H - Village Clusters and Rural development, Concept Publications - 1980.
3. Thorbeck D - Rural design, Routledge - 2002.
4. Hassan Fathy - Architecture for the Poor - University of Chicago press - 1973.

c) Practical Training

ARC17R481 Practical Training	L	P	S	Credit
	0	0	0	10
Pre-requisite: ARC17R381, Architectural Design IV and **ARC17R382,** Architectural Design V	**Course Type**: Program Core **Course Category:** Studio			

Course Objective(s):
This course shall expose students to the practical aspects of the Architectural Profession.
Course Outcome(s):
After completing this course, the student will be able to:
CO1: Facilitate an understanding of the evolution of an architectural project from design to execution.
CO2: Develop an orientation that would include the process of development of conceptual ideas, presentation skills, involvement in office discussions, client meetings, development of the concepts into working drawings, tendering procedure, site supervision during execution and coordination with the agencies involved in the construction process.
Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	L		H				H		H		H
CO2	L		H				H		H		H

H – High , M – Medium , L – Low

- The choice of the place of training shall be Architectural Firms, Organisations, Development Authorities, etc. which are headed by Registered Architects.
- The students shall work for a period of 90 working days in one firm.
- The choice of the office shall be approved by the Head of the Department of Architecture.
- The practical training primarily involves learning in the office and on the site.
- The progress of training shall be assessed periodically by reports from the employers of trainees.
- The internal continuous assessment evaluation shall be based on the monthly reports sent by each student.
- The external evaluation of the practical training will be based on
  - **a)** A report containing the following features
    1. Architectural office training – details, working drawings, presentation
    2. Site visit/field documentation.
    3. Critical study of projects done during the training period in which the student involved.
    4. Study of office management system.
  - **b)** Viva Voce: This will evaluate the understanding of the students about the drawings, detailing, materials, construction method and service integration and the knowledge gained during client meetings, consultant meetings and site visits.

d) Project Work

ARC17R582 Architectural Thesis	L	P	S	Credit
	0	0	28	14
Pre-requisite:ARC17R483, Architectural Design VI	**Course Category:** Program Core **Course Type**: Studio			

Course Objective(s):

This course shall be able to demonstrate design project comprehension to independently formulate, analyse, and solve architectural problems.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Involve in individual research and methodology to aide design problem solving

CO2: Acquire knowledge to formulate, program and design projects independently

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M	H					H		H		
CO2	M	H					H		H		

H – High , M – Medium , L – Low

Architectural Thesis

The student shall formulate and solve design problems individually demonstrating design project comprehension and proposal ability. The main areas of study and research shall be Architecture and design projects may include Campus design, housing, Urban design, Conservation, Landscape Design Urban renewal, Environmental Design etc. with specific thrust on architectural design of built environment. A Special study/ focus area appropriate to the Thesis topic shall also be part of the course.

Method of Submission

The thesis Project shall be submitted in the form of drawings, project report, models and slides and evaluation shall be in the form of reviews and a viva voce .

V. ELECTIVES

a) Major Elective

Design Theory and History Stream

ARC17R208 Vernacular Architecture of India	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R201 History of Architecture and Culture II	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s)

The student shall develop comprehension and appreciation of various vernacular architecture in India.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the concepts of vernacular architecture and factors shaping them.

CO2: Critically analyse the response of the built environment to the context through the study of various vernacular forms of architecture across India.

Mapping of Course Outcome(s):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H			L			H		**L**	
CO2	M	H			L			H			

(S – Strong, M – Medium, L – Low)

Unit 1 Introduction to Vernacular Architecture **4 Hours**

Definition of Vernacular Architecture. Importance and factors determining the Character of vernacular architecture. Approaches and concepts used in vernacular Architecture - Aesthetic, Anthropology, Architectural, Geographical, spatial, Ecological, Behavioral and Developmental.

Unit 2 Vernacular Architecture of Northern India **8 Hours**

Cultural aspects, symbolism, colour, art, materials of construction and construction techniques of Northern India: - Deserts of Rajasthan; Havelis of Rajasthan, Shekawathi Havelis, Geographical regions of Kashmir; dwellings, House boats of Kashmir – Dhoongas, Bahats, Settlement planning of Jaipur, Introduction to Planning features of forts in Jodhpur, Jaipur, Jaisalmer

Unit 3 Vernacular Architecture of Kutch Region **6 Hours**

Wooden Houses and Mansions of Gujarat – Muslim Havelis and Hindu Havelis – Bohra Houses: Their primitive form, Materials, Ornamentation and Construction details Banni Houses in Kutch regions - Materials and construction details

Unit 4 Vernacular Architecture of Kerala and Tamilnadu **8 Hours**

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

Unit 5 Vernacular Architecture of Colonial India **4 Hours**

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

Total: 30 hours

Text Books

1. Minakshi, J., and Khulbushan, J. - Mud Architecture of the Indian Desert - Ahmedabad:Aadi Centre – 1992
2. Randhawa, T. S. - The Indian courtyard house. Prakash Books - 1995

References

1. Paul Oliver – Encyclopedia of Vernacular Architecture of the World – Cambridge University Press – 1997
2. G.H.R.Tillotsum. - The tradition of Indian Architecture Continuity, Controversy Change since 1850- Oxford University Press - 1989
3. Meenakshi, M., Muthiah, S., Visalakshi, R., and Muthuraman, V. - The Chettiar Heritage. Chennai: Chettiar Heritage - 2006
4. V.S.Pramar - Haveli - Wooden Houses and Mansions of Gujarat - Ahmedabad: Mapin Publishing Pvt. Ltd. – 1989

ARC17R303 Traditional Indian Architecture	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R205 History of Architecture and Culture IV	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To understand and appreciate the philosophy and principles of Indian Architecture, which establishes the relationship between the built environment and the well being of the inhabitants. To appropriately adopt traditional architectural principles in contemporary design process

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the significance Traditional Indian Architecture and the meaning of Vastu and Vastu

CO2: Recognize traditional Space Theory and the relationship between built space, living organism and universe.

CO3: Understand the measurement of Space and Time and recognize their interface in Traditional Indian Architecture

CO4: Analyse the generic Planning principles of Architecture as stated in the texts

CO5: Evaluate the resultant ambiance in built space and Apply the planning principles for contemporary architectural design

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M				L			H			
CO2	M	H						H			
CO3	M							H			
CO4	H	M						H			
CO5	M	H						H			

High – H, Medium – M, Low – L

Unit 1 Introduction to Traditional Indian Architecture **4 Hours**

Significance and Achievements of Traditional texts in India - Meaning of Vastu and Vaastu - Its classification.

Unit 2 Space theory **4 Hours**

Gross and subtle space, Macro and micro space, enclosed and material spaces - Relationship between built space, living organism and universe - Impact of built space on human psyche.

Unit 3 Space and Time Interface and its Measurement **8 Hours**

Theory of vibration – vibration as time, equation of time and space – time space relationship and measurement of same -Units of measurement – Tala and Hastha System of measures - Physical manifestation and symbolic embodiment of time and space in the temple form and layout.

Unit 4 Planning principles **8 Hours**

Features of good building site - good building shapes – Orientation of the building, Aayadi calculations – resultant ambience in built space, Mandala or Pada vinyasa - its types - Layout and settlement- zoning of functional areas, Proportion systems, fitting of components in the building- The cube as the basic structure - positive and negative energies.

Unit 5 Architectural Applications and Case Studies **6 Hours**

Simple design of single and multi-storeyed residential building – Basement- Wall and roof specification –Pitched roof and domical roofs - Significance of pyramid- landscaping in and around buildings. Aesthetics in Indian Architecture- Case Studies.

Total: 30 Hours

Text Book(s):

1. Pk Acharya, Manasara- Volume IV- Motilal Banarsidars Publishers Pvt.Ltd., Delhi,1994
2. Bruno Dagens – Maya Matam I and II– IGNCA publication, New Delhi – 1997.
3. Dr.V.Ganapati Sthapati- Vastu Shastra – Vastu Vedic Research Foundation, Chennai – 1996.
4. Sashikala Ananth -The Penguin Guide to Vaastu - Penguin Books, New Delhi - 1998.

Reference Book(s):

1. T.Ganapathi Sastri – Silpa Ratnam – Maharaja of Travancore, Govt of Travancore -1922.
2. Stella Kramresh – the Hindu Temple Vol.I and II Motilal Banarsidars Publishers Pvt.Ltd., Delhi - 1994.

ARC17R304 Contemporary Architecture	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R205 History of Architecture and Culture IV	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To gain knowledge and exposure on the contemporary philosophies, issues and works in architecture across the world.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Gain knowledge in the recent trends in architecture by European architects.

CO2: Understand the philosophies and works of American (North and South) Architects

CO3: Acquire exposure about the issues in architecture in Asian countries and contemporary works of Asian Architects

CO4: Know about the outstanding architectural works of eminent architects and for world events.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	M			H	L				H	
CO2	M	H			H	L				M	
CO3	M	H			H	L				M	
CO4	M	L			H	M				M	

H – High , M – Medium , L – Low

Unit 1 Contemporary European Architects **10 Hours**

Philosophies and works of Alvaro Siza, Studio Granda, Rafael Moneo, Ben Van Berkel, Norman Foster, Santiago Calatrava, Mario Botta, Renzo Piano, Herzog and de Meuron, Rem Koolhas, Daniel Libenskind, Bernard Tschumi, Richard Rogers, Foreign office architects, Bjarke Ingels, Pallasmaa Juhani, Zaha Hadid, Mansilla + Tuñón Architects, Terry Farrell,

Thomas Heatherwick, Winy Maas, Saunders Architecture, Herman Hertzberger, Aslop Architects, Julien de Smedt, Videgard arkitekter, Christian de Portzamparc, Jean Nouvel, farshid Moussavi and Alejandro zaera, Massimiliano and Doriana Fuksas, peter Zumthor, Behnisch Behnisch and partner; Concepts such as green architecture; recent RIBA awards recipients

Unit 2 Contemporary American Architects **8 Hours**

North America: Philosophies and works Shigeru Ban, Doughlas Cardinal, Moshe Safdie, Jack Diamond, William Chong; Frank Gehry, Steven Holl, Randoll Stout, LMN Architects, Peter Eisenman, Richard Meier, Antoine Predock, Williams and Tsiens, Micheal Maltzen, David Childs,Jeanne Gang, Joshua Prince-Ramus, Robert Stern, Thom Mayne, William Pedersen ; Examples of Absorption of ideas from around the world; South America: Cesar Pelli, Alejandro Aravena, Rafael Viñoly; Architectural production focusing on economic and social factors with examples

Unit 3 Contemporary Asian Architects **6 Hours**

Wang Shu, Yoshio Taniguichi, Kenzo Tange, Saana Architects, Fumihiko Maki, Ken Yeang, Kengo Kuma, I.M.Pei, Ma Yansong, Sheila Sri Prakash, Toyo Ito, Tom Wright; Impact of rapid growing economies like China, India and Dubai, Architecture of skyscrapers and influence of context – Architecture addressing the issue of space constraint with examples.

Unit 4 Contemporary Architecture from rest of the World **6 Hours**

Glen Murcutt, Woods Bagot, Edmund Blacket, Sean Godsell, Philip Cox; recent recipients of Pritzker Architecture Prize; Architecture for significant World sporting events in the 21st century such as Olympics and World cup foot ball.

Total: 30 Hours

Text book(s):

1. The International Architecture Award Yearbook series – Metropolitan Art press
2. Christian Narkiewicz-Laine - New International Architecture: Global Design + Urbanish XVI - Metropolitan Art press – 2016
3. Hasan-Uddin Khan - Contemporary Asian Architects – Taschen – 1996
4. Francis D. K. Ching , Mark M. Jarzombek, Vikramaditya Prakash - A Global History of Architecture - John Wiley and Sons - 2007

Reference(s):

1. Rahul Khanna – The modern Architecture of New Delhi (1928 – 2007) – Random House India - 2008
2. Liane Lefaivre And Alexander Tzonis - Critical Regionalism: Architecture and Identity in a Globalised World – Prestel – 2003

ARC17R310 Environment Behaviour Studies	**L**	**P**	**S**	**Credit**
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Major Elective			
Co-requisite:ARC17R382, Architectural Design V	**Course Type**: Theory			

Course Objective(s):

This course shall establish the relationship between built environment and human behaviour and its application in design to augment built environments.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the biological, social, and cultural context of the users in built environment.

CO2: Recognise the multiplicity of living patterns, activities, geometric patterns in space and designing for the same.

CO3: Interpret and critically analyse social and behavioural factors that influence built environments and people's perception and adaptation to built environments.

CO4: Gain knowledge of the behavioural design process, techniques, and design contexts to enhance the quality of spaces designed.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	H	H			M						
CO2	H	H			M						
CO3	M	H			M						
CO4	M	H			M						

H – High, M – Medium , L – Low

Unit 1 Introduction **4 Hours**

Relationship between Human Behaviour and Built environment - Behaviour within environment - Factors affecting environmental perspective - Influence of Environment upon behaviour - perception and adaptation to built environments.

Unit 2 Understanding Space **8 Hours**

Spatial Experience, Perception, Interpretation, Environmental Cognition, Physical and social factors such as settings, time, climatic condition, crowding etc. Types of Environment- user groups and design, building types and design, Architectural elements and its relation to behaviour, Territoriality- Nature of territoriality, function of territoriality, territorial organization, fundamental understanding of micro space, meso space and macro space.

