



HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

SCHOOL OF PLANNING, ARCHITECTURE AND DESIGN EXCELLENCE

CURRICULUM AND SYLLABUS

(Applicable for Students admitted from Academic Year 2018-19)

M.Arch (Executive)

SCHOOL OF PLANNING, ARCHITECTURE AND DESIGN EXCELLENCE

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE

VISION AND MISSION

MOTTO

To make every man a success and no man a failure.

VISION

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

MISSION

The Mission of the Institute is

- To create an ecosystem that promotes learning and world class research, to nurture creativity and innovation.
- To instill highest ethical standards and values.
- To pursue activities for the development of Society.
- To develop national and International collaborations with institutes and industries of eminence.
- To enable graduates to become future leaders and innovators

SCHOOL OF PLANNING, ARCHITECTURE AND DESIGN EXCELLENCE

VISION AND MISSION

VISION

To facilitate the creation of built environment by adopting holistic approaches to promote sustainable development in Architecture & Planning.

MISSION

- To qualify students to address concerns of the 21st century and making them globally competent.
- To empower students by imparting Architecture and Planning knowledge in diverse areas with social commitment.
- To enable them to handle the complexities of modern requirements and encouraging exploration, innovation and creative experimentation in shaping the living environment.

M.Arch (Executive)
PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The program is expected to enable the students to

- PEO1** To develop the spatial and regional design skills using contemporary design approaches with the help of diagrams, geometries, surface parameters, media and architecture.
- PEO2** Understanding of current trends and styles in architecture.
- PEO3** To create a broad perspective on the principles of conservation and to create awareness on the historic planning, regulation, zoning and management for the problems and issues of historic buildings through conservation studio

PROGRAM OUTCOMES (ALIGNED WITH GRADUATE ATTRIBUTES) (PO)

At the end of this program, graduates will be able to

- PO1** To develop the spatial and regional design skills using contemporary design approaches with the help of diagrams, geometries, surface parameters, media and architecture.
- PO2** Understanding of current trends and styles in architecture.
- PO3** To create a broad perspective on the principles of conservation and to create awareness on the historic planning, regulation, zoning and management for the problems and issues of historic buildings through conservation studio
- PO4** Theoretical and practical knowledge on the various services in high rise buildings, advanced construction technologies and the application of the knowledge to the real life problems.
- PO5** Taking a critical stand on the norms and recommendations by learning the urban infrastructure management.
- PO6** To learn and give the awareness on the traditional values and historic significance.
- PO7** To integrate the knowledge on urban networks and a broad perspective of transport role in urban development.
- PO8** To study the intelligent building systems and energy management systems in architecture.
- PO9** To sensitize about the importance of Sustainable Design.

CURRICULUM AND SYLLABUS M.Arch (Executive)

M.ARCH (EXECUTIVE)								
(70 CREDIT STRUCTURE)								
SEMESTER - I								
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
THEORY								
1	PC	ARA3701	Contemporary Process in Architecture	3	0	0	3	3
2	MLC	ZZZ3715	Research Methodology and IPR	2	0	0	2	2
STUDIO								
3	PC	ARA3791	Advanced Architectural Design Studio-I (Form Based Design)	0	0	12	6	8
TOTAL							11	13
SEMESTER - II								
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
THEORY								
1	PC	ARA3702	Heritage and Urban Conservation	3	0	0	3	3
2	PC	ARA3703	Urban Infrastructure and Services	3	0	0	3	3
STUDIO								
3	PC	ARA3792	Advanced Architectural Design Studio-II (Heritage Conservation)	0	0	12	6	8
TOTAL							12	14
SEMESTER - III								
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
THEORY								
1	PC	ARB3704	High Rise Building and Services	3	0	0	3	3
2	PC	ARB3705	Advanced Architectural Construction Technologies	3	0	0	3	3
3	PC	ARA3706	Urban Transportation and Networks	3	0	0	3	3
4	PC	ARA3707	Building Automation	3	0	0	3	3
TOTAL							12	12

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(70 CREDIT STRUCTURE)								
SEMESTER - IV								
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
THEORY								
1	PC	ARA3708	Sustainable Design Principles	3	0	0	3	3
2	PC	ARA3709	MOOC	-	-	-	3	-
STUDIO								
3	PC	ARA3793	Advanced Architectural Design Studio-III (Sustainable Design - High Rise)	0	0	14	7	11
TOTAL							13	14
SEMESTER - V								
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
THEORY								
1	PE	E1	Elective - I	3	0	0	3	3
2	PE	E2	Elective - II	3	0	0	3	3
STUDIO								
3	THESIS	ARA3796	Thesis Phase - I	0	0	14	7	8
TOTAL							13	14
SEMESTER - VI								
SL. NO	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
STUDIO								
1	THESIS	ARA3797	Thesis Phase - II	0	0	18	9	14
TOTAL							9	14

TOTAL NUMBER OF CREDITS: 70

Note:

- 2 hours of Studio (P) = 1 Credit
- 1 hour of Lecture (L) = 1 Credit
- TCH = Total contact hours.

LIST OF DEPARTMENTAL ELECTIVES WITH GROUPING - SEMESTER WISE								
SEM (Elec tive No.)	COURSE CATEGORY	COURSE CODE	NAME OF THE COURSE	L	T	P	C	TCH
V (E1)	PE	ARA3721	Architectural Criticism	3	0	0	3	3
	PE	ARA3722	Urban Aesthetics and Perception	3	0	0	3	3
	PE	ARA3723	Urban Transformation and Extension	3	0	0	3	3
V (E2)	PE	ARA3724	Infrastructure Development and Project Finance	3	0	0	3	3
	PE	ARA3725	Performance Evaluation of Buildings	3	0	0	3	3
	PE	ARA3726	Contemporary Landscape Architecture	3	0	0	3	3

Credits under Each Category

Sl. No	Category Courses		No. of Courses	Credits	Percentage	Total
1	Professional Core Courses (PC)	Professional Core	9	27	38.57	65.71
		Professional Core (Studio)	3	19	27.14	
2	Elective Courses (Ele)	Programme Electives	2	6	8.57	8.57
3	Mandatory Learning Courses (MLC)	Research methodology & IPR	1	2	2.85	2.85
4	Thesis	Thesis	2	16	22.85	22.85
		Total	17	70	100.00	100

