



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 (Housing) (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 (Housing) (Executive)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The program is expected to enable the students to

- PEO1** Graduands will excel in professional career with sound problem solving ability for providing housing solutions by proper plan, analysis, design, implementation and validation.
- PEO2** Graduands will pursue training, advance study and research using scientific, technical and communication base to cope with the evolution in the housing industry..
- PEO3** Graduands will apply their technical skills, exhibiting critical thinking and problem solving skills in professional practices or tackle social, technical and business challenges.

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** Providing the analytical knowledge on the informal housing and providing the information about upgradation, redevelopment and improvement for such settlement.
- PO4** To formulate on the knowledge about housing byelaws, planning legislation, Real estate planning and management.
- PO5** To understand the role of housing and its importance in habitat design
- PO6** To learn housing with respect to transportation design and land development management by inculcating the knowledge on GIS modeling.
- 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 (Housing) (Executive)

M.ARCH (HOUSING) (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	ARB3791	Housing Studio-I (Form Based Cluster Housing)	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	ARB3702	Informal Housing	3	0	0	3	3
2	PC	ARA3703	Urban Infrastructure and Services	3	0	0	3	3
STUDIO								
3	PC	ARB3792	Housing Studio-II (Cost Effective Housing)	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	ARB3706	Housing Byelaws and Planning Legislation	3	0	0	3	3
4	PC	ARB3707	Real Estate Planning and Management	3	0	0	3	3
TOTAL							12	12

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

M.ARCH (HOUSING) (EXECUTIVE)								
(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	ARB3793	Housing Studio-III (Sustainable Design – Mass Housing)	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	ARB3796	Housing 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	ARB3797	Housing 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	ARB3721	Planning and Preparedness for disaster	3	0	0	3	3
	PE	ARB3722	Housing and Transportation Design	3	0	0	3	3
	PE	ARB3723	Land development and Management	3	0	0	3	3
V (E2)	PE	ARA3724	Infrastructure Development and Project Finance	3	0	0	3	3
	PE	ARB3725	Application of GIS Modelling	3	0	0	3	3
	PE	ARB3726	Housing Sociology and Economics	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	HOUSING STUDIO - I			CREDITS	6
COURSE CODE	ARB3791	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
OBJECTIVES: <ul style="list-style-type: none"> To understand contemporary processes and tools in architectural design. To integrate the processes and tools in design of projects, including those with increased complexity of parameters. <p>The design studio will focus on the role of emerging tools and processes for understanding of complex and macro forces in the realm of the built environment as well as designing with this context. It would explore relationships between user group activity, movement, land form and urban form using diagramming and mapping tools to come up with creative prescriptions of certain</p>					

projected scenarios. The studio will also emphasize on collaborative learning processes. The projects would be of macro scale involving large campus oriented architectural projects/ Township as well as architectural design interventions in the urban context.

OUTCOME:

- Students would be aware of contemporary processes and tools of design.
- Students would use these processes and tools in the design projects to identify and address specific aspects of the project, as well as integrate complexity of connections and issues.

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		INFORMAL HOUSING		CREDITS	3
COURSE CODE	ARB3702	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 about slum and squatter settlements and the related issues with respect to rapid pace of urbanization				3,4
2	To understand the logic and mechanisms behind slum formation and informal settlements development including the various actors in the field of land division, building assistance, technical services and security.				3,4,5
3	To provide information about redevelopment, improvement and up gradation of slum and squatter settlements and methods to facilitate the process.				3,5,6
4	Apply the relevant national as well as international policies				3,5,6,7
5	Analyze Slum/squatter settlements and understand their specific issues, and Design development plans for slum/squatter settlements				3,4,6
Module1:		OVERVIEW OF INFORMALHOUSING			(6)
Definitions, Urbanization and Housing Scenario in India - Emergence and growth of informal settlements in developed and developing countries - Present Situation - Housing problems in rural and urban India -relating to housing density and housing Gaps in demand and Supply					
Module2:		HOUSING FOR THE URBANPOOR			(8)
Informal housing options - pavement dwelling, squatting, illegal land sub-division, inner city organic housing, causes of growth and perpetuation-impacts of legality- Housing For Urban Poor: Issues challenges and Management strategies - Approaches - Relevant case studies					
Module3:		SLUMS AND GOVERNMENTINTERVENTION			(12)
Process of slum formation - causes and consequences - approaches to tackle the challenges of slums - relocation - rehabilitation and in-situ upgradation - Various strategies of Slum Development - Slum improvement programme in Indian cities -various relocation packages and up gradation programmes for slums, In-situ Development - Historical Developments - National Housing and Habitat Policy - Slum draft policy - Slum Networking Resettlement & Rehabilitation - JNNURM & RAY - Approaches for Mass Housing in India					
Module 4:		CIVIL SOCIETY AND POVERTY			(10)
Role of NGO`s and CBO`s in the improvement process - dimensions of poverty and its manifestation in the housing sector - indicators - programme specifically targeted towards slums and the urban poor - Shelter less inthecontextofurbanpoor-problemsofhomelessness-nightshelters-socioculturalandeconomicprofile-settlement characteristics - housing schemes.					
Module5:		CASE STUDY			(9)
Identification of an informal settlement and to study the complex issues, physical and socio-economic profile for the given housing situation, and formulation of strategies to uplift the general housing status for wholesome living environment of the inhabitants and preparation of a development plan for the same.					
TEXT BOOKS					
1	Challenges of Slums: Global report on human settlements –UN HABITAT- 2003				