Unit 3 Micro space **6 Hours**

Defining personal space, classifying personal space, variability of personal space, proxemics, spatial integration, segregation, and invasion – analysis through case studies.

Unit 4 Meso space and macro space **8 Hours**

Cognitive patterns, the neighborhood unit – philosophy of neighborhood, typology, perception of neighborhoods, criticism of neighborhood ideology, neighborhood satisfaction, the urban environment, the image of the city.

Unit 5 Application of Behavioural studies in architecture **4 Hours**

Application and influence of behavioural studies in architectural design process – case examples in various building typologies for micro, meso and macro spaces such as dwelling spaces, healing environment, learning environment, housing, office, urban spaces etc

Total: 30 Hours

Textbook(s):

1. J Douglas Porteous - Environment and behaviour: Planning and Everyday Urban life - Addison Wesley Publishing -1977
2. Thomas F Saarinen - Environmental planning: Perception and Behavior - Houghton Mifflin Company Boston -1976
3. Christopher Alexander - A Pattern Language: Towns, Buildings, Construction – Oxford University Press - 1977
4. Oscar Newman - Defensible Spaces - HUD's Office of Policy Development and Research -1970
5. Kevin Lynch - The Image of a City - Cambridge MIT -1973.
6. Jane Jacobs - The Death and Life of Great American Cities - Vintage; Vintage Books ed. – 1992
7. Jan Gehl - Life Between Buildings: Using Public Space - Danish Architectural Press – 2008
8. Canter, D.V, and Lee, T- Psychology and the Build Environment - Architectural Press, London -1974.

Reference(s):

1. Clare Cooper Marcus and Carolyn Francis - People Places: Design Guidelines for Urban Open Space - John Wiley and Sons - 1997
2. Diane Y. Carstens - Site Planning and Design for the Elderly: Issues, Guidelines, and Alternatives - John Wiley and Sons – 1993
3. Clare Cooper Marcus, Wendy Sarkissian - Housing As If People Mattered: Site Design Guidelines for the Planning of Medium Density Family Housing - University of California Press - 1988
4. Clovis Heimsath - Behavioral architecture - Mc Graw Hill - 1977
5. David canter and Terence lee - Psychology and the Built environment - Halstead press, New York - 1974.
6. Paul A. Bell , Thomas C. Greene, Jeffrey D. Fisher and Andrew S. Baum - Environmental Psychology - Psychology Press - 2006
7. William H Whyte – The Social life of small urban spaces – Project for Public spaces - 2004.
8. Edward T hall - The Hidden Dimension – The Anchor Book, Doubleday - 1990
9. Environmental Design research association - http://www.edra.org/

ARC17R311 Temple Architecture of India	**L**	**P**	**C**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R104, History of Architecture and Culture II **Co-requisite:** ARC17R382, Architectural Design V	**Course Category:** Major Elective **Course Type:** Theory			

Course Objective(s):

To gain knowledge on the basic philosophy of Hindu Temple architecture and understand the various styles of temple architecture across India through case studies.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Become familiar with the origins, scriptures, beliefs, gods, rituals, customs, main philosophical, ethical and theological teachings of Hindu religion.

CO2: Gain knowledge about the physical experience of buildings in order to appreciate the complexity of the physical and metaphysical influences bearing on architecture.

CO3: Evolution of temple Architecture in India in its various stylistic modes, characterized by technology, ornamentation and planning practices of both Northern and Southern India.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1								H			
CO2	L				L			H			
CO3	L							H			

H – High , M – Medium , L – Low

Unit 1 Hinduism **6 Hours**

Origin of Hinduism-Historical overview of Hinduism-Hindu beliefs, practices, core philosophical and theological thoughts-important aspects of Hindu religion, culture and society as a historical continuity from the ancient times to modern times-Origin of Bhakthi movement and its importance-Its impact on Hinduism-Saivism: Origin and Development of Saiva Tradition, Trika and Saiva Siddhanta School: God, Soul and Liberation-Vaishnavism: Origin and Development, Alvars, Ramanuja, Madhva, God, Soul, World, Devotion and Liberation-Sakthi Dharma: Origin and Development of Sakthi Tradition.

Unit 2 Introduction to Temple Architecture 4 Hours

Historical overview-Hindu scriptures- Vedas and Upanishads -Introduction to Veda, Concept of deity-the three paths of discipline-Vedic sacrificial tradition-ritual action and moral action-

Unit 3 Temple Architecture Case studies -Northern Region 8 Hours

Climatic, Geographical, Geological, Cultural and religious factors that influenced temple Architecture in North India: Ghats architecture – Varanasi, Salient features of temples – Jaganath temple, Puri - Khajuraho temple - Dilwara temple, Mt.Abu- Somnath Temple, Gujarat - Kali temple, Bengal.

Unit 4 Temple Architecture Case studies - Southern Region 12 Hours

Climatic, Geographical, Geological, Cultural and religious factors that influenced in South - Salient features of Kerala Temples: Vadakkunathan temple, Sree padmanabhaswamy temple, Thirunakkara Temple -Cultural Architecture-temple theatres, Koothambalams - Temple architecture of Tamil Nadu: Relationship between temple complex and settlement: examples such as Kancheevaram, Srirangam and Madurai – Pallava temple architecture with examples such as Shore temple, Mahabalipuram – Chola architecture with examples such as Airavateswara temple at Darasuram – Pandya and Nayak Architecture with examples such as Ranganatha swami temple, Srirangam, Andal Temple Srivilliputur and Rameshwaram Ramanathaswamy temple – Salient features of temples at Hampi, Hoysaleshwara temple at Halebid.

Total: 30 Hours

Text Books

1. George Michell - Temple towns of Tamil Nadu - Marg Publications, Mumbai - 2008.
2. George Michell - The New Cambridge History of India – Architecture and Art of Southern India - Cambridge university press - 2000.
1. Satish Grover - Buddhist and Hindu Architecture in India - CBS Publishers and Distributors – 2013
2. Percy Brown, Indian Architecture (Buddhist And Hindu Period), Read Books publishers, 2010.
3. Christoper Tadgell - The History of Architecture in India from the Dawn of civilization to the End of the Raj - Longmon Group U.K. Ltd., London - 1990.

Reference(s):

1. Surendranath Dasgupta- A History of Indian Philosophy by Surendranath Dasgupta - Motilal Banarsi Dass, New Delhi - 2000
2. Ksetresh Chandra Chattopadhyaya - Vedic Religion -
3. Jason Boyett - Twelve Major Religions of the World: The Beliefs, Rituals, and Traditions of Humanity's Most Influential Faiths - Zephyros Press - 2016
4. Kamalakar Mishra - K. Mishra Kashmir Saivism: The Central Philosophy of Tantrism - Indica Books - 2011
5. Yatin Pandya - Concepts of space in traditional Indian architecture - Mapin publishing - 2005
6. Satish Grover - Masterpieces of Traditional Indian Architecture - Om Books - 2004
7. Adam Hardy - The Temple Architecture of India - Wiley -2007.

ARC17R353 Interior Design	L	P	S	Credit
	2	0	2	3
Pre-requisite: Nil	**Course Category:** Major Elective			
Co-requisite: ARC17R382, Architectural Design V	**Course Type**: Theory cum Studio			

Course Objective(s):

To understand principles of visual and spatial composition in Interior Design and comprehend the process of interior designing.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the principles, functional and aesthetic aspects of interior Design.

CO2: Gain exposure in the various materials and construction techniques in interior design.

CO3: Acquire skill in the design of efficient interior lighting for various spaces

CO4: Critically analyse furniture layouts and effectively design the furniture layout

CO5: Appreciate the role of interior landscape and their effects in built environments.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M	H			L						
CO2	H	H	H	H							
CO3	H	H	H						L		
CO4	M	H	H		L				L		
CO5	L			L						L	

H – High , M – Medium , L – Low

Unit 1 Principles of Interior Design **12 Hours**

Introduction to the design of interior spaces as related to typologies and functions, themes and concepts - study and design - Principles of composition in interior design - size, volume, proportion and shape of enclosures, ideal space proportions use of scales for space representation, psychological effect of space - *Design of composition using the above principles – Murals, sculptures , ornamentations – Application in Single activity space*

Unit 2 Study of various materials, construction techniques and cost analysis 14 Hours

Various materials for ceiling, walls and floors, sources and collecting product information - advantage and disadvantage – market trend –innovative materials - Decorative finishes and fabrics -cost analysis – *Exercise on Design of false ceiling, flooring and partition walls - specification and estimation*

Unit 3 Interior Lighting Design **14 Hours**

Visual elements - color, texture, plane and fixtures in relation to the surroundings – Interior lighting - different types of lighting, their effects, types of lighting fixtures - Modulation of interior space with art objects - Space modulation through artificial and natural lighting, emphasizing of focal points – Design of Interiors – *Lighting and electrical layout for display systems - commercial , residential interiors.*

Unit 4 Interior Furniture Design **12 Hours**

Role of furniture, evolution of furniture styles, Ergonomic factors of furniture design, materials used, Functional classification, Barrier free design, Matching of furniture to decorative style, fitted furniture – its characteristics and applications. Study on furniture for specific types of interiors like office furniture, children's furniture, residential furniture, display systems, etc**. –** *Design of simple furniture for work Counters, work stations, residential interior spaces, etc., and Furniture layout*

Unit 5 Interior Landscaping **8 Hours**

Interior landscaping - elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc. their physical properties -Methods of application, effects on spaces and design values. – *Design of interior landscaping – exhibition space, museums, lobby space, recreation spaces, etc.*

Total: 60 Hours

Text Book(s)

1. Francis D.K.Ching , Corky Binggeli - Interior Design Illustrated – John Wiley and Sons - 2012

Reference Book(s)

1. Clive Edwards - Interior Design: A Critical Introduction - Bloomsbury Academic - 2010
2. Helen Marie Evans - An Invitation to design - Macmillan Pub Co - 1982
3. Steport - De - Van Kness, Logan and Szebely - Introduction to Interior Design - Macmillan Publishing Co., NY - 1980.
4. Julius Penero and Martin Zelnik - Human Dimensions and Interior space - Whitney Library of Design, NY - 1979.
5. Inca/Interior Design Register - Inca Publications, Chennai - 1989.
6. Kathryn B.Hiesinger and George H.Marcus - Landmarks of twentieth Century Design - Abbey Ville Press - 1993.
7. Syanne Slesin and Stafford Ceiff - Indian Style - Clarkson N.Potter, NY.
8. Dr.Saranya Doshi - The Impulse to adorn : Studies in traditional Indian Architecture. – Editor, Marg Publications - 1982.

ARC17R403 Architectural Writing and Research Methods	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To train students in the methods of architectural enquiry, research and writing for independent exploration.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Train in various types of writing required for architectural reporting and research.

CO2: Critically read and write leading to an independent thinking aptitude.

CO3: Apply explorative/ critical thinking towards discussion and debate of issues of national and global significance.

CO4: Analyse and examine the fundamentals of architectural research its purpose, types and techniques.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1					M						
CO2					M						
CO3					M						
CO4					M						

H – High , M – Medium , L – Low

Unit 1 Introduction to Scientific Writing **3 Hours**

Introduction to architectural writing for various purposes – abstracts, reports, articles for magazines and journals - Issues of copyright.

Unit 2 Introduction to Architectural Criticism **6 Hours**

Need for Architectural Criticism, social perspective of criticism, types and characteristics of criticism – normative, interpretative, descriptive - Survey of literature – design magazines and journals; positive and negative impact of criticism

Unit 3 Constructive Discussions and Debates **6 Hours**

Regional, National and International discussion forums. Architectural magazines and journals – types, focus. Public discourse – media on current National and Global issues of architecture and the built environment.

Unit 4 Architectural Research **7 Hours**

Introduction to Architectural Research – need, challenges and drawbacks - Research Paradigms-qualitative and quantitative. Formulation of aim, objectives, hypothesis and research questions. Identification of the Research problem.

Unit 5 Introduction to Research **8 Hours**

Types of research – application based, method based, mode based. Architectural research as process, product and performance. Architectural research methods/ strategies – Interpretational, Correlational, Experimental. Case study, Descriptive/ Exploratory research.