SEMESTER – I

COURSE TITLE		CONTEMPORARY PROCESS IN ARCHITECTURE		CREDITS	3
COURSE CODE	ARA3701	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-2				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To understand Contemporary design approach with the help of theories.				1,2,7
2	To orient the students towards contemporary process				1,2,5
3	To approach spatial & regional designs with help of diagrams, geometry and surface parameters.				1,2,6
4	To sensitize students in digital technology and architecture				1,2,7
5	To impart concepts of geometries and surface, media and architecture				1,2,4
Module 1:INTRODUCTION					(6)
Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and Art – Technology and Architecture – Technology as Rhetoric – Digital Technology and Architecture					
Module 2:ASPECT OF DIGITAL ARCHITECTURE					(9)
Aspects of Digital Architecture – Design and Computation – Difference between Digital Process and Non-Digital Process – Architecture and Cyber Space – Qualities of the new space – Issues of Aesthetics and Authorship of Design – Increased Automatism and its influence on Architectural Form and Space					
Module 3: CONTEMPORARY PROCESS					(12)
Overview of various Contemporary design process and it 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					
Module 4: GEOMETRIES AND SURFACES					(12)
Fractal Geometry and their properties – Architectural applications - Works of Zevi Hecker-- Shape Grammar - Shapes, rules and Label - Shape Grammar as analytical and synthetic tools- Combining Shape grammar and Genetic algorithm to optimize architectural solutions - Hyper Surface– Introduction to Hyper surface and concepts of Liquid architecture.					
Unit 5: CASE STUDIES					(6)
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 BOOKS					
1	The Phaidon Atlas of Contemporary World Architecture, 2008				
2	Dennis Sharp, Twentieth Century Architecture – A visual History, Images Publishing 2006				

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3	DimitrisKottas 'Contemporary Digital Architecture: Design and Techniques', Links International, 2010
4	Antoine Picon, 'Digital Culture in Architecture' , Birkhäuser Architecture, 2010
REFERENCE BOOKS	
1	Nick Dunn, 'Digital Fabrication in Architecture', Laurence King Publishing, 2012
2	RivkaOxman, and Robert Oxman, 'Theories of the Digital in Architecture', Routledge, 2014
3	The Phaidon Atlas of Contemporary World Architecture, 2008

COURSE TITLE	RESEARCH METHODOLOGY AND IPR			CREDITS	2
COURSE CODE	ZZZ3715	COURSE CATEGORY	MLC	L-T-P-S	2- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-2				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	Identify research problems and formulate the methodology.				2,4,7,10
2	Prepare effective research report based on literature.				2,4,7,10
3	Adopt suitable sampling techniques to analyse data and interpretation of results.				2,4,7,10
4	Utilize the knowledge gained on IPR and apply for innovative ideas and products				2,4,7,10
5	Utilize the knowledge gained on patent rights for licencing and transfer of technology with new developments in IPR				2,4,7,10
MODULE 1 – Research Problem Formulation					(9)
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations					
MODULE 2 –Research Proposal and Ethics					(9)
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.					
MODULE 3 - Data Analysis and interpretation					(9)
Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research Data analysis, Statistical techniques and choosing an appropriate statistical technique, Hypothesis, Hypothesis testing, Data processing software (e.g. SPSS etc.), statistical inference, Interpretation of results.					
MODULE 4 - Nature of Intellectual Property					(9)
Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.					
MODULE 5 – Patent Rights and New Developments in IPR					(9)

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Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS	
1	Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students",
2	Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3	Ranjit Kumar, 2 nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4	Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5	Mayall , "Industrial Design", McGraw Hill, 1992.
6	Niebel , "Product Design", McGraw Hill, 1974.
7	Asimov, "Introduction to Design", Prentice Hall, 1962.
8	Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
9	T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008
10	C.R. Kothari, GauravGarg, Research Methodology Methods and Techniques , New Age
11	International Publishers, Third Edition, Ranjith Kumar, Research Methodology: A Step by step Guide for Beginners, 2nd Edition, SAGE, 2005
12	Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
13	Creswell, John W. Research design: Qualitative, quantitative, and mixed methods, approaches. Sage publications, 2013.

COURSE TITLE	ADVANCED ARCHITECTURAL DESIGN STUDIO - I			CREDITS	6
COURSE CODE	ARA3791	COURSE CATEGORY	PC	L-T-P-S	0- 0- 12
CIA	60%			ESE	40%
LEARNING LEVEL	BTL-6				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To understand Contemporary design approach and apply them with the required tools and techniques in relation with the built environment				1,2,4,7,8, 9
This specialized studio introduces design thinking and problem solving through intensive research and the development of design proposals design in peri-urban and urban areas with a range of functions and social amenities. Studio project applies Digital Architecture theories and techniques that involve digital mediation to create engaging architectural designs that stimulate all human senses in their relationship with the built environment. The studio addresses various issues related to design theories, digital media, digital design techniques, rule-based design processes, computational concepts and other factors influencing the development of architectural production using digital tools. The studio will prompt students to develop critical reflections and positions on					

design conventions and explore those positions through the architectural design process. The studio includes many case studies of contemporary structures, understanding the urban function of the building, climate, technologies, detailing and social conditions is the emphasis of the studio. Students would have to evolve structural systems with a thorough understanding of regulations and safety. Issues would involve functional organization, socio-economic conditions, services, and other infrastructure, study of urban guidelines, Imageability of the building, climatic responses, structure and typology, and multi-functional design. Projects shall be of urban scale with multiple functions and a need for imagery and identity of public building (aesthetics, symbolic character, and meaning) will be one of the architectural goals. Museums, art galleries, theme-based hotels, shopping, Industrial structures areas can be chosen.

It is recommended that site sizes should not be larger than 10 acres to allow for intensive study. However, the Design studio faculty shall determine the extent of the site size. Design emphasis shall be on the use of innovations in materials and techniques of construction. Design emphasis shall be on the skins and support of structural systems and resulting architectural form, space and experience.

TEXT BOOKS

1	The Phaidon Atlas of Contemporary World Architecture, 2008
2	Dennis Sharp, Twentieth Century Architecture – A visual History, Images Publishing 2006
3	Nick Dunn, 'Digital Fabrication in Architecture', Laurence King Publishing, 2012
4	Rivka Oxman, and Robert Oxman, 'Theories of the Digital in Architecture', Routledge, 2014

SEMESTER – II

COURSE TITLE		HERITAGE AND URBAN CONSERVATION			CREDITS	3	
COURSE CODE		ARA3702	COURSE CATEGORY		PC	L-T-P-S	3- 0- 0
CIA		50%			ESE	50%	
LEARNING LEVEL		BTL-2					
Prerequisites : Urban design, Conservation techniques							
CO	COURSE OUTCOMES					PO	
1	To appreciate the classification of heritage.					3,5,6	
2	To be capable of describing the principles of conservation					3,4,6,8	
3	To have a broad perspective of the historic building materials & structural systems.					3,5,9	
4	To be aware of the historic planning, regulation, zoning and management					3,4,6,7	
5	To understand the problems & issues of historic buildings through conservation studio.					3,6,9	
Module 1: CONCEPTS OF CULTURAL HERITAGE						(9)	
Social, Cultural and regional heritage – Myths, Legends and Traditions – Oral and living – Vedic and archaeological literary sources – Various concepts behind cultural heritage in various parts of the world.							
Module 2: CONSERVATION PRINCIPLES & PRACTICES						(9)	
Rationale for conservation – History of conservation movements in India and world view – Pioneers of conservation: Viollet De Duc, John Ruskin, William Morris and others. – Scope, principles and approach to conservation – National & international approach to conservation: UNESCO, ASI, INTACH, etc.							
Module 3: HISTORIC BUILDING MATERIALS & STRUCTURAL SYSTEMS						(9)	
Traditional building materials used in India from prehistoric times till date: Earth, clay, stone, brick, timber, bamboo, iron, lime, metals, glass – Materials used in structural, non-structural & decorative applications: mortars, renders, paints, plasters, additives and stabilizers – Categorization of materials as organic and non-organic.							
Module 4: HERITAGE PLANNING, REGULATION, ZONING & MANAGEMENT						(9)	
Planning parameters and Principles: Types of planning – Regional planning & socio-economic planning - Integrated development plan – Planning authorities – Regulations & Land use control – Zoning concept: Density and area planning, transportation planning, Legislative control – Project management: Management systems, cost analysis, plan preparation and phase development.							
Module 5: CONSERVATION METHODS OF HERITAGE BUILDINGS						(9)	
Methods of heritage conservation – Revitalization – Preservation – Maintenance – Restoration – Reconstruction – Adaptation – Structural conservation – Chemical Preservation – Re-pointing – Sandblasting – Traditional composition.							
TEXT BOOKS							
1	Radhakrishnan, S. et. al. 1993. The Culture Heritage of India (6 Vols.). The R.K. Mission. ISBN: 0 7506 6225 5						
2	Subbarayappa, B.V. 1988. Scientific Heritage of India. Bangalore.						
3	A.K. Bhatia : International Tourism : Fundamentals and Practice. Sterling Pub. Pvt. Ltd. 1997						