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2	Slums of the World: Eduardo López Moreno, Global Urban Observatory – UN HABITAT – 2003
3	Eugenie L. Birch and ShahanaChattaraj, „Slums: How Informal Real Estate Markets Work (The City in the Twenty-First Century)“, University of Pennsylvania, 2016
REFERENCE BOOKS	
1	Upgrading of Urban Slum and Squatter Areas, http://www.unhabitat.org/downloads/docs/3617_80393_CHS-OP-81-4.pdf
2	Marie-Caroline Saglio-Yatzimirsky and Frederic Landy ,“Megacity Slums : Social Exclusion, Space and Urban Policies in Brazil and India (Urban Challenges: Volume 1)“, Imperial College Press, 2013

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

COURSE TITLE	HOUSING STUDIO - II			CREDITS	6
COURSE CODE	ARB3792	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 evolve the design strategies for the disaster prone housing with cost effective technology and the given design requirements				1,2,3,4,5,9
Design of a disaster resistant housing complex for a disaster prone area (Earthquake/ Tsunami/ Cyclone and Storm surge) for an approximate population of 3000- 3500 with a cluster of approximately 500 houses					
Design Approach:					
1. Site Analysis					
<ul style="list-style-type: none"> • Study of the existing site condition • Family size and occupation, way of life, vehicles, etc. • Shops in the area • Ancillary activities happening • Study of existing dwellings and their organization and their vulnerability to disaster. • Weather conditions throughout the year and how weather behaves, • Electricity and sewage system, garbage disposal, transport links 					
2. Stages of design and requirements					
<ul style="list-style-type: none"> • Site Analysis • Inference from Case Studies – mitigative measures of design 					

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- Listing Disaster Mitigation measures of the design
- Preliminary design Idea
- Detailing out the design idea – exploring criteria
- Finalizing design and Final presentation
- (Reviews at each stage)

TEXT BOOKS

1	Radhakrishan, 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	Yahya Mohamad Yatim, 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					

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

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	HOUSING BYELAWS AND PLANNING LEGISLATION			CREDITS	3
COURSE CODE	ARB3706	COURSE CATEGORY	PC	L-T-P-S	3- 0- 0
CIA	50%			ESE	50%
LEARNING LEVEL	BTL-3				
Prerequisites : Nil					
CO	COURSE OUTCOMES				PO
1	To understand the Legislative process in India				2,4,5
2	To understand the laws and regulations regarding planning and development.				4,5,6
3	To understand the relation between regulation and development, and their effects.				4,5
4	To interpret regulation relating to planning, development and housing.				4,6,7
5	To understand the relation between development and regulation				2,4,6
Module1: GENERAL LEGISLATION AND THE INDIAN CONSTITUTION					(6)
Sources of law (custom, legislation and precedent); meaning of the term of law, legislation, ordinance, bill, act, regulations and bye-laws; significance of law; benefits of statutory backing for planning schemes; eminent domain, the law making process; Concepts and contents of Indian Constitution; provisions regarding property rights; evolution of planning legislation and overview of legal tools connected with urban planning and development					
Module2: LAWS AND ACTS FOR PLANNING AND DEVELOPMENT					(8)
Introduction, scope and relevance of various laws and acts relevant to planning; Model Town and Country Planning Acts, Development Authorities Act, 73rd and 74th Constitution Amendment Acts; Municipal Acts, Environmental and Pollution Control Acts, etc.; Land Acquisition Act, 1984, Historical					