Total: 30 Hours

Text book(s)

1. Linda N. Groat and David Wang - Architectural Research Methods, Second Edition - Wiley and Sons - 2013
2. Sattrup, P. A - Architectural Research Paradigms: an overview and a research example- Accessed from orbit.dtu.dk - 2012

Reference(s)

1. Edward Jay Friedlander and John Lee Feature - Writing for Newspapers and Magazines, 4th edition - Longman - 2000
2. Fuller, David, Waugh, Patricia eds - The Arts and Sciences of Criticism - Oxford University Press – 1999
3. Foust, James - Online Journalism: Principles and Practices of News for the Web - Holcomb Hathaway Publishers, Scottsdale, AZ – 2005

Drawings and Presentation Stream

C17R281 Visual Arts and Model Making	L	P	S	Credit
	0	0	4	2
Pre-requisite: Nil	**Course Category:** Major Elective			
Co-requisite: ARC17R283, Architectural Design II	**Course Type**: Studio			

Course Objective(s):

The student will gain basic hands on experience and fundamental knowledge in both two and three dimensional visual representation using different materials and mediums.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand and exhibit proficiency in the various mediums of presentation for 2 dimensional architectural presentations

CO2: Acquire skills in different types of architectural model making using various materials.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1			H	M							
CO2			H	H							

H – High , M – Medium , L – Low

Unit 1 Techniques of Visual Art

Techniques of rendering with pen and ink- graphical representation of objects such as concept sketching and idea sketching - Exposure to other medium of presentation - Pencil, Crayon, Pastel Colors, Poster colours, water Colors and Oil Colour, etc, - *Simple Exercises on the above*

Unit 2 Rendering techniques for architecture

Rendering techniques specific to building exterior, interior technical drawings, views etc. using mediums such as color pencils, pen and ink, Crayon, water colour, poster colour etc - Sketching of built up structures of Architectural importance using different mediums - *Exercises on rendering site plan, floor plan, section elevation and view using above said techniques*

Unit 3 Model making

Need and role of architectural models in design - General practices in model Making- Scale and Types of models: Block detailed, construction and interior models – techniques of cutting and finishing of different materials – Form generation - *Simple exercises in cutting, finishing and joinery with simple blocks, composition of simple Geometrical forms like cube, dome, sphere, arches etc.- exercises on conceptual models*

Unit 4 Building modelling

Various materials and tools to be used in 3D model making - Use of materials, viz. Paper, mount Board, cardboard, Plaster of Paris (POP),Clay, Bamboo and waste materials which can be used in architectural models -Painting model surfaces with various finishes, development of topography and landscape. *Exercises on architectural model making including detailed models and site models with different materials.*

Unit 5 Model Making for Architecture

Exercises on model making of buildings with simple and complex forms – exercises on site model especially contour site.

Total: 60 Hours

Text Book(s):

1. Bhatt, N. D. - Engineering Drawing - Anand : Charotar Publishing House – 2003

2. Arthur L. Guptill - Rendering in Pen and Ink: The Classic Book On Pen and Ink Techniques for Artists, Illustrators, Architects, and Designers - Watson-Guptill - 1997
3. Ching, F. D. K. - Architectural Graphics - 5th Ed. Hoboken : John Wiley and Sons - 2009
4. Thames and Hudson - Manual of Rendering with Pen and Ink - Robert W Gil – 1990

Reference(s):

1. Florian Afflerbach, Michael Heinrich, Jan Krebs, Alexander Schilling – Basics: Architectural Presentation – Birkhäuser – 2014
2. Michael E Doyle - Color Drawings: Design drawing skills and techniques for architects, landscape architects and interior designers - John Wiley and Sons - 1995
3. Criss. B. M. - Designing with models: A Studio guide to Architectural Process Models, 3rd Ed - John Wiley and Sons - 2011
4. Werner, M. - Model Making - Princeton Architectural Press, New York - 2011.
5. Jannsen - Constructional Drawings and Architectural models - Kari Kramer Verlag Stuttgart - 1973.
6. Harry W.Smith - The art of making furniture in miniature - E.P.Duttor Inc., New York, - 1982.

ARC17R282 Computer Applications in Architecture I	**L**	**P**	**S**	**Credit**
	0	**0**	**4**	**2**
Pre-requisite: ARC17R152 Architectural Graphics II	**Course Category:** Major Elective **Course Type**: Studio			

Course Objective(s):

To introduce the technology of computer system, operation principles, use of other related hardware's, with a thrust on two dimensional drafting as a necessity for architects.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Create and edit architectural drawings using softwares.

CO2: Gain knowledge on understanding of advanced tools in 2 dimensional drafting of building drawings.

CO3: Understand and Mange to plot drawings created using computers.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1			H	M							
CO2			H	M							
CO3			H	M							

H – High, M – Medium, L – Low

Unit 1 Two Dimensional Drawing and Editing **16 Hours**

Introduction: hardware / software – operating system, basics of CAD packages - Setting up and controlling the CAD drawing environment: filing, specifying coordinates, setting drawing units, scales, limits and size – Creating and Editing: use of drawing tools, object editing – setting of dimension, text. *Exercises on of drawings of simple objects*

Unit 2 Advanced Tools for Two Dimensional Drawing **24 Hours**

Organizing a drawing with layers – Advanced geometry editing – Creating and using Blocks – Inquiry Tools – Text annotation – Creating and Customizing Hatch patterns – Productive Dimensioning – Defining Text and Dimension Styles. *Exercises on of simple architectural drawings with text and dimensioning.*

Unit 3 Advance Computer Aided 2 Dimensional Drafting **16 Hours**

Advance command programming - transparent overlays hatching utilities - assigned colour and line type, use of multiline - style, block - symbol library manipulation for accurate drawing – templates - *Exercises on of complete set of complex architectural drawings using above mentioned tools.*

Unit 4 Plotting and Printing **4 Hours**

Model Space Viewports, Paper Space Viewports, And Layouts - Printing, and plotting: settings and management - creating a slide presentation –importing / exporting Files

Total: 60 Hours

Text Book(s):

1. Robert M Thomas - Advance Technique in AutoCAD – Longman Higher Education – 1989
2. Ellen Finkelstein - AutoCAD 2015 and AutoCAD LT 2015 Bible - John Wiley and Sons – 2014
3. Carol Buehrens - Data Cad for Architects and Designers - McGraw-Hill Publishing Co. - 1995

Reference(s):

1. AUTOCAD (AUTOCAD Reference Manual) - AUTODESK, INC - 1992
2. Tutorial books - AutoCAD 2017 For Architectural Design - Createspace Independent - 2016
3. Sham Tickko - AutoCAD MEP 2018 for Designers - Cadcim Technologies - 2017
4. http://www.sln.fi.edu/-Computer drafting
5. http://www.ccollege.hccs.cc.tx.us/-Comp.graphic

ARC17R284 Computer Applications in Architecture II	**L**	**P**	**S**	**Credit**
	0	**0**	**4**	**2**
Pre-requisite: ARC17R282 Computer Applications in Architecture I	**Course Category:** Major Elective **Course Type**: Studio			

Course Objective(s):

To introduce to computer based tools of productivity, concept of object linking and editing session, with a thrust on 3 Dimensional drafting and rendering as a necessity for architects along with additional presentation technique.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand basic interface and editing necessary for creating 3 dimensional objects using computers.

CO2: Comprehend computer based tools for creating, modifying, and finishing of 3 dimensional objects and output of the 3D model construction of a 3D model.

Mapping of Course Outcome(s):

CO/PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L		H								
CO2	L		H	L							

H – High , M – Medium , L – Low

Unit 1 Creating 3 Dimensional Drawings **35 Hours**

Understanding 3D coordinate system - Using View ports – 3 Dimensional drawing and Editing commands – 3D surfaces setting up elevation thickness and use of dynamic projections - Interactive Viewing in 3D - Surfacing in 3D, working with advanced surfacing

commands – Solid modelling – Advanced solid modelling commands – Editing Solids – *Exercises on creating and editing simple 3D objects and buildings.*

Unit 2 Presentation techniques **25 Hours**

Rendering and scene setting to create a photo realistic picture, understanding material mapping, environment setting and image filing - Construction of any object or building using above said utilities – Enhancing digital images from CAD Application using graphic programs – Basics of animation - Use of advanced softwares for modeling of buildings and presentation of design projects as Photo realistic images and virtual architecture – *exercises on creating 3D views (interior and exterior) for architecture complete with rendering and animation.*

Total: 60 Hours

Text Book(s):

1. Robert M Thomas - Advance Technique in AutoCAD – Longman Higher Education – 1989
2. Ellen Finkelstein - AutoCAD 2015 and AutoCAD LT 2015 Bible - John Wiley and Sons – 2014
3. Carol Buehrens - Data Cad for Architects and Designers - McGraw-Hill Publishing Co. - 1995

Reference(s):

1. AUTOCAD (AUTOCAD Reference Manual) - AUTODESK, INC - 1992
2. Tutorial books - AutoCAD 2017 For Architectural Design - Createspace Independent - 2016
3. Sham Tickko - AutoCAD MEP 2018 for Designers - Cadcim Technologies – 2017
4. Andrew Faulkner, Conrad Chavez - Adobe Photoshop CC Classroom in a Book - Adobe Press - 2017
5. http://www.sln.fi.edu/-Computer drafting
6. http://www.ccollege.hccs.cc.tx.us/-Comp.graphic

Building Materials, Construction, Structures, and Services Stream

ARC17R305 Advanced Structures	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R207 Design of Structures II	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To understand the concept of High rise, Long span, shell, flat slabs, tensile and pneumatic structures and the structural and construction issues involved with each type of structure.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the basic principles of prestressing

CO2: Realize the fundamental requirements of long span structures

CO3: Understand the architectural features and necessity of shells and plate structures

CO4: Comprehend the design principles and applications of pneumatic and tensile structures

CO5: Gain knowledge on the design and construction of underwater constructions

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1				M		M					
CO2	H	M		M		H					
CO3				M		H					
CO4	M			M		H					
CO5	H			M		H					

H – High , M – Medium , L – Low

Unit I Principles of Prestressing **6 Hours**

Principles of Prestressing - types and systems of prestressing, need for High Strength materials, Analysis - method losses

Unit 2 Long Span Structures **8 Hours**

Concept, Design and Construction of long span structures - various types of roofing systems – Case studies like Sports Stadiums, Gymnasium, Auditorium etc - Industrial Structures: Classification of Industries and Industrial structures - planning for Layout Requirements - Protection against noise and vibration Fire Safety - Guidelines of Factories Act.

Unit 3 Design Principles of Prefabricated Structures **4 Hours**

Requirements for planning and layout of prefabrication plant. Modular co-ordination, standardization, Disuniting of Prefabricates, production, transportation, erection, stages of loading – Case studies.

Unit 4 Shells and Folded Plates **6 Hours**

Shell structures – various forms and classification of shells – Analysis of shells by theorem – Introduction to folded plates – types of folded plates – Elements of folded plates – structural action on folded plates – Case Studies.

Unit 5 Pneumatic and Tensile Structures **4 Hours**

Cable structures – principles of cable stayed bridges, Design principle of Masts and Trestles, Practical Examples – case studies

Unit 6 Underwater Construction **2 Hours**

Introduction: purpose, concepts, and principles – techniques of underwater construction – wet and dry construction –concrete laying methods – Marine construction – precautions - case studies

Total: 30 Hours

Text Book(s):

1. Sigrid Adriaenssens , Philippe Block, Diederik Veenendaal , Chris Williams - Shell Structures for Architecture: Form Finding and Optimization – Routledge - 2014
2. Krishna Raju - Prestressed Concrete - Tata McGraw Hill Publishing Co - 2000
3. Sinha.N.C.and.Roy.S.K - Fundamentals of Prestressed Concrete - S.Chand and Co., 1998
4. Laszlo Mokk - Prefabricated Concrete for Industrial and Public Structures – AkademiaiKiado - 2007.

Reference(s):

1. Jurgen Axel Adam, Katharria Hausmann, Frank Juttner, Klauss Daniel - Industrial Buildings: A Design Manual, Birkhauser Publishers, 2004.
2. IS 1343:1980 Code of Practice for Prestressed Concrete
3. IS 3483:1965 Code of Practice for Noise Reduction in Industrial Buildings
4. IS 8091:2008 Industrial Plant Layout – Code of Safe Practice

ARC17R306 Alternate Building Materials and Construction	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R252 Materials and Construction III	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To understand the various alternate building materials used and their applications in the construction industry.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognise mud as an alternate material and to understand its properties and construction techniques.

CO2: Comprehend the various types of alternate construction blocks.

CO3: Gain knowledge on the applications of natural materials such as bamboo and straw in building construction.

CO4: Appreciate the applications of alternate cement based building materials.

CO5: Critically analyse the cost effective construction techniques through case studies.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M	L	M				L		M	
CO2	L			H		L		H		H	
CO3	L			H				M		H	
CO4		M		M		L		-		L	
CO5				M				-		M	

Mapping Legend H – High , M – Medium , L – Low

Unit 1 Mud **6 Hours**

Necessity of the Alternative techniques - Mud: types, usability and tests- Soil stabilization: Need – Stabilized soil blocks, Compressed Stabilised Earth Blocks, Laterite Blocks, Mud wall, Rammed Earth Wall, Porotherm etc. – Mud flooring – plastering, fiber reinforcement

clay plaster – precautions - Various Techniques Adopted in mud constructed buildings by Laurie baker, Hassan Fathy, Auroville etc.,

Unit 2 Building Blocks **4 Hours**

Flyash, Building blocks from mine and industrial waste, Aerocon panel, cement concrete hollow blocks, light weight blocks, rice husk in blocks and concrete, Pre fabricated brick panels – Aerated Concrete Blocks

Unit 3 Bamboo and straw in Construction **4 Hours**

Bamboo: Properties, processing and preservation of Bamboo – advantages - techniques and details in wall, roof, floor, and bamboo mat foundations - details of joints – case studies. Strawbale: properties – construction methods - structural and insulation - advantages and disadvantages – thatch as a building materials, precautions and treatments

Unit 4 Cement based Alternate materials **8 Hours**

Alternative binders and aggregates for concrete such as flyash, manufactured sand, special cement, dicalcium silicate (Belite) cement, Fibre cement composite: Bagasse, Jute and coir - geopolymer concrete, Polymer-bamboo Reinforced Concrete and their advantages - Cemented fibreboards, - precast concrete elements - Ferro cement Properties and technology, applications in water tanks, roofs, doors and windows – shell structures –micro concrete roofing tiles – Plaster: Calcium silicate plaster.