COURSE TITLE	URBAN INFRASTRUCTURE AND SERVICES			CREDITS	3
COURSE CODE	ARA3703	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-3				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To take a critical stand on the norms and recommendations provided by the guidelines				2,5,8
2	To make new knowledge on implementation techniques and contribute to execution methods.				1,3,5
3	To develop an insight on qualitative and quantitative aspects of urban built environment.				4,5,6,8
4	To enable the students to have a sound knowledge about the current/ innovative practices in water supply, sewerage system, and solid waste management.				3,5,7
5	To expose the students to urban infrastructure management.				4,8
Module 1: INTRODUCTION- STANDARDS AND GUIDELINES					(9)
Definitions-Types and characteristics of urban infrastructure. Norms and standards for infrastructure planning, National and local guidelines -recommendations of Rakesh Mohan Committee. Infrastructure provision and guiding principles.					
Module 2 WATER SUPPLY SYSTEMS					(9)
Source identification and assessment of water demand, zoning of water system, planning and design for distribution system including storage systems, pumping stations, water distribution network, filtration and treatment plants.					
Module 3: WASTE WATER DISPOSAL SYSTEMS					(9)
Characteristics of waste water, estimating storm water and sewerage system requirement, designing layout for sewage collection system, planning and location of treatment plants, type and hierarchy of pipes, sewage disposal and treatment facilities; waste water treatment methods.					
Module 4: SOLID WASTE MANAGEMENT SYSTEM					(9)
Sources and types of solid wastes– factors affecting generation of solid wastes, waste quantity and composition. On-Site Storage & Processing On-site storage methods– on-site segregation of solid wastes. Waste Collection and Transport- selection of location, operation & maintenance; options under Indian conditions. Treatment/disposal Technologies					
Module 5: INFRASTRUCTURE SERVICES MANAGEMENT					(9)
Introduction to urban management–decentralized and people led infrastructure, Quality control mechanisms. Case studies of successful and innovative urban infrastructure provisions – development, management and maintenance schemes.					
TEXT BOOKS					
1	Nelson L. Nemerow and Franklin J. Agardy,'Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation-6th Edition', Wiley,2009				
2	Terrance McGhee ,'Water Supply and Sewerage', Mcgrawhil Exclusive – 2013.				
3	William A. Worrell and P. AarneVesilind, 'Solid Waste Engineering: A Global Perspective-3rd Edition, CL Engineering, 2016				

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4	Solid Waste Management: The Regional Approach, Clayton, CK
REFERENCE BOOKS	
1	Water supply, waste disposal & Environmental Engineering, Chatterjee AK
2	Water, Wastewater, Stormwater Infrastructure Management, Neil S. Grigg
3	Infrastructure Planning Engineering and Economics, Alvin Goodman and Makarand Hastak. (2015, McGraw Hill).

COURSE TITLE	ADVANCED ARCHITECTURAL DESIGN STUDIO - II	CREDITS	6
COURSE CODE	ARA3792	COURSE CATEGORY	PC
CIA	60%	ESE	40%
LEARNING LEVEL	BTL-6		
Prerequisites : Nil			
CO	COURSE OUTCOMES		PO
1	To evolve design strategies to adaptively re-use heritage buildings		1,2,3
2	To document and represent the techniques using AUTOCAD and other software is encouraged as part of the process of conservation.		1,6,9
3	To explore several different approaches to conservation and adaptive reuse and analyze the heritage project		1,3,6
4	To come out with design proposals after the analysis on the selected site		3,6,7,9
Module 1: RECONNAISSANCE SURVEY ON THE PROJECT			(10)
The course encourages students to evolve design strategies to adaptively re-use heritage buildings, like palaces, medieval museums, colonial buildings in disuse and disrepair, colonial era railway stations, historic institutions etc. The first stage of the studio is to do the reconnaissance survey on the selection.			
Module 2: DOCUMENTATION OF THE SITE			(90)
The design project involves a concept plan and suggestive policies to conserve, delineate avenues for tourism, adaptive re-use suggesting other new functions to utilize the building, and a study documentation of the existing heritage structures. Students will undertake extensive international and national case studies based on internet studies, library literature as well as site visits to existing historic buildings and precincts. Documentation and representation techniques using AUTOCAD and other software is encouraged as part of the process of conservation. Case studies of projects by INTACH, UNESCO and other World Heritage sites will be undertaken to provide a broader overview. Emphasis will be given to the documentation and history of the building and analyzing its present condition and urban context.			
Module 3: ANALYSIS OF THE PROJECT			(40)
The conservation design project is based on these studies to revitalize derelict heritage structures. Emphasis on the cultural capital and heritage value in the design will be imperative. Students will be encouraged to explore several different approaches to conservation and adaptive reuse. Adaptive reuse could involve designing museums, cultural and art centers, heritage hotels and resorts, and other institutions etc.			
Module 4: PROPOSAL DESIGN			(40)

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Students will be encouraged to come out with design proposals after the analysis on the selected site and submit the work in various advised modes – such as models, sheets, computer presentations, etc.