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

background, need, advantages; Judicial process and interpretation of the law	
MODULE 3: DEVELOPMENT CONTROL AND GUIDELINES (12)	
History of development control and regulations, significance of regulation in housing, different forms of development control - byelaws, GO"s, guidelines, standards, codes, etc.; cases regarding alternative interpretations of byelaws and standards; Model Bye-Laws or Housing Societies; consequences of failure to implement laws and schemes to ensure compliance.	
Module 4: SAFETY AND SECURITY (10)	
UN role in housing, Housing in the Sustainable Development Goals; Town and Country Planning Act, Improvement Trust Act, Development Authorities Act, State Housing Board Act, Urban land (ceiling and regulation) Act 1976, Slum Clearance/Slum Improvement Act, Rent Control Act, Apartment Ownership Act 1983 – Zoning, subdivision regulations, heritage conservation zones and incentives for development, Compensatory FAR and TDR. Focus on the TN T&CPA,	
Module 5: DEVELOPMENTVS REGULATION(9)	
Land classification and change in land use, development control rules related to habitat and housing development, Role of public/private/NGOs/Socio Economic groups in Housing development.	
TEXT BOOKS	
1	Balaji V. & Rajmanohar, "Housing Sector in India; Issues, Opportunities and Challenges", ICFAI University Press.
2	Reading Material on Planning Legislation and Professional Practice – ITPL New Delhi.
3	Girish K. Misra, PSN Rao - Housing Legislation on India
REFERENCE BOOKS	
1	National Housing Policy Paper – Government of India, Ministry of Urban Development, New Delhi, May 1988.

COURSE TITLE	REAL ESTATE PLANNING AND MANAGEMENT			CREDITS	3
COURSE CODE	ARB3707	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 gain expertise on qualitative aspects of identifying and achieving successful projects.				1,3,5
2	To critically analyze market specific factors that impact RE investment performance (property rights, taxes, transparency, planning procedures)				3,4,7
3	To gain knowledge about the recent trends in Real Estate				4,6,7
4	To expose students to the world of cross-border real estate development and investment with a focus on emerging market economies				3,4,8
5	To apply the various principles and techniques taught in the subject				4,7,8
Module1: REAL ESTATE DEVELOPMENT					(9)
Fundamental Concepts, Techniques & Sequential events in Real Estate Development Process Site Evaluation Development Team assembly – Micro and Macro market. Communication tools required					

for presenting the project, In house sales promotion, franchisee system, Public relations, Branding, transfer of completed project.	
Module 2 PLANNING & REGULATORY REGIME (12)	
Laws and regulatory Framework – Understanding and appraisal of the regulatory regime Development Control - Land use regulations – ordinances – subdivision rules municipalities and local bodies act, Acts relating to environmental quality and infra-structure development. Planning objectives, Master plan & Detailed Development Plan. Front end clearances from various authorities	
Module 3: CURRENT TRENDS IN REALESTATE (9)	
SEZ, SPV, Joint ventures, Smart city concepts, Types & Parameters, Franchisee systems, Real Estate Regulatory Act (RERA) Development of real estate investment trusts (REIT) industry – development of market for real estate debt securities	
Module4: GLOBAL REAL ESTATE MARKETS (9)	
Rationales for Cross Border RE Investing - Facilitators of Real Estate Globalization: public markets, professionalization -Types of Global Real Estate Investors and Developers -Understanding Global Linkages-Rewards of International RE Investing -Risks and Costs of Cross-border Investing: transaction and information costs, political risk, transparency, currency risk, liquidity.	
Module5: ENTREPRENEURSHIP AND INNOVATION IN REAL ESTATE (6)	
Information Technology, and Technical Progress - Entrepreneurship, Organization, investment flexibility and future redevelopment Opportunities and Innovation Natural Resources and the Environment: Toward Sustainable Development	
TEXT BOOKS	
1	Brown, G. & Matysiak, G., (2000) Real Estate Investment, FT/Prentice Hall.
2	Edwards V and Ellision L, (2003) Corporate Property Management: Aligning Real Estate with Business Strategy, Blackwell
3	Haynes B and Nunnington N, (2009) Corporate Real Estate Asset Management: Strategy and Implementation, EG Books
4	Hoesli, M., Lekander, J. and Witkiewicz, W., (2004) International evidence on real estate as a portfolio diversifier, Journal of Real Estate Research, Vol. 26, pp. 161-206
5	Sirmans C. F. and Worzala E. (2003), International Direct Real Estate Investment: A Review of the Literature, Urban Studies, Vol. 40, Nos 5–6, 1081–1114
6	Fillmore W Galaty, “Modern Real estate practice” (2002); Dearborn Trade Publishing, New York, U.S.A.
7	Gerald R Cortesi, “Mastering Real estate principles” (2001); Dearborn Trade Publishing, New York, U.S.A
REFERENCE BOOKS	
1	Mike .E. Miles, “Real estate development – Principles & Process 3rd edition, (2000); Urban Land Institute, ULI –Washington DC
2	Richard B Peiser& Anne B. Frej, “Professional real estate development” – The ULI guide to the business – (2003), Urban Land Institute U.S.A.
3	Tanya Davis, “Real estate developer’s handbook”, (2007), Atlantic pub company, Ocala, USA.