Unit 5 Cost effective construction **8 Hours**

Cost-Effective Foundations - Inverted arch foundations - flooring – mud, moorum, brick flooring stone flooring, Walls: Rat-Trap Bond – Roofs : filler slab, brick vaults, domes etc - Reuse materials like Containers, recycled steel reinforcement- construction details – Various Techniques Adopted in cost effective architecture by Laurie baker, Nari Gandhi , building technology centres like CBRI, SERC, Auroville etc.,

Total: 30 Hours

Text Book(s):

1. BMTPC - Standards and Specifications for Cost Effective Innovative Building Materials and Technology including Rate Analysis - 2nd Edition, BMTPC
2. SHEE - Environmental Friendly Indian Building Materials and Technology for Cost Effective Housing - Society for excellence in Habitat development, Environmental protection and Employment generation
3. Matthew R Hall - Modern earth Buildings - Cambridge [UK] : Woodhead Publishing - 2012
4. H.Y. Ghorab, A. Anter, H. El Miniawy - Building with local materials : stabilized soil and industrial wastes – 2007
5. Bishwendu K. Paul ; Ricardo P. Pama – Ferrocement - International Ferrocement Information Center, Bangkok – 1978
6. Laurie Baker – Brickwork - Centre of Science and Technology for Rural Development
7. Laurie Baker – Mud - Centre of Science and Technology for Rural Development
8. Laurie Baker – Laurie Bakers Cost Reduction Manual - Centre of Science and Technology for Rural Development
9. Karl Kramer Verlag Stuttgart - Bambus – Bamboo – Uneranderte Auflage - 2005

Reference(s):

1. Satprem Maïni - Earth architecture for sustainable habitat and compressed stabilised earth block technology - Auroville Building Centre, Auroville Earth Institute.
2. Website of Auroville Bamboo Center
3. Jules J.A. Janssen - Building with bamboo : a handbook - Intermediate Technology Publications Ltd., London – 1988

ARC17R312 High Rise Buildings	L	P	C	Credit
	2	0	0	2
Pre-requisite: ARC17R302 Building Services III	**Course Category:** Major Elective **Course Type:** Theory			

Course Objective(s):

To understand the behaviour of tall structures and confront suitable design criteria challenging the current scenario. To develop proficiency in the design of services for high rise buildings.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Relate the performance of buildings subjected to various loadings and examine the significance of diverse structural components in a high-rise structure

CO2: Perceive the resisting capacity of elements exposed to different effects

CO3: Safeguard the stability of a structure through approximate methods

CO4: Understand the importance of service core design and analyse the relation of service planning.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M			M		H					
CO2				M		H					
CO3		H									
CO4	M										

H – High , M – Medium , L – Low

Unit 1 Design Principles and Behaviour of Various Structural Systems 8 Hours

Loading: Sequential, Gravity, wind, Earthquake Loadings –Equivalent Lateral Force, Modal Analysis – Combination of Loading – Static and Dynamic Approach - Factors affecting Growth, Height and Structural Form, High Rise Behaviour, Rigid Frames, Braced Frames, In-filled Frames, Shear Walls

Unit 2 Structural Elements for tall buildings 4 Hours

Sectional Shapes, Properties and resisting capacity – Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance

Unit 3 Stability of Tall Buildings 4 Hours

Overall Buckling Analysis of Frames, Approximate Methods – Second Order Analysis for gravity of loading, P-Delta Analysis, Translational and Torsional instability

Unit 4 Service Core 4 Hours

Integration of Services – Components of Service Core – Design criteria for Service Core – Various service core configurations – Vertical and Horizontal Ducts for various services

Unit 5 Various Service Installation in High Rise Buildings 10 Hours

Types of Water storage and distribution systems, Sewage Collection systems and Refuse Collection and disposal in High rise buildings - Standards of sanitary services in High Rise Buildings - Selection of pumps , Auto Hydro-pneumatic and Pressure Boosting/Control Pumps – Natural and Mechanically assisted Ventilation Systems for high rise buildings – Air-conditioning systems for Multi-zone, Multi-storey buildings – Planning and Design of elevator systems and services – Planning of Electrical rooms and Distribution Boxes – Security systems and Passive Fire Safety Standards for High Rise Buildings as per National Building Code of India.

Total: 30 Hours

Text Book(s):

1. Lynn S, Beedle - Advances in Tall Buildings - CBS Publishers and Distributors, New Delhi - 1996
2. Gupta Y P - Proceedings of National Seminar on High Rise Structures - Design and Construction Practices for Middle Level Cities - New Age International Limited, New Delhi -1995

Reference(s):

4. Taranath B S - Structural Analysis and Design of Tall Buildings - McGraw Hill Co. - 1988
5. Lin T Y, Burry D, Stotes - Structural Concepts and Systems for Architects and Engineers - John Wiley -1994
6. Fred Hall and Roger Greeno - Building Services Handbook – Elsevier - 2005.
7. Ken Yeang, Ivor Richards - Bioclimatic skyscrapers – Ellipsis – 1994

ARC17R371 Architectural Acoustics	**L**	**P**	**S**	**Credit**
	2	**1**	**0**	**3**
Pre-requisite: ARC17R302 Building Services III	**Course Category:** Major Elective **Course Type**: Theory cum Laboratory			

Course Objective(s):

Study of this subject will make students realize the importance of acoustics spaces and necessity of designing acoustical appropriate environments in buildings.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: To study about the basic fundamental principles in acoustics

CO2: To analyze the various behaviour of sound in indoor and outdoor space

CO3: Ability to apply the various acoustical materials and treatments in buildings.

CO4: Ability to solve the acoustical design problems in buildings

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M		M							
CO2	L	M		M							
CO3	L	M		H							
CO4	M	M	L								

Unit 1 Fundamentals **3 Hours**

Properties of Sound - Human ear and hearing - Basic terminology: frequency, pitch, tone, timbre, sound pressure, sound intensity, decibel scale, loudness, threshold of audibility and pain, sound masking, inverse square law – Frequency range of audible sounds – *Simple experiments using models*

Unit 2 Sound transmission and absorption **6 Hours**

Propagation of sound, sound reflection, diffusion, diffraction - Types of noises, transmission of noise - Outdoor noise levels, acceptable indoor noise levels, Acoustical defects, absorption co-efficient choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient - noise control and sound insulation, remedial measures and legislation – *Simple exercises on the above*

Unit 3 Acoustical Material **8 Hours**

Acoustical Material and interior finishes, Sound absorbing materials and their properties - Constructional and planning measures for good acoustical design of building in general, Walls/partitions, floors/ceilings, widow/doors, insulating fittings and gadgets, machine mounting and insulation of machinery - Acoustical treatment of Auditorium / Lecture Halls / Conference hall – *Experiments for the above using different materials*

Unit 4 Sound Systems **2 Hours**

Sound systems – introduction – types – equipments such as mics, speakers etc –standards - basic principles of sound system design for different types of spaces and purpose – examples.

Unit 5 Acoustical Design **12 Hours**

Site selection, noise survey, room zoning, shape, volume, treatment for interior surfaces, basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls and auditoriums - Acoustical privacy in open plan offices, halls for speech and music – *Exercises involving acoustical design and treatment for the above mentioned spaces*

Total: 45 Hours

Text Book(s):

1. David Egan - Architectural Acoustics - J Ross Publishing – 2007
2. M. A. Siraskar - Acoustics in Building Design – Sangam Books Ltd - 1979
3. Michael Barron - Auditorium Acoustics and Architectural Design - Taylor and Francis - 2009
4. Leslie L Doelle - Environmental Acoustics - McGraw Hill Higher Education - 1972

Reference(s):

1. Knudsen and Harris - Acoustical Designing in Architecture - American Institute of Physics - 1980
2. Dr.V.Narasimhan - An Introduction to Building Physics - Kabeer Printing Works, Chennai - 1974.
3. D.J.Groomet - Noise, Building and People - Pergumon Press - 1977.
4. Thomas D.Northwood - Architectural Acoustics - Dowden, Hutchinson and Ross Inc. - 1977.
5. B.J.Smith, R.J.Peters, Stephanie Owen - Acoustics and Noise Control - Longman Group Ltd., New York, USA - 1982.

ARC17R402 Design of Built Environment for Disaster Mitigation	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To study the characteristics of various natural disasters which damage the built environment. To equip with the skill of architectural designing for natural disasters and disaster preparedness

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the characteristics and impact of natural disaster in built environment
CO2: Apply architectural design concepts for earth quake resistance structures
CO3: Apply architectural design and detailing of structure for Landslides
CO4: Apply architectural design and detailing of structure for Hydrological disaster
CO5: Appreciate and recognise the Disaster mitigation and Management measures

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M			M	L					
CO2	L	M				L					
CO3	L	M				L					
CO4	L	M		L		L					
CO5		M			M						

H – High , M – Medium , L – Low

Unit 1 Building Safety from Natural Hazards: an Introduction 9 Hours

Disaster- definition , types – Geological, Mass Movement and Land Disasters - Earthquake, Landslides, Volcano, Fire safety in buildings - Hydrological, Coastal and Marine Disasters - Floods , Cyclone effects, Tsunami and EI Nino: High winds and storm surge - Overview of Disaster in Indian Perspective

Unit 2 Architectural Design Concepts for Earth Quake Resistance and Detailing 9 Hours

Elementary Seismology , Site selection, Building Forms, Seismic effects related to building configuration, Plan and vertical irregularities, Earthquake codes, Choice of materials and structural systems, Earthquake resistance measures in RC Structure , Masonry structure and Adobe structure.

Unit 3 Architectural Design and detailing for Landslides 9 Hours

Preparation of landslide – Hazard zonation maps - Landslide Analysis, Site Evaluation for Human Settlement and Safe Design, Selection of Building Materials and Mode of Construction Suitable for Hilly Area. , Guidelines for Landslide Control - Guidelines for siting, design and selection of building materials for residential structures - Selection of Type of Walls - Guidelines for Retaining Wall for Hill Areas, Construction of Dry stone walls

Unit 4 Architectural Design and detailing for Hydrological, Coastal and Marine Disasters 9 Hours

Types of floods – Indian sub continent scenario– Integrated Flood Management Information System (IPMIS), Impacts of Cyclonic Storms along East Coat of India, Coastal Floods, Physiological Hazards - Cyclone Resistant Structures - planning, design and construction of Cyclone Resistant Structures and Buildings

Unit 5 Disaster Mitigation and Management 9 Hours

Role of Various Agencies in Disaster management, Relief measures, Post disaster recovery measures,Reconstruction and rehabilitation, GIS and Remote sensing in real time disaster monitoring, Disaster preparedness - Vulnerability assessment and Hazard mapping, Awareness, Capacity building of professionals, Awareness and community preparedness.

Total: 30 Hours

Text Book(s):

1. Ministry of Home affairs, New Delhi - Manual of NPCBAERM -2008
2. Govt. Of India - Disaster Management in India, A status report - Ministry of Home affairs, New Delhi - 2004
3. National Disaster Management Plan (NDMP) - National Disaster Management Authority Government of India - 2016

Reference(s):

1. Planning Commission - Tenth Five Year Plan (2002-2007) - Vol.1 - Planning Commission, Government of India; New Delhi - 2002
2. Harsh K. Gupta - Information Technology and Natural Disaster Management in India - Indian National Science Academy - 2003
3. www.gisdevelopment.net
4. International Federation of Red Cross and Red Crescent Societies - World Disaster Report: Focus on reducing risk - IFRCRCS; Geneva - 2001
5. www.ndmindia.nic.in

ARC17R404 Retrofitting for Buildings	L	P	S	Credit
	2	0	0	2
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To create exposure to the concept of retrofitting for buildings and different techniques of retrofitting.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the concept of retrofitting in buildings, its needs and methods

CO2: Acquire knowledge on the various techniques of retrofitting for various building components like beams, slabs, column etc

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1		H				H					
CO2		M				M					
CO3		M				M					
CO4		M				M					

H – High , M – Medium , L – Low

Unit 1 Concept of Retrofitting **6 Hours**

Definition, Significance, Benefits and Principles of design for retrofitting - Step by step method of retrofitting, changes over time in performance of retrofitted buildings - Inspection and Evaluation of Buildings: Methods of Evaluation of buildings, Concepts for reliability assessment of buildings, inspection for mechanical performance of material in the building, Deformation and crack inspection, Reliability assessment methods. Damage degree assessment method

Unit 2 Retrofit Solutions for Beams, slabs, columns and roof trusses **10 Hours**

Retrofitting design of Beams and Slabs: Causes of capacity insufficiency section enlarging, addition of Tensile reinforcement, prestress retrofitting, Sticking steel reinforcement method – Retrofitting of columns and roof trusses: Problems in reinforced concrete columns and analysis, encased steel technique, section – enlargement, replacement method, Analysis of concrete roof trusses, retrofitting of roof trusses - Examples

Unit 3 Retrofitting of Masonry Components **8 Hours**

Repairing and strengthening of wall cracks, Retrofitting of the wall, retrofitting of brick columns for bearing capacity deficiency. Retrofitting of wall between windows, strengthening the integrity of masonry structures, connections retrofitting, and Practical examples. 7 Hrs

Unit 4 Retrofitting design of wooden members **6 Hours**

Reasons for retrofitting, Principles of retrofitting in wooden member, Retrofitting of beams, Columns, roof trusses, frames, purlins, Ceilings, Stair cases.