TEXT BOOKS

1	Radhakrishnan, S. et. al. 1993. The Culture Heritage of India (6 Vols.). The R.K. Mission. ISBN: 0 7506 6225 5
2	Subbarayappa, B.V. 1988. Scientific Heritage of India. Bangalore.
3	A.K. Bhatia : International Tourism : Fundamentals and Practice. Sterling Pub. Pvt. Ltd. 1997

SEMESTER – III

COURSE TITLE		HIGH RISE BUILDING AND SERVICE		CREDITS	3
COURSE CODE	ARB3704	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-3				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To understand the various services in high rise buildings.				2,4
2	To understand the various types of structural systems adopted for high rise buildings.				1,4,5,8
3	To consciously chose the structural system for a particular project considering the need for consideration of building service requirements and fire safety.				3,4,8
4	To understand how service integration can translate into an intelligent and energy efficient system which will enable sustainability of the structure				4,8,9
5	To apply some of these services in their design studio.				1,2,3,4,8
Module 1: INTRODUCTION					(6)
Introduction - High rise buildings in urban environment -High rise buildings and its support structure - Evolution of High rise buildings - general planning considerations - Concepts of intelligence architecture and building automation					
Module 2: HIGH RISE BUILDING STRUCTURAL SYSTEMS					(8)
Structural systems in RCC and steel for high rise buildings - composite structural system consideration for wind and earthquake loads - Floor structure - load bearing Wall panel systems - Shear core structure - Rigid frame systems - Building systems - comparison of high rise structural systems - other design approaches controlling building drift - efficient building forms					
Module 3: HVAC, ELECTRICAL AND MECHANICAL SYSTEMS					(12)
Building services - Natural and mechanical ventilation systems - air conditioning systems and load estimation - planning and designing for efficiency - Basic concepts - Automation and energy management concepts - natural lighting systems - energy efficient lighting systems - planning and designing for energy efficiency - structural Glazing system - Types of elevators, systems and services - lobby design - escalators - Express elevators – Sky lobbies – Local elevators, Service floors - Energy conservation methods - NBC recommendations					
Module 4: SAFETY AND SECURITY					(10)
Security systems - access control and perimeter protection - CCTV intruder alarms - passive fire safety - fire detection and fire alarm systems - planning and design - Wet risers, Sumps, Smoke detectors, Alarms, Sprinkler systems, Fire escape stairs, Fire resistant doors, Fire resistant rating of materials and Firefighting equipment etc.					
Module 5: CASE STUDIES					(9)
Architectural design consideration for high rise buildings - space planning and design standards - Case studies of high rise buildings and skyscrapers through appropriate examples - Norman Foster, Ove Arup, Ken Yeang etc.,					
TEXT BOOKS					
1	A.K.Mittal, Electrical and Mechanical services in high rise buildings design and estimation Manual, 2001				
2	YahyaMohamadYatim, Fire safety issues in High Rise residential Buildings: escape routes				

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	Design and specification, Lambert Academic Publishing, 2011
3	William J. Mcguinness, Benjamin Stein and John S. Reynolds, Mechanical and Electrical Equipment for Buildings, John Wiley and Sons, Inc. 1980
REFERENCE BOOKS	
1	Mehmet HalisGünel and), HüseyinEmrellgin,' Tall Buildings: Structural Systems and Aerodynamic Form' , Routledge, 2014
2	100 of the World's Tallest Buildings, 2015, by CTBUH (Council on Tall Buildings and Urban Habitat) (Author), Antony Wood (Editor)

COURSE TITLE	ADVANCED ARCHITECTURAL CONSTRUCTION TECHNOLOGIES			CREDITS	3
COURSE CODE	ARB3705	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-3				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To understand the theoretical and practical aspects of new technology				1,5,8
2	To design projects in the larger context of new technologies				2,4,5
3	To be conscious of the need for consideration of hazardous conditions and their impact on design				2,5,8
4	To gain a diverse knowledge of Advanced technology practices applied to real life problems.				2,4,5,8
5	To gain an experience in the implementation of new construction technology on engineering concepts which are applied in field Advanced construction technology.				5,8
Module 1: INTRODUCTION					(9)
Conceptual understanding of various large span structures like Geodesic domes, hyperbolic paraboloids and free form shapes used for airports, stadia, Industrial Buildings, Public spaces etc., Case studies of such structures.					
Module 2: CONSTRUCTION MATERIALS					(9)
Materials in the construction industry, Modern trends, Futuristic Materials, Advantages / Disadvantages with emphasis on Maintenance, cost, sustainability and over all embedded energy related issues etc. Concepts of tensile fabrics, metal lattice structures, special structural envelopes, smart materials., Study of advanced building materials like special alloys of steel and other metals, glass, polymer, fabric, various type of finishes and treatments, Market survey and collection of information about materials					
Module 3: CONSTRUCTION TECHNOLOGIES					(9)
Conceptual understanding of pre-fabrication in building construction, concept of modular coordination, Process of manufacturing and handling pre-fabricated components, construction details, understanding service systems, structural systems, sequence of erection and facilitating maintenance of such structures, case studies.					
Module 4: CONSTRUCTION SAFETY AND HAZARDOUS SAFETY					(9)
Safety aspects in construction process – design consideration for different hazardous like					

Earthquakes, Wind, Tsunami, Fire etc. Application of Technology in disaster risk reduction: Application of various technologies, Case studies.	
Module 5:ADVANCED STRUCTURES (9)	
Conceptual Understanding of buildings in normal and adverse conditions considering topography of the site, water-logging, marine structures, Construction details, High performance facades, Building integrated renewable energy systems. Advanced mechanical and electrical building systems.	
TEXT BOOKS	
1	Building Materials : Products, Properties and Systems 1st Edition (Paperback) Tata McGraw - Hill Education , 2011
2	B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain ,Building Construction 10 Edition, Laxmi Publications, 2009
3	Vincent Hui, Terri Meyer Boake, Understanding Steel Design: A Handbook of Steel in Architecture, Birkhauser 2012
REFERENCE BOOKS	
1	Introduction to Natural and Man-Made Disasters and Their Effects on Buildings, Architectural Press, 2003
2	TulioSulbaran, Jorge Capote, David Marchman , Construction Documentation Pearson Education Limited , 2012

COURSE TITLE	URBAN TRANSPORTATION NETWORKS			CREDITS	3
COURSE CODE	ARA3706	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-3				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To have the knowledge on urban network and its types.				1,5,7
2	To understand urban networks its environmental and sustainability aspects.				6,7
3	To have a broad perspective of transport role in urban development.				2,7,8
4	To understand network density and integration of networks.				5,7,8
5	To understand network management through case studies.				2,5,7,8
Module 1:UNDERSTANDING SYSTEMS (9)					
Concepts of city networks and its application at the urban level; Definitions of Networks and Systems, Components of an network, scale and types of networks and systems, complexity and inter-connectivity of networks, classical models of networks - center periphery model and hierarchical model; specialized urban networks, and “capital” city networks; Networks and territorial integration.					
Module 2:URBAN NETWORKS (9)					
City and Regional networks, tangible and intangible networks as service carriers; Urban Networks - types: water, sewage, electricity, communication, level of service and related specification, standards and guidelines, carrying capacity of networks, sustainability aspects in networks, tangibility of networks; Food, and social networks; environmental services and bio mimicry in networks; Domino effect in networks, retrofitting networks, adaptive use of networks					

Module 3: TRANSPORTATION NETWORKS		(9)
Role of transport in Urban Development, Transport networks as carriers and facilitators of other networks, infrastructure requirements for transport infrastructure; level of service and specification, transportation problems in India, network planning and associated factors, Human component in transport networks, integration of networks.		
Module 4: NETWORK ANALYSIS AND DESIGN		(9)
Central Place theory and network generation; human behavior, choice and network planning; network density and planning for the future; monetization of networks; service demand, network optimization; proximity and accessibility analysis of networks; identification of bottlenecks, dead ends and points of congestion.		
Module 5: CASE STUDIES		(9)
Indian and international case studies on the network management, adaptive use, and integration of multiple networks, adaptive reuse of existing infrastructure for new networks, networks of the future, ICT in network planning and management, future developments in network.		
TEXT BOOKS		
1	Géraldine Pflieger, Céline Rozenblat; Introduction. Urban Networks and Network Theory: The City as the Connector of Multiple Networks	
2	Zachary P. Neal, The Connected City: How Networks are Shaping the Modern Metropolis	
3	Peter J. Taylor , Ben Derudder, World City Network: A global urban analysis 2nd Edition,	
REFERENCE BOOKS		
1	Eijk, G.V, Unequal Networks: Spatial Segregation, Relationships and Inequality in the City, IOS Press, Amsterdam, 2010	
2	Drew, D.R., "Traffic Flow Theory and Control", McGraw Hill, New York, 1968	
3	Papacostas C.S., Prevedouros, "Transportation Engineering and Planning", 3rd Edition, Prentice Hall of India, New Delhi, 2002.	

COURSE TITLE	BUILDING AUTOMATION			CREDITS	3
COURSE CODE	ARA3707	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-4				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To develop necessary skills to identify and interpret issues relating to Intelligent Buildings and Building Automation.				1,2,4,8
2	To understand various aspects of intelligent building systems				2,5,8
3	To know the various controls and techniques related to automated systems				2,4,7,8
4	To comprehensively understand the design considerations of an envelope				1,2,4,8
5	To understand and analyse energy management systems in various buildings				4,8,9
Module 1: CONCEPTS, DEVELOPMENT AND TRENDS IN INTELLIGENT BUILDINGS					(9)
Introduction to Intelligent buildings: concepts, definitions of intelligent buildings, intelligent architecture and structure, evolution of intelligent buildings, Use of Artificial intelligence in building					

systems - IB assessment criteria - Developments in technology contributing to the intelligent buildings concept	
Module 2: VARIOUS ASPECTS OF INTELLIGENT BUILDING DESIGN (10)	
Environmental controls- traditional building controls, Lighting control- integration of automatic lighting control for buildings - Sensors, actuators, and end devices-including adjustable speed drives, chillers complete packaged air-conditioning, Fire and Life Safety integration with the automated buildings - Security integration for the tenants of automated buildings - Elevators integration for the tenants of automated buildings	
Module 3: BUILDING AUTOMATION CONTROLS AND TECHNIQUES (10)	
Interfaces and components of Building Automation Systems - Hardware and software requirements of Building Automation System - Expert systems, genetic algorithms, Artificial Neural Networks Fuzzy Systems, and their application in Intelligent Buildings especially for HVAC, Electrical, Fire, Vertical Transportation, safety and security systems and energy management and design	
Module 4: INTEGRATED BUILDING SYSTEM (10)	
General principles, Passive design considerations, building envelope design consideration, integration of building system, energy storage - cold storage techniques - Economic analysis, economic aspects of energy management, general considerations - Economic analysis methods - life cycle costing - break even analysis - benefit cost analysis - payback period analysis - equivalent annual cost analysis	
Module 5: BUILDING MANAGEMENT SYSTEM (6)	
Building energy management – trends and advances in energy management systems, Building management systems for retrofit. - Case-studies of Intelligent Buildings from India and Abroad.	
TEXT BOOKS	
1	KjellAnderson,'Design Energy Simulation for Architects', Routledge, 2014
2	Timothy L. Hemsath and KavehAlaghehBandhosseini ,'Energy Modeling in Architectural Design, Routledge,2015
3	Robert B.Bechtel and Arza Churchman 'Handbook of Environmental Psychology", John Wiley & Sons Inc. New York 2002.
4	Energy Audit of Building Systems - moneefKrarti - CRC Press 2000

SEMESTER – IV

COURSE TITLE	SUSTAINABLE DESIGN PRINCIPLES			CREDITS	3
COURSE CODE	ARA3708	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-3				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To articulate the various concepts and strategies of sustainable design practices.				3,6,8
2	To apply Sustainable planning principles at micro and macro level.				4,9
3	To address Eco-sensitive sustainable design processes, features etc.				8,9
4	To comprehend the environmental impact of materials.				1,2,6,9
5	To develop analytical abilities in evaluating buildings.				2,4,6,7,8,9
Module 1:INTRODUCTION					(9)
A historical perspective-Sustainable development concepts, needs, goals and issues. Definitions, objectives and basics of sustainability and sustainable design -ecological foot print, carbon foot print, climate change and global warming. What makes today's cities unsustainable? Impact of construction sector on the environment. Nature, built heritage and community networks. General premises and strategies for sustainable design principles.					
Module 2 SUSTAINABLE PLANNING AND ARCHITECTURE					(9)
Settlement level planning, Urban ecology, Urban planning considerations -quantifying the urban environment. Buildings and its interaction with environment -general principles for minimizing environmental impact of buildings; passive design principles. Theoretical basis for a sustainable and ecofriendly design. Eco-mimicry as a design tool based on ecosystem analogy- theoretical basis for a sustainable and ecofriendly design. Explore, investigate and apply various parameters of sustainable planning for sustainable design development of site planning, housing, building envelope, neighborhoods and urban forms.					
Module 3: ENERGY AND THE BUILT ENVIRONMENT					(9)
Energy management in buildings: conserving energy, reducing demand, relying on renewable energy; net zero/energy plus building. Working with climate: passive solar design; - photo voltaic and solar hot water systems. Water harvesting- demand management; small scale wind systems and hydro power; optimizing resources and recycling. Sustainable techniques to improve - Sites, Water efficiency, Energy Atmosphere, Materials & Resources, Indoor Environmental quality					
Module 4: ENVIRONMENTAL IMPACT OF BUILDING MATERIALS					(9)
Measuring the impact of building materials- calculating embodied energy of different building materials and structure - innovative use of recycled material - processing and time on embodied energy- low energy building and masonry materials- life cycle analysis- optimizing construction, site management, post occupancy building management. Adaptive reuse, brown field site development, construction and demolition waste management.					
Module 5: EVALUATING SUSTAINAINABILITY IN BUILDINGS					(9)
Definition of Green building. Innovation and Design process in green practices. Green building Evaluation Systems; LEED Certification; Green Globe Certification; GRIHA. Legal instruments/incentive's for sustainable building. Post occupancy performance evaluation of buildings.					

Case Studies of buildings and analysis of the performance with respect to principles of sustainability.	
TEXT BOOKS	
1	Rhonda Phillips, Bruce Seifer Ed, 'Sustainable Communities: Creating a Durable Local Economy (Tools for Community Planning)'-Volume 2, Routledge 2013
2	Daniel Vallerio and Chris Brasier; Sustainable Design- The science of sustainability and Green Engineering; Wiley; 2008
3	Dominique Gauzin- Muller; Sustainable architecture and Urbanism; Birkhauser; 2002
REFERENCE BOOKS	
1	Anna Ray-Jones, Sustainable Architecture in Japan-The Green buildings of Nikken Sekki, Wiley Academy 2000
2	Sustainable Architecture low tech Houses-Charles Broto&ArianMoatediPub:Joseph Ma Minguet 2002
3	Energy Efficient Buildings in India –TERI publications and Ministry of Non-Conventional Energy Sources, 2001.