Total: 30 Hours

Reference(s):

1. Xilin Lu - Retrofitting Design of Building Structures - CRC Press – 2010

2. Amarnath Chakrabarti , Devdus Menon , Amlan K. Sengupta - Handbook on Seismic Retrofit of Buildings - Narosa Publishing House - 2008

ARC17R405 Advanced Building Services	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R481 Practical Training	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To explore advanced technologies such as intelligent buildings and BIM which include integration, automation, and optimization of all the services and equipment that provide services and manages the environment of the building concerned.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the concept and need of intelligent buildings.

CO2: Understand the building management systems and technologies.

CO3: Apply these technologies in current building practices

CO4: To understand strategies involved in integration of building services system to deliver optimum performance mandates.

CO5: To impart knowledge on various digital tools available for building information modelling.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1		M								M	
CO2	L			L						M	
CO3	L			L						M	
CO4	L	M		L						M	
CO5			M						M	M	

H – High , M – Medium , L – Low

Unit 1 Introduction to intelligent buildings **6 Hours**

Concept of intelligent buildings - Need, purpose and benefit of intelligent buildings - Control technologies: Time based and optimizer parameter based. Choosing and installing a building management system. Components of building automation system - Integration of Components of building automation system; HVAC, electrical, lighting, security, fire-fighting, communication, CCTV interface, Energy management system etc.;

Unit 2 Management of Intelligent Buildings **8 Hours**

Building energy management – trends and advances in energy management systems, Building management systems for retrofit , Shared tenant services – Performance Evaluation, Software - Networking: Cable management: Fibre optic network design for intelligent buildings, Beyond the intelligent building, EDI (electronic data interchange) and telecommuting - The future of communities, buildings and building systems. – A case example for an intelligent home and for an intelligent office building.

Unit 3 Total Building Performance **5 Hours**

Integration of building services with the Physical structure and its performance evaluation - Conceptual frame work of Total: building Performance - Performance mandates, Terms of evaluation, Limit of acceptability -

Unit 4 Simulation and Analysis of Building Performance Using Digital Tools 9 Hours

Introduction to various tools available for Building information modeling (BIM) - (REVIT, Ecotect, Radiance, daysim) - Modeling and simulation of a Case study using digital tools - Interpretation and analysis of data generated from Simulation.

Total: 30 Hours

Text Book(s):

1. Burroughs Hansen - Managing Indoor Air Quality - Fairmont Press - 2011

2. Ernest Tricomi - ABC's of air conditioning - Pennsylvania State University - 2009
3. Marshall Long - Architectural Acoustics - Elsevier Academic Press - 2006
4. Jason Livingston - Designing With Light: The Art, Science, and Practice of Architectural Lighting Design – Wiley - 2014.

Reference(s):

1. ASHRAE and ISHRAE journals.
2. Tutorials from www.Youtube.com for building information modeling tools.

Environment and Energy Studies Stream

ARC17R372 Energy Efficient Architecture	L	P	S	Credit
	2	1	0	3
Pre-requisite: ARC17R271, Climate and Built Environment **Co-requisite: ARC17R382**, Architectural Design V	**Course Type**: Major Elective **Course Category:** Theory Cum Lab			

Course Objective(s):

To understand Energy efficient Architecture to create sustainable built environment. To gain knowledge on the need to use alternative sources of energy in view of the depleting resources and climate change.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognise the importance of Energy efficient architecture and to understand simple site planning techniques.

CO2: Understand the concept and principles of passive energy techniques

CO3: Understand the importance of day lighting and natural ventilation through case examples and laboratory study.

CO4: Recognise contemporary and future trends in Energy efficient architecture.

CO5: Understand energy efficient architecture through case examples of different climatic zones in India.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	L	H			L					H	M
CO2		M		H						H	
CO3		M		H						H	
CO4				H						H	
CO5		H			M				M	H	M

H – High , M – Medium , L – Low

Unit 1 Introduction **2 Hours**

Need for energy efficiency in buildings - Sources of energy-renewable and non renewable. Definitions-embodied energy, energy conservation, energy efficiency, zero energy buildings, net zero buildings, green buildings, sustainable buildings

Unit 2 Site planning and development **9 Hours**

Land form, vegetation type and pattern, water bodies, open and built spaces. Modification of factors affecting thermal comfort. Integration of building with site. Examples-orientation, landscape, ventilation principles. Design considerations depending on climate zones of India. Simple passive design considerations involving Site Conditions, Building Orientation, Plan form and Building Envelope – *Design Exercises on energy efficient site planning*

Unit 3 Passive Techniques **15 Hours**

Techniques of heating and cooling-direct, indirect and isolated gain, Principles of heat transfer of walls and roofs -conduction, convection, radiation, infiltration - Building envelope-Choice of materials, k-value, heat balance equations, fenestrations. Examples from traditional buildings - Direct Gain Thermal Storage of Wall and Roof-Roof Radiation Trap: Solarium-Isolated Gain Evaporative Cooling, Nocturnal Radiation cooling ,Passive Desiccant Cooling, Induced Ventilation, Earth Sheltering, Wind Tower, Earth Air Tunnels - Energy efficient lighting –day lighting and artificial lighting - HVAC-geothermal heat pumps, district air cooling, indoor air quality - Case studies - *Exercises on calculation and design of passive energy techniques*

Unit 4 Introduction to tools for evaluation of building performance 10 Hours

Introduction to energy management systems - Types of energy auditing and their significance - Role of thermal imaging systems. Introduction to energy simulation programs- Introduction to Energy star labels – *Exercises on evaluation of building performance using softwares*

Unit 5 Energy Efficient design for Climatic Zones in India 9 Hours

Active and passive design strategies for the various climate zones of India: Design principles and techniques - Photo Voltaic Cells, Thermal Energy Storage, Recycled and Reusable Building materials, Nanotechnology, smart materials and the future of built environment, Energy Conservation Building code - Case studies such as TERI Office,Bangalore (Moderate Climate), Vikas Apartments, Auroville (Warm and Humid), Torrent Research Center, Ahmedabad (Hot and Dry), RETREAT, Gugaon (Composite), MLA Hostel, Shimla (Cold and Cloudy), LEDeG Trainees Hostel, Leh (Cold and sunny)

Total: 45 Hours

Text Book(s):

1. Manual on Solar Passive Architecture - IIT Mumbai and Mines New Delhi -1999
2. Arvind Krishnan and Others - Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings- TATA McGraw Hill Publishing Company Limited, New Delhi - 2001
3. Majumdar M - Energy-efficient Building in India - TERI Press - 2000
4. Givoni .B - Passive and Low Energy Cooling of Buildings - Van Nostrand Reinhold, New York -1994
5. Mili Majumdar - Energy Efficient Buildings in India - TERI and Ministry of non-conventional energy sources.

Reference(s):

1. Fuller Moore - Environmental Control Systems - McGraw Hill INC, New Delhi - 1993
2. Sophia and Stefan Behling, Solpower - The Evolution of Solar Architecture - Prestel, New York -1996
3. PatrickWaterfield, - The Energy Efficient Home: A Complete Guide – Crowood press ltd - 2011.
4. Dean Hawkes - Energy Efficient Buildings: Architecture, Engineering and Environment - W.W. Norton and Company - 2002
5. David Johnson, Scott Gibson - Green from the Ground Up: Sustainable, Healthy and Energy efficient home construction - Taunton Press - 2008

ARC17R406 Energy Audits	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: ARC17R372, Energy Efficiency **Co - requisite:** ARC17R483, Architectural Design VI	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To understand the need for energy audits in buildings, in the present scenario. To gain knowledge about energy analysis and evaluation techniques.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Recognise the basic terminologies and need for energy audit.
CO2: Understand the energy audit procedures and techniques.
CO3: Understand the energy audit policy planning and implementation methods.
CO4: Recognise Energy audit instruments and its simulation techniques.
CO5: Understand Energy Audit through case examples and to manage Indoor air quality.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M								M	
CO2				H						M	
CO3		M		H						H	
CO4			H	H						M	
CO5										M	L

H – High , M – Medium , L – Low

Unit 1 Introduction **4 Hours**

General philosophy and need of energy audit and management. Energy Audit types, Methodology and Approach. Understanding Energy performance, optimising input energy requirements, fuel and Energy substitution - Introduction to ECBC rules, Energy audit and Green buildings rating eg. TERI, Griha, LEED etc.

Unit 2 Energy Audit Procedures and Techniques **12 Hours**

Energy Audit: Types and Methodology - Energy Audit Reporting Format - Understanding Energy Costs - Benchmarking and Energy Performance - Matching Energy Usage to Requirement - Maximising System Efficiency - Fuel and Energy Substitution - Basic Principles of Material and Energy Balance - Sankey Diagram and its Use - Material Balances - Energy Balances - Method for Preparing Process Flow Chart - Facility as an Energy System - How to Carryout Material and Energy (M and E) Balance -Data Gathering, Analytic Techniques, Evaluation of saving opportunities, Energy audit reporting.

Unit 3 **Energy Policy Planning and Implementation** **4 Hours**

Field analysis, Policy purpose perspective, content and formulation of energy balance sheet, energy modelling and Optimisation (Heating and Cooling, Electrical equipment etc)

Unit 4 Energy Audit Instruments **6 Hours**

Lightmeter, Thermometer, Tape measures, Power factor meter, Combustion Analyser, Voltmeter, Airflow measure device, smoke generator - Energy monitoring, Energy Saving. Its Types and Accuracy.

Unit 5 Case study **4 Hours**

Energy Conservation options and recommendations – case studies of Industrial, Commercial, Residential Audits - Indoor Air Quality and Its management.

Total: 30 Hours

Text Book(s):

1. Energy Management Handbook, Wayne C.Turner. The Fairmont Press inc, Georgia, Marcel Dekker inc, Newyork and Basel.
2. General Aspects of Energy Management and Energy Audit - Bureau of Energy Efficiency, New Delhi, India, 2nd edition - 2005.
3. K. V. Sharma , P. Venkataseshaiah - Energy Management and Conservation - I K International Publishing House Pvt. Ltd – 2011
4. Energy conservation Building codes: User guide – Bureau of Energy efficiency, New Delhi – 2009
5. IGBC Green Building rating system – Indian Green Building council – 2014
6. TERI website - http://www.teriin.org
7. Green Rating for Integrated Habitat Assessment – Manuals and Guidelines – TERI - 2015
8. Green Building Rating System For New Construction and Major Renovations – LEED - 2002

Reference(s):
1. Energy Audit Manual – Kerala Energy management Center
2. Dennis Landsberg and Ronald Stewart - Improving Energy Efficiency in Buildings: A management guide - State University of New York Press, Albany - 1980.
3. Santamouris - Energy Performance of Residential Buildings - James and James, London - 2005.
4. Moncef Krarti - Energy Audit of Building Systems: an Engineering approach - CRC Press, LLC, Florida – 2000
5. Chris P Underwood and Francis W H Yik - Modelling methods for Energy in Buildings - Blackwell publishing co., Oxford - 2004.

ARC17R505 Sustainable Architecture and Planning	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite:ARC17R372, Energy Efficiency	**Course Category:** Major Elective			
Pre-requisite:ARC17R581, Architectural Design VII	**Course Type**: Theory			

Course Objective(s):

This course will provide awareness on the emerging vulnerabilities of global warming and climate change and understand the contribution of building industry to the same. The students will be familiar with the various approaches to achieving sustainable buildings and communities.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the concept of sustainability and sustainable development.

CO2: Identify various issues like climate change, ecological footprint, etc.

CO3: Analyse low impact construction practices, life cycle costs, and alternative energy resources.

CO4: Familiarize with the various rating systems for building practices with case studies

CO5: Develop knowledge on sustainability through case studies to understand the concept of sustainable communities and the economic and social dimensions.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M								M	
CO2				H						M	
CO3		M		H						H	
CO4			H	H						M	
CO5										M	L

H – High , M – Medium , L – Low

Unit 1 Introduction to Sustainability **4 Hours**

Concept of Sustainability – Carrying capacity, sustainable development – Bruntland report – Ethics and Visions of sustainability. Circles of Sustainability - Sustainable economy and Use. Eco systems, food chain and natural cycles or cradle to cradle concept.

Unit 2 Climate Change and Sustainability **6 Hours**

Overview of climate change and its impact on a global and regional scale. Principles of energy systems. Energy crisis and global environment. Study on Vernacular techniques and technological advancements in climate control in various climatic zones.

Unit 3 Site and Sustainability **8 Hours**

Sustainable site selection and development. Introduction to Green building concepts. Teri,

LEED, GIRHA and BREEAM. Ecology and sustainability. Various sources of energy, recyclable products and embodied energy.

Unit 4 Sustainable Materials **6 Hours**

Selection of materials Eco building materials and construction. Low impact construction – Bio mimicry, Zero energy buildings, Nano technology and smart materials.