COURSE TITLE	ADVANCED ARCHITECTURAL DESIGN STUDIO -III			CREDITS	7
COURSE CODE	ARA3793	COURSE CATEGORY	PC	L-T-P	0- 0- 14
CIA	60%			ESE	40%
LEARNING LEVEL	BTL-6				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To develop an understanding of current sustainable practice over mixed use sustainable development projects and to create design ideologies for sustainable designs				1,2,4,5,6,8,9
<ul style="list-style-type: none"> To incorporate sustainability in architectural design at various scales. To balance varied technical and planning considerations in building design with aspects of sustainability. To understand the problems associated with services and structural problems associated with high rise, tall structures. 					
<p>The studio will focus on the challenges of incorporating sustainable principles into architectural design projects and typologies of increased complexity that are prevalent in the contemporary world. Students would be required to prepare detailed plans and sections of any suitable tall building after careful site selection with regard to function, imageability, climatic and cultural aspects. The students would also be encouraged to study and apply suitable structural and service systems after acquiring knowledge about design standards and case studies of contemporary high rise buildings.Aspects of planning, technology, services, density, height of construction, management would be examined along with considerations such as environmental performance, resource optimization, ecological impact in order to produce a viable synthesis of diverging needs.</p>					

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TEXT BOOKS	
1	Rhonda Phillips, Bruce Seifer Ed, 'Sustainable Communities: Creating a Durable Local Economy (Tools for Community Planning)'-Volume 2, Routledge 2013
2	Sustainable Architecture low tech Houses-Charles Broto&ArianMoatediPub:Joseph Ma Minguet 2002
3	Dominique Gauzin- Muller; Sustainable architecture and Urbanism; Birkhauser; 2002

SEMESTER – V

COURSE TITLE	THESIS PHASE I			CREDITS	7
COURSE CODE	ARA3796	COURSE CATEGORY	PC	L-T-P	0- 0- 14
CIA	40%			ESE	60%
LEARNING LEVEL	BTL-5				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To train the students in doing a research topic pertaining to his/her interest in the field of architecture and in the preparation of systematic report, which may be useful when he/she undertakes the same area of research for his/her Thesis				1,2,4,5,6,8,9
<p>It is a formal report written systematically on a particular topic related to Architecture. This exercise is taken up as to widen and enrich the literature pertaining to a topic of research. It may focus upon cross section of literature of a topic with or without research hypothesis. The material written systematically may be useful in fourth semester when the same topic with literature reviewed systematically be confined as a part of Thesis Phase - II.</p> <p>There will be three reviews conducted internally and at the end of the semester there will be a viva voce conducted by the Institute comprising of a panel with one external member.</p>					
TEXT BOOKS					
1	Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students",				
2	C.R. Kothari, GauravGarg, Research Methodology Methods and Techniques , New Age				

SEMESTER – VI

COURSE TITLE	THESIS PHASE II			CREDITS	9
COURSE CODE	ARA3797	COURSE CATEGORY	PC	L-T-P	0- 0- 18
CIA	30%			ESE	70%
LEARNING LEVEL	BTL-6				
Prerequisites :					
CO	COURSE OUTCOMES				PO
1	To develop a basic understanding of the area chosen for study (by carrying out a detailed Literature review).				1,3,5,7,8,9
2	To undertake detailed exploration of the topic (by way of surveys and studies).				1,7,8,9
3	To identify issues and concerns those emerge out of the study and suggest recommendations.				1,7,8,9
<p>The students are required to carry out independent research and prepare a thesis on a topic on Urban design, Urban renewal, Urban Housing/Settlements, Sustainable and Environmental Design. However, the specific thrust shall be on architectural design and environment context and approved by the faculty under the supervision of a research guide allocated by the department.</p> <p>The main objective of the Thesis is to provide an opportunity to the students to conduct an original</p>					

study and develop a subject of their choice, which adds significantly to the knowledge. Depending upon the theme of the Thesis, investigations may involve original field work (collection of primary data), compilation and analysis of data already available and critical analysis.

PRESENTATION REQUIREMENTS

The Thesis Project shall be submitted in the form literature and case study report, presentation drawings, models, reports, slides and CD's as required for the project.

Periodic reviews will be conducted internally consisting of a panel and at the end of the semester there will be a viva voce conducted by the university comprising of panel with external member.

TEXT BOOKS

1	Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students',
2	C.R. Kothari, GauravGarg, Research Methodology Methods and Techniques , New Age

ELECTIVE – I

COURSE TITLE		ARCHITECTURAL CRITICISM			CREDITS	3
COURSE CODE	ARA3721	COURSE CATEGORY	PE	L-T-P	3- 0- 0	
CIA	50%			ESE	50%	
LEARNING LEVEL	BTL-2					
Prerequisites : Nil						
CO	COURSE OUTCOMES					PO
1	To be clear about the status, nature and limits of the philosophical term of critique in general					1,5
2	To demonstrate a critical understanding of the history of modernism.					2,3,6
3	To be able to relate critique to criticism and the issue of form.					1,4,9
4	To understand the issues of the effects of a work of art as distinct from its meaning					1,4,7
5	To write, discuss and critique among them and come out with new interpretations.					1,5,6
Module 1: VERSIONS OF THE CRITIC (9)						
Criticism is judgment – Judgment and discipline – Kant’s Critique of judgment – Phenomenology in architecture – Critical thinking – Lateral thinking						
Module 2: QUESTIONING MODERNISM (9)						
Detailed examination of modes of architectural writing - manifesto, historical narrative, canon, typological analysis, critical essay and theoretical speculation - The role of key texts played during the first half of the twentieth century in the construction and subsequent critique of the early histories of modern architecture between 1920 and 1968						
Module 3: THE ESSAY AS FORM TO WRITE ARCHITECTURE (9)						
Essay as Form by Theodor Adorno – Architectural journalism – Writing about architecture – A practical guide to clear communication about the built environment – Reporting on architecture – Looking at and explaining a building – writing it in 2500 words – Criticism and social commentary.						
Module 4: ARCHITECTURE KNOWLEDGE & WRITING (9)						
Writing architecture – Writing history – Writing the city – Writing the object – Discussion of the written assignment – Phenomenology & performativity of language. – Sense in architecture.						
Module 5: DRAFTING THE CRITIQUE (9)						
Submission of new drafts – Group discussion – Criticizing & feedbacks of the drafts – New interpretations.						
TEXT BOOKS						
1	Raman, Pattabi G. and Coyne, Richard, ‘The Production of Architectural Criticism’, in: Architecture Theory Review, The University of Sydney, vol. 5, No 1, 2000, pp. 83-103					
2	Terry Eagleton, The Function of Criticism. London: Verso, 1984					
3	Merleau-Ponty, Maurice, Phenomenology of Perception, trans. Landes, Donald A., Routledge, 2012 The Prose of the World, Soutwestern University Press, 1973					

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COURSE TITLE		URBAN AESTHETICS AND PERCEPTION		CREDITS	3
COURSE CODE	ARA3722	COURSE CATEGORY	PE	L-T-P	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-2				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	Approach urban design under theoretical aspects.				2,4,5,
2	Response to the need for conservation landscape and art in urban design				3,5,7
3	To have a broad perspective of the history of architecture in various continents.				3,6,9
4	To be aware of the site planning with landscape engineering.				3,5,6
5	To comprehend the professional practice in landscape designing.				1,3,5,9
Module 1: PRECEDENTS AND JUDGEMENT					(9)
Introduction – The precedent conscious – the contextual conservative.					
Module 2: PERCEPTION IN URBAN DESIGN					(9)
The visual system – Environmental perception – Meaning of perception – Cerebral organization – Brain and system of perception – motivation – memory – learning – symbolism.					
Module 3: THEORIES OF PERCEPTION					(9)
Introduction of Gestalt – The behaviorist – Structuralism – Basis of Levi Strauss – Perspective values in urban design – Coherence – Proportion – Internal & external integration – Proportion in urban environment – Human dimension – Perceptual preference – Environmental complexity – Notions of surprise – Ambiguity – Novelty – Elements of complexity: Vision, sound, smell, tactile, body movement, areas.					
Module 4: AESTHETIC QUALITIES OF URBAN					(9)
Aesthetic and emotion – Arousal – Intrinsic aesthetic emotion – The aesthetics of symbols – Aesthetic pleasure – Intuitive aesthetics – A sense of pattern – Appreciation of rhythm – Appreciation of balance – Sensitivity to harmonic relationships					
Module 5: APPROACHES AND PRINCIPLES					(9)
Kevin Lynch: Image of the city – Edmund Bacon: Design of cities – Gordon Cullen: Townscape – Rapoport & Kantor: Complexity and ambiguity in urban environment – Peter F Smith: Dynamics of urban design.					
TEXT BOOKS					
1	Banerjee, Tridib and Michael Southworth, ed. City Sense & City Design: Writings and Projects of Kevin Lynch. Cambridge: MIT Press, 1990.				
2	Norberg Schultz 1971 existence; space and architecture; studio vista London.				
REFERENCE BOOKS					
1	Spreiregen, Paul D. Urban Design: The Architecture of Towns and Cities. New York: McGraw-Hill, 1996.				
2	Wekerle, Gerda R. and Carolyn Whitzman. Safe Cities: Guidelines for Planning, Design and Management. New York: Van Nostrand Reinhold, 1995.				

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COURSE TITLE		URBAN TRANSFORMATION AND EXTENSION		CREDITS	3
COURSE CODE	ARA3723	COURSE CATEGORY	PE	L-T-P	3- 0- 0
CIA		50%		ESE	50%
LEARNING LEVEL		BTL-2			
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To comprehend the process of urbanization in developing countries.				5,7,8,9
2	To provide understanding on the causes and effects of urbanization.				5,7,8,9
3	To understand the interrelation between Urbanization, urban space utilization, land use and infrastructure requirements.				5,7,8,9
4	To provide adequate inputs to understand the larger contextual land dynamics as an integral part of the urban fabric.				4,5,7,8,9
5	To emphasize the need for sustainability of the existing morphology through adaptive reuse to provide alternative options in urban renewal with reference to changing market dynamics				4, 5,7,8,9
Module 1:URBANISATION					(10)
Defining urban, the process of urbanization, causes and effects of urbanization, Differences between characteristics of urban areas and urbanization in developing and developed countries, Historic planning principles that paved way for the recent principles (example: the principles of Howard, Mumford), emerging concepts under urban transformation, planning cultures and planning models					
Module 2:URBANISATION AND URBAN SPACE					(8)
Urban form and architecture, urban transformation in heritage sites, landscapes, waterfronts, public spaces					
Module 3: LANDUSE AND INFRASTRCTURE					(8)
Housing and squatter settlements, commercial and industrial districts, transportation and infrastructure					
Module 4: SUSTAINABLE URBANISATION					(10)
Location theories, process of spatial economic analysis. The study of the allocation of scarce resources. Market forces in the development of cities and location decisions, size and economic structure. Economic policy- Urban problems and public policy. Land use and spatial organization of activities within cities, land-use controls, such as zoning.					
Module 5: PLANNING PROCESS					(9)
Financial arrangements in urban transformation, sustainable transformation, green interventions, urban renewal, conservation and redevelopment processes; Concepts of smart growth, transit-oriented design, growth management strategies, transit metropolis, new urbanism, advocacy planning, smart city etc.					
TEXT BOOKS					
1	Edmund Bacon, “ Design of Cities (1976), revised edition, Viking Penguin Inc, USA				
2	Leonhard Schenk, ‘Designing Cities’, Birkhäuser, 2013				
3	Gcoffrey Broadbent, “Emerging concepts in Urban Space Design-(1995), Jayker&Fravels.				
4	Jon Lang, “Urban design” – a typology pf procedures & products 2005, Glsevier, North America				
5	Kostof, Spiro, The City Assembled: The Elements of Urban Form Through History				

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6	Bacon, Edmund, N. Design of Cities. 3. Gosling, David & Maitland, Barry, Concepts of Urban design
REFERENCE BOOKS	
1	Broadbent, Geoffrey. Emerging Concepts of urban Design
2	VítorOliveira,'Urban Morphology: An Introduction to the Study of the Physical Form of Cities (The Urban Book Series)' , Springer, 2016Jenks, Compact City: Sustainable urban form in developing countries., E & FN Spon, London 2000