Unit 5 Sustainable Cities **6 Hours**

Dimensions of sustainable, sustainable community, Social, cultural and economic factors, urban ecology, urban heat island effects, smog etc. Various case studies of eco city or communities.

Total: 30 Hours

Textbooks:

1. Dominique Gauzin – Muller - Sustainable Architecture and Urbanism: Concepts, Technologies and examples - Birkhauser - 2002.
2. Slessor, Eco-Tech - Sustainable Architecture and High Technology - Thames and Hudson - 1997.
3. Ken Yeang - Ecodesign : A manual for Ecological Design", Wiley Academy, 2006.

References:

1. Arian Mostaedi - Sustainable Architecture : Low tech houses - Carles Broto - 2002.
2. Sandra F.Mendler and William Odell - HOK Guidebook to Sustainable Design - John
3. Wiley and sons - 2000.
4. Richard Hyder - Environmental brief: Pathways for green design - Taylor and Francis - 2007.
5. Brenda Vale and Robert Vale - Green Architecture: Design for a sustainable future - Thames and Hudson - 1996.

Urban Studies and Complex Systems Stream

ARC17R502 Smart City Systems	L	P	S	Credit
	2	0	0	2
Pre-requisite:ARC17R308, Human Settlement Planning	**Course Category:** Major Elective			
Co-requisite: ARC17R581, Architectural Design VII	**Course Type**: Theory			

Course Objective(s):

This course shall deliberate on the latest concept of Smart Cities as a means of resolving the current urban issues and providing sustainable living environments for the citizens.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehension of the concept of Smart city and its components.

CO2: Critical appraisal of the issues and challenges that warrant the smart city concept.

CO3: Holistic approach to the theory of Smart City and critical analysis of the current solutions proposed.

CO4: Detailed study of the application of principles through case studies from the world and India.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M				L					H	L
CO2	M							L		H	L
CO3	M	M			M			L		H	L
CO4		M			L			M		H	L

H – High , M – Medium , L – Low

Unit 1 Introduction **3 Periods**

Smart City- the concept- terms and definition, Objectives

Unit 2 Challenges of Contemporary Cities **5 Periods**

Problems and Issues of todays cities that necessitate a paradigm shift in development policies - Urban Sprawl, Urban Incoherence, Urban Congestion, Urban Pollution, Traffic congestion and inefficient Transportation, Zoning, Urban Safety and Surveillance

Unit 3 Components of Smart City Systems **6 Periods**

Key principles of smart city systems: Empower-Access- Facilitate- Promote- Encourage- Include. Delivery systems: Urban Infrastructure, Finance, Operations and Governance.

Unit 4 Case Studies **10 Periods**

Holistic approach for Smart City development. Smart city solutions through case studies from – Korea- Amsterdam- Stockholm- Barcelona- Masdar- California- Seattle

Unit 5 Smart City Mission in India **9 Periods**

The smart city Mission of India –Objectives, Schemes and Strategies, Critical review of Identified Indian Cities – Unique features/ highlights of the proposals.

Text Books:

Textbook(s)

1. Michael Batty - The New Science of Cities - IT Press - 2013
2. Richard T.T. Forman - Urban Ecology: Science of Cities - Cambridge Press - 2014
3. Mohsen Mostafavi, Gareth Doherty - Ecological Urbanism - Harvard - 2011
4. Manuel Castells - The Rise of the Network Society- Wiley-Blackwel - 2010

Reference(s)

1. Mike Hodson**,** Simon Marvin - Low Carbon Nation? – Routledge - 2013
2. Timothy Beatley - Green Urbanism: Learning From European Cities 4th ed. Edition - Island Press - 2000

3. Stephen Glodsmith, Susan Crawford - The Responsive City: Engaging Communities Through Data-Smart Governance - John Wiley and Sons - 2014
4. Smart City Council data base

ARC17R503 Architectural Conservation	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Major Elective			
Co-requisite: ARC17R581, Architectural Design VII	**Course Type**: Theory			

Course Objective(s):

This course shall provide exposure to critically analyse and evaluate heritage built forms and provide architectural solutions for conservation.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Identify the various issues and practices of Conservation.

CO2: Familiarize with the status of conservation in India and the various agencies involved in the field of conservation worldwide and their policies.

CO3: Outline the status of conservation practice in the country and the various guidelines for the preservation, conservation, and restoration of buildings.

CO4: Gain information on the character and issues in our heritage towns through case studies.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M				L					H	L
CO2	M							L		H	L
CO3	M	M			M			L		H	L
CO4		M			L			M		H	L

H – High , M – Medium , L – Low

Unit 1 Introduction to Conservation **5 Hours**

Understanding Heritage. Defining Conservation, Preservation and Adaptive reuse. Heritage conservation- Need, Debate and purpose - History of Conservation movement. International agencies like ICCROM, ICOMOS, UNESCO and their role in Conservation- Charters. Principles and ethics of conservation.

Unit 2 Conservation in India **5 Hours**

Monument conservation and the role of ASI, INTACH – Central and state government policies and legislations – inventories and projects- selected case studies of sites such as Hampi, Golconda, Mahabalipuram.

Unit 3 Conservation Methods and Materials **6 Hours**

Investigation techniques and tools- Behaviour of historic materials and structures- Problems with masonry, foundation- repair methods- traditional and modern methods- seismic retrofit and disabled access/ services additions to historic buildings- moisture and pollution problems - Craft Issues of conservation.

Unit 4 Conservation Practice **7 Hours**

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, Chettinad dwellings, etc, heritage site management.

Unit 5 Urban Conservation and Conservation Planning **7 Hours**

Understanding the character and issues of historic towns, selected case studies, historic districts and heritage precincts, Conservation as a planning tool.- financial incentives and

planning tools such as TDR- urban conservation and heritage tourism- case studies of sites like Cochin, Pondicherry French town- conservation project management.

Total: 30 Hours

Textbooks:

1. Bernard Fielden - Conservation Manual - INTACH Publication.
2. MS Mathews - Conservation Engineering - Universitat Karlsruhe - 1998.
3. J. Kirk Irwin - Historic Preservation Handbook - McGraw Hill - 2003.
4. Donald Appleyard - The Conservation of European Cities - M.I.T.Press, Massachusetts - 1979.

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.
3. B.K. Singh - State and Culture - Oxford, New Delhi.
4. A.G. K. Memon 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, Inc - 2011.

ARC17R552 Urban Housing	**L**	**P**	**S**	**Credit**
	2	**0**	**2**	**3**
Pre-requisite: Nil	**Course Category:** Major Elective			
Co-requisite:ARC17R581, Architectural Design VII	**Course Type**: Theory cum Studio			

Course Objective(s):

To be aware of housing scenario in Indian context. To learn the techniques of Housing project formulation techniques and Housing Design strategies to be competent enough in the growing housing market.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand and Analyse Various Housing typologies and its characteristics

CO2: Appreciate and recognize the issues regarding Housing Development in Indian Context

CO3: Analyse Housing Design concepts in India and abroad through various Housing Projects and Case studies

CO4: Apply the Project Formulation Techniques for Housing development

CO5: Exhibit skill in designing larger Housing complex and Residential townships

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M				M						
CO2	L	H									
CO3		M									
CO4					M		H				
CO5					M		H				

H – High , M – Medium , L – Low

Housing Typologies **8 Period**

Definitions – Dwelling Unit, Household, Housing , Housing Need and Housing Supply- Housing Density, Typologies-Villa, Apartments, Condominium, Core Housing, Cooperative housing, Employee Quarters, Slums and Squatters – Its Characteristics, Tenureship, Problems and Issues .

Housing in Indian Context **8 Period**

Emerging Issues of Housing in the Indian Context – Salient Features of National Urban Housing and Habitat Policy 2007 - Role of Housing Agencies towards the housing development in Post Independence Era, Government Housing Schemes-Site and Services, SUP and RAY , IAY, - Case study of traditional housing in India

Housing Concepts and Case Studies **12 Period**

Planning Ideologies of Various Housing Projects in India- Aranya, Titan Township, Asian Village- Concepts and Strategies - Planning Ideologies of Various Housing Projects Abroad - Park hill estate, Sky Habitat, Vertical Cities, Vertical forest, Beirut Tower, Quinta Monroy Housing, Chile, Tulou affordable housing, Hong kong walled city Resettlement- Concepts and Strategies - Case studies-Traditional Housing, High Rise Housing, Mixed Use Developments and New Townships - *Exercise on analysis of housing case studies*

Housing Standards and Project Formulation **8 Period**

DCR relevant to Housing- Special Building Rules - Performance standards - Various stages and tasks in Project Development – Feasibility study- Contextual analysis - Demand assessment and Requirement Formulation - Report Writing -*Exercise on Feasibility Study Report preparation*

Housing Design Methodology **24 Periods**

Factors affecting Housing Design - Socio – Economical and Cultural – Affordability- Resources - House Types and Cluster Development – Row house, Town House, Flat, Patio House, Maisonette and Terrace House - Circulation - Hierarchy of Roads and its characteristics – Parking – standards - Open Space and its characteristics – Size, Hierarchy , ownership and Maintenance - Utilities and Common Facilities – Services - Housing Management and Community participation - *Exercise on Housing Design*

Text Books

1. Joseph de chiara and Others - Time Saver Standards for Housing and Residential development, McGraw Hill Co., New York - 1995.
2. Ministry of Housing and Urban Affairs, NUHHP - 2007

Reference Books

1. Richard Untermanu and Robert Small - Site Planning for Cluster Housing - Van Nostrand Reinhold Company, London/New York - 1977.
2. Forbes Davidson and Geoff Payne - Urban Projects Manual - Liverpool University Press, Liverpool -1983.
3. HUDCO Publications - Housing for the Low income, Sector Model.

Allied Fields Stream

ARC17R209 Art Appreciation	L	P	S	Credit
	2	0	0	2
Pre-requisite: ARC17R201 History of Architecture and Culture III	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s)

This course shall impart knowledge on vocabulary of art, its principles, and various art forms through the ages within the cultural contexts

Course Outcome(s)

After completing this course, the student will be able to:

CO1: Appreciate the art forms and analyse the same and resizing the concept.

CO2: Gain knowledge on world art and the use of art in architecture and its use in architecture profession.

CO3: Critically analyse art and its directions globally

CO4: Understand the various styles and history of art in India

CO5: Acquire exposure on contemporary trends and philosophies of art.

Mapping of Course Outcome(s):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	L				M						
CO2	L				M						
CO3	L				M			H			
CO4	L				M						
CO5	l				M						

(S – Strong, M – Medium, L – Low)

Unit 1 Introduction to Art **4 Hours**

Definition of art - need for art – role of art – art reality, perception, representation- categories of art in terms of media and technique - appreciating art: form, content and context.

Unit 2 Vocabulary of Art **6 Hours**

Introducing the vocabulary of art constituted by elements (line, shape, form, space, colour, light, value, texture) and principles (unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement).

Unit 3 Appreciating Art – The Western Ideology **10 Hours**

Appreciating art through the study of art production in the West from beginnings to birth of modern art: Prehistoric Art, Egyptian and Mesopotamian art Greek and Roman art,Medieval art - Renaissance and Baroque art, Neoclassicism, Romanticism, Realism - Context for new directions in art in the late 19th and early 20th century: Impressionism, post Impressionism, Fauvism, Expressionism, Cubism, Dadaism, Surrealism, abstract art, Futurism, Constructivism, Suprematism, De Stijl, Abstract Expressionism, Pop art, Op art- new forms and media of art.

Unit 4 Appreciating Art- The Indian Perspective **6 Hours**

Appreciating art through the study of art production in India over history – folk art, tribal art, regional, Islamic and the colonial influence - Important works from the following art traditions will be studied and analysed in terms of their form, content, composition and context – Art orientation in the modern context in India.

Unit 5 Contemporary Art **4 Hours**

Introduction to contemporary art styles – types of contemporary arts and art installations – examples

Total: 30 Hours

Textbook(s)

1. Fred, S. Kleiner, Gardener's - Art through Ages - Harcourt College Publishers - 2001.
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.

Reference(s)

1. Peter and Linda Murray - The Penguin Dictionary of Art and Artists - Penguin books - 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.

ARC17R352 Graphic and Product Design	**L**	**P**	**S**	**Credit**
	2	**0**	**2**	**3**
Pre-requisite: Nil **Co-requisite:** ARC17R381, Architectural Design IV	**Course Category:** Major Elective **Course Type**: Theory cum Studio			

Course Objective(s):

To inculcate design centric approach and appreciation towards objects of small and large scale in the human environment.

Course outcome(s):

After completing this course, the student will be able to:

CO1: Appreciation of human comfort and aesthetics towards objects of everyday use through enhanced design.

CO2: Strategic skill development for visual aesthetics, communication and product presentation.

CO3: Analyse the need for human comfort in through form, function, material and technological attributes.

CO4: Examine the need for user centric and one size fits all concepts in design.

CO5: Application of case studies for personal exploration of the concepts.

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	M	H	H		H						H
CO2	M	H	H		H						H
CO3	M	H	M		H						H
CO4	M	H	M		H						H
CO5	M	H	H		H				M		H

H – High , M – Medium , L – Low

Unit 1 Introduction **4 Hours**

Fundamentals of graphic design – as a discipline-history, career options. Fundamentals of product design – History, purpose, role of product designer.