ELECTIVE – II

COURSE TITLE	INFRASTRUCTURE DEVELOPMENT AND PROJECT FINANCE			CREDITS	3
COURSE CODE	ARA3724	COURSE CATEGORY	PE	L-T-P	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-2				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To assure the smooth implementation of projects				1,5
2	To appraise project proposals from the angles of financial cost and benefit for concerned company / organization.				2,5,7
3	To apply basic analytical methods for investment decisions and finance of infrastructure.				2,4,8
4	To comprehend risks in infrastructure development and use risk as a tool in mortgaging and investment performance.				2,4,5,8
5	To prepare projects based on realizable cost and targets within the stipulated time.				2,4,7
Module 1: FUNDAMENTAL CONCEPTS OF FINANCE					(9)
Introduction to financial systems and public financing – Frame work and functions, Policies and norms, Financial procedures. Financial institutions in India; Various financial institutions (IDBI, ICICI, IFCI, etc.), Business Organization, financial Institutions and Project Financing in India.					
Module 2 INFRASTRUCTURE DEVELOPMENT STRATEGIES					(9)
Overview of Infrastructure development and financing in India. Concepts of urban infrastructure –social and physical infrastructure. Regulatory Issues and role of Government. Issues in infrastructure development and financing. Public and private sector role in resource mobilization and infrastructure development. International agencies involved in financing.					
Module 3: FINANCIAL TOOLS FOR INFRASTRUCTURE PROJECTS					(9)
Project viability and evaluation, Financial modelling and returns analysis. Capital Cost, Operational cost, Planning, Analysis, Costing, Income/Expenditure Statement, Balance Sheets Discounted Cash Flow, Return on Investment, IRR, NPV, Payback Period, CBR, CBA, Debt Service Coverage Ratio.					
Module 4: RISK ANALYSIS AND SECURITIZATION					(9)
Techniques of Financial Appraisal. Project risks, Theory of Conventional Techniques to handle risks, Payback, Risk Adjusted discount rate, Certainty equivalent coefficient, Sensitivity and Scenario Analysis, Simulation Analysis and Decision trees.					
Module 5: PROJECT STRUCTURING AND IMPLEMENTATION					(9)
Legal and financial structuring. Introduction to important steps of project implementation, tender, contract, implementation consultant. Monitoring, cost control, reporting. Privatization of Infrastructure: Experiences of successful and innovative infrastructure provisions.					
TEXT BOOKS					
1	ARORA, Essentials of Cost Accounting, Vikas publishing house Pvt Ltd, 2009				
2	Finance for Managers, Harvard Business Essentials , 2003				
3	H.L Ahuja, Economic Environment of Business, Macro Economic Analysis, Tata Mac Grow Hill, 2001				

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4	D. Chandra Bose, Fundamentals of Financial Management, PHI Learning P.Ltd 2009
REFERENCE BOOKS	
1	Dr. S. Gurusamy, Financial Services and Systems, The McGraw Hill Companies, 2009
2	Principles of Project and Infrastructure Finance by Willie Tan, published by Taylor & Francis 2007
3	Infrastructure Finance Trends & Techniques edited by Henry A Davis, Euromoney Institutional Investor Plc, 2008

COURSE TITLE	PERFORMANCE EVALUATION OF BUILDINGS			CREDITS	3
COURSE CODE	ARA3725	COURSE CATEGORY	PE	L-T-P	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-2				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To understand the need and assessment for Performance Evaluation of buildings				1,2,5
2	To gain knowledge on environmental assessment methods, audit and simulation techniques				2,4,7
3	To Conduct modeling and simulations in the areas of thermal comfort/performance, energy efficiency, etc. To the building envelope				2,5,8,9
4	To comprehensively understand how the actual performance of various buildings can be studied and analyzed				1,2,5,8
5	Add values to architectural design processes and equip with energy modeling skills				2,7,8
Module 1: INTRODUCTION TO PERFORMANCE OF BUILDINGS					(6)
Need for performance evaluation of buildings - Investigation and assessment - Performance audit and rating systems - GRIHA, LEED, IGBC and BREEM - Comprehensive analysis of green rating systems - Architectural computation and performance audit - Introduction to Building performance simulation tools					
Module 2: ENVIRONMENTAL ASSESSMENT METHODS AND MODELING FOR PASSIVE SYSTEMS					(12)
Modelling and experimental techniques for building assessment/ evaluation and design - basics of thermal comfort, solar shading/access/control, day lighting, acoustics, air movement etc., - issues and opportunities with current assessment modes / evaluation tools. Evaluation and assessment based on building type, function and program - building performance with respect to function, micro climate, envelope design, material - computer studio and simulation - mathematical models of heat and mass transfer phenomena through building components, transfer function methods and numerical methods - models of relative and convective heat transfer phenomena within buildings.					
Module 3: PERFORMANCE OF BUILDING ENVELOPE					(9)
Modeling of dynamic building envelope thermal performance – Thermal bridges – Modeling – Advanced glazing and evaluation of window performance – Active building envelope components for heat and moisture control – Experimental techniques for performance evaluation of the building envelope.					
Module 4: POST OCCUPANCY EVALUATION OF BUILDINGS					(9)

Purpose and components of Post occupancy evaluation (POE), Building performance bench marks, Occupant satisfaction, Indoor air quality, PPD & PMV analysis, Techniques and methods for post occupancy evaluation, assessing existing buildings based on their energy and water usage.	
Module 5: CASE STUDIES (6)	
Case study presentation on performance evaluation of a building identified.	
TEXT BOOKS	
1	KjellAnderson,'Design Energy Simulation for Architects', Routledge, 2014
2	Timothy L. Hemsath and KavehAlaghehBandhosseini ,'Energy Modeling in Architectural Design, Routledge,2015
3	Robert B.Bechtel and Arza Churchman 'Handbook of Environmental Psychology", John Wiley & Sons Inc. New York 2002.
REFERENCE BOOKS	
1	Energy Audit of Building Systems - moneefKarti - CRC Press 2000
2	KjellAnderson,'Design Energy Simulation for Architects', Routledge, 2014

COURSE TITLE	CONTEMPORARY LANDSCAPE ARCHITECTURE			CREDITS	3
COURSE CODE	ARA3726	COURSE CATEGORY	PE	L-T-P	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-2				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To have the knowledge on the evolution of landscape.				1,3,9
2	To be capable of apprehending the theory of architecture.				1,2,8
3	To have a broad perspective of the history of architecture in various continents.				1,3,6,8.9
4	To be aware of the site planning with landscape engineering.				3,5,9
5	To comprehend the professional practice in landscape designing.				2,4,6,9
Module 1: TIMELINE OF THE LANDSCAPE					(9)
Detailed study on the timeline of evolution of landscape – From agriculture to the human settlement – Prehistoric examples – European, American and Indian examples.					
Module 2: THEORY OF LANDSCAPE ARCHITECTURE					(9)
Outline of the chronology of development and evolution of landscape – Relationship of landscape development in art, architecture and city planning – Changing perceptions of man’s relationship with nature – responses and attitudes with nature – Environmental and behavioral theories – Entropy, prospect and refuge, defensible space etc.					
Module 3: HISTORY OF CONTEMPORARY LANDSCAPE ARCHITECTURE					(9)
Industrial revolution – Landscape from 16th century – Detailed study on the history of architecture of various countries – England – France – Italy – India – Works of famous landscape architects – F L Omsted – Ian McHarg- Geoffrey Jellicoe.					
Module 4: SITE PLANNING & LANDSCAPE ENGINEERING					(9)

Site planning process and its significance – Site survey and appraisal – Earth grading – Surface Drainage – Landscape engineering and water conservation – Watershed and their characteristics – Environmental friendly material specification.

Module 5: CONTEMPORARY LANDSCAPE PRACTICE (9)

Economics: Cost benefits – Landscape management at the regional scale – Horticulture practice and maintenance – Establishment and maintenance from planting to forestry.

TEXT BOOKS

1	Environmental Science, Earth As A Living Planet, Second Edition By University Of California, Santa Barbara.
2	Time Saver Standards For Landscape Architecture, Charles W Harris And Nicholas T Dine Mcgraw – Hill International Edition, Arch. Series
3	History Of Landscape Architecture: The Relation Of People To Environment, Tobey, George, Elsevier And Co. Ny
4	Landscape Assessment : Values, Perceptions And Resources By Zuber And Others