Unit 2 Graphic Design Process and Semantics **16 Hours**

Overview of design basics – color, harmony, rhythm, balance, proportion, composition. Visual perception and graphical thinking – signs, symbols, visual intent and communication. Tools of graphical expression – lettering, typography, image, trademark, logo, signage – Brand identity and promotion. Digital media and graphic design – *Exercises on the above*

Unit 3 Applied Anthropometry and Ergonomics **16 Hours**

Definition of human factors- application of human data for human comfort, Relationship between form, function and anthropometry. Concepts of user – centric design and universal design - – *Exercises on the above*

Unit 4 Attributes of Product Design **12 Hours**

Changing role of designer, classification of products based on scale, process, and mode of production. User centered approach to design production – Multi-utility oriented approach to product design. Material, technology , cultural and regional influences – *Exercises on the above*

Unit 5 Case Analysis **12 Hours**

Detailed documentation, critical analysis and presentation of successful household device, furniture, design for the physically challenged. Presentations on successful and strategic business models in collaboration with Industry.

Total: 60 Hours

Text book(s):

1. Bryony Gomez- Palacio, Armin Vit - Graphic Design, Referenced: A Visual Guide to the Language, Applications, and History of Graphic Design – Rockport Publishers - 2009
2. Lupton and Phillips - Graphic Design: The New Basics - Princeton Architectural Press - 2015
3. Alex W. White - The Elements of Graphic Design - All Worth Press - 2011
4. Don Norman - The Design of Everyday Things – Basic Books - 2013

Reference(s):

1. Alina Wheeler - Designing Brand Identity: An Essential Guide for the Whole Branding Team - 2012
2. Ed Catmull - Creativity Inc: Overcoming the Unseen Forces That Stand in the Way of True Inspiration – random House – 2014

ARC17R504 Intellectual Property Rights	**L**	**P**	**S**	**Credit**
	2	**0**	**0**	**2**
Pre-requisite: Nil **Co-requisite:** ARC17R581, Architectural Design VII	**Course Category:** Major Elective **Course Type**: Theory			

Course Objective(s):

To understand the significance of Intellectual property rights in the current market and provisions to protect the creativity and inventions.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the importance and role of intellectual property rights in invention and creativity

CO2: Acquire awareness on patents, copy rights etc and its legal aspects

CO3: Familiarise international scenario on intellectual property rights

Mapping of Course Outcome(s):

CO / PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1					L		M				H
CO2					L		M				H
CO3					L		M				H

H – High , M – Medium , L – Low

Unit 1 Introduction to IPR **6 Hours**

Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property (Movable Property, Immovable Property and intellectual Property).

Unit 2 Patents, Copy Rights, Trade Marks and Industrial Designs **6 Hours**

IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures.

Unit 3 GATT and International Scenario on IPR **6 Hours**

International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities - History - General Agreement on Trade and Tariff (GATT).

Unit 4 Government Initiatives **6 Hours**

Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO-Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.

Unit 5 Case Studies **6 Hours**

Case Studies on - Patents (Basumati rice, turmeric, Neem, etc.) - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition.

Total: 30 Hours

Text Book

1. Subbaram N.R - Handbook of Indian Patent Law and Practice - S. Viswanathan (Printers and Publishers) Pvt. Ltd.- 1998.

References

1. Eli Whitney - United States Patent Number : 72X - Cotton Gin - 1794.
2. Intellectual Property Today : Volume 8, No. 5 - May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches - Derwent IP Matters, July 2000.
4. www.ipmatters.net/features/000707_gibbs.html.

V.ELECTIVES

4. Self Study courses

ARC17R405 Advanced Construction Technology	L	P	S	Credit
	0	0	0	2
Pre-requisite:ARC17R252, Materials and Construction III and **ARC17R481,** Practical Training	**Course Category: Self Study** **Course Type**: Theory			

Course Objective(s):

Comprehensive introduction to construction technology pertaining to large span, large scale and high rise structures.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Ability to comprehend the Design criteria's, erection process and application of large span structures

CO2: To understand the need and importance of prefabricated components and structures as an alternative to cast in situ construction process.

CO3: To understand the need and importance of Form works in contemporary construction process

CO4: To comprehend the design criteria's and application of deep foundations in large span and high rise structures.

CO5: To Understand the needs, requirements, and selection of tools and equipments for various types of structures.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	L			M							
CO2	L	L		H							
CO3				M							
CO4				H							
CO5	L										

H – High , M – Medium , L – Low

Unit 1 Large Span Structures

Flat slabs, Post tension RC slabs, Geodesic domes, hyperbolic paraboloids, and its applications in Airports, stadiums, Bus terminus, Rail stations, etc.,. Design considerations and Construction process of large span structures – Identification of tools and Equipments, Sequence of Erection, fabrication and finishing. Case studies of large span structures.

Unit 2 Prefabrication In Building Construction

Introduction to prefabrication in building construction, Origin, History and modern advancements. Modular construction, manufacturing process of prefabrication components, Handling of prefabricated components, Sequence of erection and finishing. Case studies of buildings, structures erected with prefabricated components.

Unit 3 Temporary Structures

Requirements of temporary structures (formwork), elements, joints, shuttering and de-shuttering, formwork failures, mechanized shuttering, Introduction to Mivan technology and Doka formwork.

Unit 4 Deep Foundations

Construction of deep foundation, use of pile, raft foundation, caissons and well foundation; open, box and pneumatic caissons, vibro floatation, timber, steel concrete and bored pile construction, Pile driving equipments, Application, design considerations of deep foundations in buildings.

Unit 5 Tools, Plants and Equipments

Importance of tools, plants and equipments, classifications, selection, Engineering fundamentals, Earth Handling Equipment, Hauling and Hoisting Equipment, Concreting Equipments. Cranes – Types and its application in large span, high rise structures, Factors affecting selection of equipments: efficiency, power consumption, etc. Case studies of any large span / high rise structures involving selection of tools, plants and equipments.

Text Book(s):

1. Chudley, R, greeno, R., Butterworth-Heinemann - Building Construction Handbook (6th ed.) - 2007.
2. M. Hurd, Amer - Form work for concrete 7th Edition - Concrete institute - 2005.
3. Roy chudley, R. Greeno - Advanced Construction Technology - Prentice Hall - 2006

Reference(s):

1. W.B. McKay - Building Construction, Volume 1 – 4, 5th Edition - Pearson Education India - 2013

ARC17R451 Computation and Design	L	P	S	Credit
	0	0	0	2
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Self Study **Course Type**: Theory cum Laboratory			

Course Objective(s):

This course shall introduce contemporary theories of media and their influence on the perception of space and architecture and provide an overview of various contemporary design processes and its relation to computation

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Understand the contemporary design processes using computation.

CO2: Use algorithms as part of a design process to solve architectural modelling problems.

CO3: Critically analyse the architectural applications of computational design through case studies

Mapping of Course Outcome(s):

CO/PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	L		H								
CO2	L		H								
CO3			H								

H – High , M – Medium , L – Low

Unit 1 Computation and Design

Introduction to Computation and Design – Difference between Digital Process and Non Digital Process – Architecture and Cyber Space – Qualities of the new space – Increased Automatism and its influence on Architectural Form and Space.

Unit 2 Contemporary Process

Overview of various Contemporary design processes and its relation to Computation: Diagrams – Diagrammatic Reasoning – Diagrams and Design Process – Animation and Design – Digital Hybrid Design Protocols – Concept of Emergence – Introduction to Cellular Automata and Architectural applications – Genetic algorithms and Design Computation – *Simple exercises on contemporary application of design methods*

Unit 3 Geometries and Surfaces - Fractal Geometry and their properties – Architectural applications - Works of Zvi Hecker, – Shape Grammar - Shapes, rules and Label -Shape Grammar as analytical and synthetic tools- Works of Stiny, Jose Durate, Gulen Cagdas - Combining Shape grammar and Genetic algorithm to optimize architectural solutions -

Works of Gero.J - Hyper Surface– Introduction to Hyper surface and concepts of Liquid architecture – *Exercises on geometries and surfaces*

Unit 4 Case Studies

Case studies- Study, understanding and analysis of known examples at the national and international levels which demonstrates the contemporary theories of media and their influence on the perception of space and architecture, contemporary design processes and its relation to computation.

Text Book(s):

1. Peter Szalapaj – Contemporary Architecture and the digital design process – Elsevier - 2004
2. Peter Eisenmann - Diagram: An Original Scene of Writing - Diagram Diaries MOVE, UN Studio
3. Grey Lynn - The Folded, The Pliant and The Supple, Animate form Contemporary Techniques in Architecture - Halsted Press - 2002
4. Ali Rahim - Contemporary Process in Architecture - John Wiley and Sons – 2000

Reference(s):

1. Walter Benjamin - Practices of Art in the Age of Mechanical Reproduction – Colinpress - 1977
2. Work of Architecture in the Age of Mechanical Reproduction - Differences MIT press - 1997.
3. William J Mitchell - The Logic of Architecture: Design, Computation and Cognition - MIT Press, Cambridge – 1995

ARC17R452 Architectural Appraisal	**L**	**P**	**S**	**Credit**
	0	**0**	**0**	**2**
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Self Study **Course Type**: Theory cum Studio			

Course Objective(s):

This course shall introduce students to critical study and analysis of buildings and identify the parameters influencing design and design process through case studies.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Critically analyse Modern buildings applying study methods and techniques.

CO2: Examine and identify the design process and factors shaping buildings

Mapping of Course Outcome(s):

CO/PO	**PO**										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
CO1	L	M	H		H				M		
CO2	L	M	H		H				M		

H – High , M – Medium , L – Low

This course introduces students to the methods and techniques of "how to see" as an architect. This course concentrates on issues that influence the way modern buildings and their architects are perceived by critics, scholars and the public. The various factors/ parameters that influence the design of a building from project conception to completion, shall be thoroughly and scientifically documented through primary sources, secondary sources, literature reviews, surveys and interviews. The student shall clearly and

progressively analyse the shaping of Design – the factors that contributed to the success, failure and criticisms levied on the building - The student can only choose one prominent building preferably in his hometown and with whose clients and architect he can interact with - The study must culminate in a report submission and will also be presented as a seminar to the review committee.

Reference(s)

1. Alan Colquhoun, Kenneth Frampton - Essays in Architectural Criticism: Modern Architecture and Historical Change - The MIT Press - 1985
2. Fuller, David, Waugh, Patricia eds - The Arts and Sciences of Criticism - Oxford University Press – 1999
3. Architectural Criticism and Journalism: Global Perspectives - Proceedings of an International Seminar - Aga Khan Award for Architecture in Association and Kuwait Society of Engineers - December 2005
4. Joan Ockman - Architecture, criticism, ideology - Princeton Architectural Press – 1985

ARC17R453Architectural Entrepreneurship	L	P	S	Credit
	0	0	0	2
Pre-requisite:ARC17R481 Practical Training	**Course Category:** Self Study **Course Type**: Theory cum Studio			

Course Objective(s):

To inculcate leadership and management skills, enabling the student to establish as an entrepreneur.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Confidence building towards establishing, operating and managing an enterprise.

CO2: Strategic skill development for architectural business operations.

CO3: Critical awareness towards factors of human resource, office accounting, and business management.

CO4: Develop managerial skills for collaborating with colleagues, employees, clients, and vendors.

Mapping of Course Outcome(s):

CO / PO	PO										
	1	2	3	4	5	6	7	8	9	10	11
CO1	M		M				M		H		H
CO2	M		H				M		M		H
CO3	M	M	M				M		H		H
CO4	M		H				L		M		H

H – High , M – Medium , L – Low

Unit 1 Introduction

Skill of an entrepreneur – Leadership, Initiative, Motivation- Management of Time, People and Resources. Interpersonal relationship skills required in an organization.

Unit 2 Introduction to Accountancy for Business

Introduction to financial,cost and management accountancy – Basic records: balance sheet, proft and loss account. Measurement of income – valuation of assets – Preparation of income sheet and balance sheet.

Unit 3 Business Law

Meaning of Company – Companies Act, types of companies, articles, and memorandum of association, prospects, powers, duties and liabilities of directors.

Definition of Contract, types and elements of a contract, breach of contract and its remedies – Quasi contract – Contract of Agency.

Unit 4 Business Communication

Work place communication – strategies for writing: e-mails, report, minutes, annual report, status report, survey report, proposal, memorandum, profile of organization, responding to enquiries, complaints, applications. Oral presentation aspects.

Unit 5 Case Analysis

Report and presentation of any one successful architect's office - Presentations on successful and strategic business models in collaboration with Industry.

Text books:

1. Narayanaswamy .R - Financial Accounting: A Managerial Perspective, 2nd edition - Prentice Hall India Pvt., Ltd., New Delhi - 2005.
2. Don R Hansen - Management Accounting, 7th Edition - Cengage Learning, Delhi - 2007.
3. Kapoor N.D - Elements of Mercantile Law,28th edition - Sultan chand and company, New Delhi - 2007.

4. Akhileshwa Pathak - Legal aspects of Business, 1stedition - Tata McGraw Hill, New Delhi - 1996.
5. John M Penrose - Business Communication for Managers: An Advanced Approach, 5th Ed - Cengage Learning, Delhi - 2007

References:

1. Klein, IIA - The Architect's Guide to Small Firm Management: Making Chaos Work for Your Small Firm, 1st Edition - John Wiley and Sons - 2010
2. Architect's Handbook of Practice Management, 9th Edition - R.I.B.A Enterprises - 2013.

Open Electives offered to Other Departments

ARC17R221 Creativity and Design	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Open Elective **Course Type**: Theory			

Course Objective(s):

To learn techniques for improving the flexibility and originality of thinking and hence enhance the students capacity through a multi dimensional approach to problem solving.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehend the different types of thinking and understand the process of creative thinking.

CO2: Apply the different techniques of creative thinking in design problem solving.

CO3: Perceive architecture as one of the many fields under the broader ambit of design as a fundamental human activity.

CO4: Acquire knowledge on design process, its types and strategies.

Unit 1: Thinking **3 Hours**

Theories of thinking, thinking process - the way the mind works - and types of thinking like convergent, divergent thinking, lateral and vertical thinking, directive thinking, visual thinking – reasoning and imagination.

Unit 2: Creative Thinking Techniques **12 Hours**

Concept of 'creativity' – Need for creative thinking - blocks in creative thinking - various creative thinking and lateral thinking techniques like generation of alternatives, challenging assumptions, suspended judgement, fractionation, reversal method, checklists, brainstorming, synectics, mind mapping, Storyboarding, six hat thinking, analogy, dominant ideas and crucial ideas random simulation etc - exercises on problem solving

Unit 3: Design Process **11 Hours**

Design process – stages such as program, concept, scheme, design development etc - analysis of design problems - Various approaches and strategies to design problem solving - Design ideas and concepts, types such as analogy, metaphor, essence etc with examples - Design traps.

Unit 4: Creativity and Design **4 Hours**

Application of creativity in various fields of design such as product design, industrial design, architecture etc – role of creativity in design with case studies.

Total: 30 Hours

Text Book(s):

1. Edward de Bono - Lateral Thinking - Penguin, UK- 2010
2. Bryan Lawson - How Designers Think- Architectural Press, London - 1980.
3. Anthony Antoniades - Poetics of architecture: Theory of design - Wiley - 2008

Reference(s):
1. Edward de Bono - Serious creativity – profile books – 2003
2. Keyam, S.M. - Psychology in relation to design - Dowden, Hutchinson and Ross - 1973.
3. Donald A. Norman - The design of everyday things - Basic Books - 2013
4. Hall, E.T. - The Hidden Dimension - Doubleday, New York - 1996.
5. Donna Duerk - Architectural Programming - Information Management for Design - Wiley, John and Sons, Incorporated - 1993.
6. John Chris Jones - Design Methods - John Wiley and Sons - 1992
7. Nigel Cross - Developments in Design Methodology - John Wiley and Sons - 1984.
8. Evans, Helen Marie, Dumesnil, Carla Davis - An Invitation to Design - Macmillan Publishing Co., New York - 1982.

ARC17R222 Visual Arts	L	P	S	Credit
	0	0	4	2
Pre-requisite: Nil	**Course Category:** Open Elective **Course Type**: Studio			

Course Objective(s):
The student will gain basic hands on experience and fundamental knowledge in both two and three dimensional visual representation using different materials and mediums.

Course Outcome(s):
After completing this course, the student will be able to:

CO1: Understand and exhibit proficiency in the various mediums of presentation for 2 dimensional architectural presentations

CO2: Acquire skills in different types of mediums of drawings such as water colors, pencil sketching, pen and ink etc

CO3: Gain proficiency in different types of perspective drawings and presentation mediums.

Unit 1 Introduction to Drawing **15 Hours**

Introduction to Drawing - Exercises: Techniques of Pencil handling, lines, curves, circles and perspective lines - Introduction to Colour Theory. Practical exercise on Primary, Secondary and Tertiary colours

Unit 2 Rendering techniques **25 Hours**

Outline of simple objects - Still Life Composition with multiple objects to study on measurement and perspective relations – Spot sketching - Study of 3D effects through light and shade – Exercises on Still life using drawing Techniques using mediums such as pen and ink, Pencil, Crayon, Pastel Colors, Poster colours, water colors and Oil Colour, etc, Exercises on drawing from imagination – Study of human beings and sketching

Unit 3 – Perspective drawing **20 Hours**

Basic principles and concepts – Exercises in One point, 2 point and 3 point perspective construction sketching – perspective sketching at various eye levels – use of mediums in perspective drawings of simple objects, buildings and natural scenes.

Total: 60 Hours

Text Book(s):
1. Bhatt, N. D. - Engineering Drawing - Anand : Charotar Publishing House – 2003
2. Arthur L. Guptill - Rendering in Pen and Ink: The Classic Book On Pen and Ink Techniques for Artists, Illustrators, Architects, and Designers - Watson-Guptill - 1997

3. Ching, F. D. K. - Architectural Graphics - 5th Ed. Hoboken : John Wiley and Sons - 2009
4. Thames and Hudson - Manual of Rendering with Pen and Ink - Robert W Gil – 1990

Reference(s):

1. Florian Afflerbach, Michael Heinrich, Jan Krebs, Alexander Schilling – Basics: Architectural Presentation – Birkhäuser – 2014
2. Michael E Doyle - Color Drawings: Design drawing skills and techniques for architects, landscape architects and interior designers - John Wiley and Sons - 1995

ARC17R223 Product Design	L	P	S	Credit
	2	0	2	3
Pre-requisite: Nil	**Course Category:** Open Elective **Course Type**: Theory cum Studio			

Course Objective(s):

To inculcate design centric approach and appreciation towards objects of small and large scale in the human environment.

Course outcome(s):

After completing this course, the student will be able to:

CO1: Appreciation of human comfort and aesthetics towards objects of everyday use through enhanced design.

CO2: Strategic skill development for visual aesthetics, communication and product presentation.

CO3: Analyse the need for human comfort in through form, function, material and technological attributes.

CO4: Examine the need for user centric and one size fits all concepts in design.

CO5: Application of case studies for personal exploration of the concepts.

Unit 1 Introduction **8 Hours**

Fundamentals of product design – History, purpose, role of product designer – as a discipline-history, career options – Basics of design and design process – user and role of designer - Various approaches and strategies to design problem solving

Unit 2 Applied Anthropometry and Ergonomics **18 Hours**

Definition of human factors- application of human data for human comfort, Relationship between form, function, and anthropometry. Concepts of user – centric design and universal design – *Exercises on the above*

Unit 3 Attributes of Product Design **20 Hours**

Changing role of designer, classification of products based on scale, process, and mode of production. User centered approach to design production – Multi-utility oriented approach to product design. Material, technology , cultural and regional influences – *Exercises on the above*

Unit 4 Case Analysis **14 Hours**

Detailed documentation, critical analysis and presentation of successful household device, furniture, design for the physically challenged. Presentations on successful and strategic business models in collaboration with Industry.

Total: 60 Hours

Text book(s):

1. Don Norman - The Design of Everyday Things – Basic Books – 2013
2. Bryan Lawson - How Designers Think- Architectural Press, London - 1980.
3. Keyam, S.M. - Psychology in relation to design - Dowden, Hutchinson and Ross - 1973.

4. John Chris Jones - Design Methods - John Wiley and Sons - 1992

Reference(s):

1. Alina Wheeler - Designing Brand Identity: An Essential Guide for the Whole Branding Team - 2012
2. Ed Catmull - Creativity Inc: Overcoming the Unseen Forces That Stand in the Way of True Inspiration – random House – 2014
3. Nigel Cross - Developments in Design Methodology - John Wiley and Sons - 1984.
4. Evans, Helen Marie, Dumesnil, Carla Davis - An Invitation to Design - Macmillan Publishing Co., New York - 1982.

ARC17R224 Smart City	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Open Elective **Course Type**: Theory			

Course Objective(s):

This course shall deliberate on the latest concept of Smart Cities as a means of resolving the current urban issues and providing sustainable living environments for the citizens.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Comprehension of the concept of Smart city and its components.

CO2: Critical appraisal of the issues and challenges that warrant the smart city concept.

CO3: Holistic approach to the theory of Smart City and critical analysis of the current solutions proposed.

CO4: Detailed study of the application of principles through case studies from the world and India.

Unit 1 Introduction **3 Periods**

Introduction to concept of city – components and factors - Smart City- the concept- terms and definition, Objectives, Needs and purpose.

Unit 2 Challenges of Contemporary Cities **5 Periods**

Problems and Issues of today's cities that necessitate a paradigm shift in development policies - Urban Sprawl, Urban Incoherence, Urban Congestion, Urban Pollution, Traffic congestion and inefficient Transportation, Zoning, Urban Safety and Surveillance

Unit 3 Components of Smart City Systems **6 Periods**

Key principles of smart city systems: Empower-Access- Facilitate- Promote- Encourage-Include. Delivery systems: Urban Infrastructure, Finance, Operations and Governance.

Unit 4 Case Studies **10 Periods**

Holistic approach for Smart City development. Smart city solutions through case studies from – Korea- Amsterdam- Stockholm- Barcelona- Masdar- California- Seattle

Unit 5 Smart City Mission in India **9 Periods**

The smart city Mission of India –Objectives, Schemes and Strategies, Critical review of Identified Indian Cities – Unique features/ highlights of the proposals.

Text Books:

Textbook(s)

5. Michael Batty - The New Science of Cities - IT Press - 2013
6. Richard T.T. Forman - Urban Ecology: Science of Cities - Cambridge Press - 2014
7. Mohsen Mostafavi, Gareth Doherty - Ecological Urbanism - Harvard - 2011
8. Manuel Castells - The Rise of the Network Society- Wiley-Blackwel - 2010

Reference(s)

5. Mike Hodson, Simon Marvin - Low Carbon Nation? – Routledge - 2013

6. Timothy Beatley - Green Urbanism: Learning From European Cities 4th ed. Edition - Island Press - 2000
7. Stephen Glodsmith, Susan Crawford - The Responsive City: Engaging Communities Through Data-Smart Governance - John Wiley and Sons - 2014
8. Smart City Council data base

ARC17R225 Introduction to Interior Design	L	P	S	Credit
	2	0	0	2
Pre-requisite: Nil	**Course Category:** Open Elective **Course Type**: Theory			

Course Objective(s):

This course shall give exposure to principles of visual and spatial composition and the process of interior designing.

Course Outcome(s):

After completing this course, the student will be able to:

CO1: Gain exposure in various principles and elements of interior design

CO2: Acquire knowledge on the history of interior design and styles of interior design.

CO3: Know the basic elements of interior design such as enclosing elements.

CO4: Gain exposure in the various materials and construction techniques in interior design, efficient interior lighting for various spaces and role of interior landscape and their effects in built environments

CO5: Critically analyse furniture layouts and effectively design the furniture layout

CO6: Comprehend the design aspects of interiors holistically for different types of spaces through case studies.

Unit 1 Introduction to Interior Design 4 Hours

Definition of interior design - interior design process - vocabulary of design in terms of principles and elements - Introduction to the design of interior spaces as related to typologies and functions, themes and concepts - study and design.

Unit 2 Historic styles 2 Hours

Brief study of the history of interior design through the ages relating to historical context, design movements and ideas etc. - Brief study of folk arts and crafts, vernacular design in India with reference to interior design and decoration.

Unit 3 Elements of Interior Design - Enclosing Elements 6 Hours

Introduction to various elements in interiors like floors, ceilings, walls, staircases, openings, interior service elements, incidental elements etc. and various methods of their treatment involving use of materials and methods of construction in order to obtain certain specific functional, aesthetic and psychological effects.

Unit 4 Elements of interior design - lighting, accessories, interior landscaping 8 Hours

Study of interior lighting - different types of lighting, their effects, types of lighting fixtures. Other elements of interiors like accessories used for enhancement of interiors - paintings, objects de art, etc. Interior landscaping - elements like rocks, plants, water, flowers, fountains, paving, artifacts, etc. their physical properties, effects on spaces and design values.

Unit 5 Elements of Interior Design – Furniture 6 Hours

Study of relationship of furniture to spaces and human movements furniture design as related to human comfort, function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas - study on furniture for specific types of interiors like office furniture, children's furniture, residential furniture, display systems, etc.

Unit 6 Case studies 4 Hours

Case Studies – Involving enclosing elements, lighting, accessories, interior landscaping and furniture for different types of spaces such as living, bed room, dining, office, commercial spaces etc.

Total Hours: 30

Text Book(s)

1. Francis D.K.Ching , Corky Binggeli - Interior Design Illustrated – John Wiley and Sons - 2012

Reference Book(s)

1. Clive Edwards - Interior Design: A Critical Introduction - Bloomsbury Academic - 2010
2. Helen Marie Evans - An Invitation to design - Macmillan Pub Co - 1982
3. Steport - De - Van Kness, Logan and Szebely - Introduction to Interior Design - Macmillan Publishing Co., NY - 1980.
4. Julius Penero and Martin Zelnik - Human Dimensions and Interior space - Whitney Library of Design, NY - 1979.
5. Inca/Interior Design Register - Inca Publications, Chennai - 1989.
6. Kathryn B.Hiesinger and George H.Marcus - Landmarks of twentieth Century Design - Abbey Ville Press - 1993.
7. Syanne Slesin and Stafford Ceiff - Indian Style - Clarkson N.Potter, NY.
8. Dr.Saranya Doshi - The Impulse to adorn : Studies in traditional Indian Architecture. – Editor, Marg Publications - 1982.