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.					

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

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	HOUSING STUDIO -III			CREDITS	7
COURSE CODE	ARB3793	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 high rise sustainable housing projects and to create design ideologies for sustainable designs				1,2,4,5,6,8, 9
Module 1:INTRODUCTION (9)					
OBJECTIVES					
<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. <p>Students are required to design Mass high-rise housing developments in a distinct housing area which is integrated planned, designed and constructed, and is dominated by a number of high-rise residential buildings that are multifamily housing. The design not only includes the physical environment where the residents are living in, but also includes the psychological and social environment which satisfies the resident's non-material needs, such as safety, comfort, and social interaction. Designing of a multi-level residential environment that includes: the private family spaces, the collective residential building of shared ownership, the semi-public gated community, and the public urban neighborhood. Therefore the project aims at a resident-centered and multi dimension residential environment that is composed of the psycho-social environment and the physical environment, where the resident is placed at the center of a series of spatial dimensions,</p>					

which starts with the Dwelling Unit" and enlarges, layer by layer, from „Dwelling Building“, „Housing Estate“, to „Mass Housing Neighborhood“Special focus needs to be given to the housing quality which stems from the fulfillment of the basic and superior living standards within the dwelling unit, as well as the amount of complementary services, housing utilities and amenities, including health, education, shopping, working, recreation, etc. The satisfaction of all human needs and desires represents a very wide range of factors, which must be taken into account and consequently incorporated into the design of living environment. The creation of mixed areas with the optimal proportion of residential units, amenities, working and public spaces facilitates the design of convenient, pleasant spaces for the largest possible spectrum of users and dwellers. Design of the residential areas must be considered as a multifunctional unit consisting of mutually interconnected architectural elements that constitute the cultural and social milieu. They must cover all standard needs of the individual and community expressive of its way of life

Aspects of planning, technology, services, density, height of construction, management would be examined along with considerations such as environmental performance, resource optimisation, ecological impact in order to produce a viable synthesis of diverging needs.

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	HOUSING THESIS PHASE I			CREDITS	7
COURSE CODE	ARB3796	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	HOUSING THESIS PHASE II			CREDITS	9
COURSE CODE	ARB3797	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 detailedLiterature 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 study and develop a subject of their choice, which adds significantly to the knowledge. Depending</p>					

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	PLANNING AND PREPAREDNESS FOR DISASTER			CREDITS	3
COURSE CODE	ARB3721	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 process of urbanization and its risks associated with the environment				2,4,7
2	To acquire knowledge on the different types of disasters and safe construction practices				2,7,9
3	Make an assessment at settlement level, structural interventions, infrastructure and other facilities.				4,6,7
4	To learn the methods of preventing disasters, response, rehabilitation and reconstruction.				3,4,7
5	To understand the theory and practice of community based approach to disaster management				2,6,8
Module1: URBANISATION AND ASSOCIATED RISKS					(6)
Urbanization patterns - Resource consumption and environment versus economy, its impacts - resource depletion and pollution - Impact of human activity on environment - role of land use planning - zoning and development control regulation in managing urban risks - Urban risk assessment.					
Module2: DISASTER TYPES AND IMPACTS					(9)
Disasters - Definitions, Types and examples of disasters across the world, Natural and manmade calamities - Degree of damage - Frequency of occurrences and other historical facts, classification of disasters in India, Impacts of disasters, disaster safe construction practices for different types of disasters - Relevant case studies					
Module3: DISASTER RESILIENT DESIGN					(10)
Site planning - land topography - open space and built form - building forms - horizontal and vertical eccentricities - building envelope and finishes - non-structural elements like services, fixtures, structural interventions - foundation, base isolation, soil stabilization, retaining walls, openings, roofs, terraces, parapets, boundary walls, underground and overhead tanks, staircases.					
Module4: DISASTER VULNERABILITY PREPAREDNESS					(10)
Identification of disaster prone areas - forecasting and early warning systems for various types of disasters, communication and IT in disaster Management - Disaster vulnerability mapping, disaster preparedness . Role of Architecture in disaster relief - Current practices in disaster response - Effects of haphazard disaster relief measures on the environment - changes in the ecosystem of post disaster - restoring the ecological balance of post disaster - rehabilitation measures.					
Module5: DISASTER MITIGATION AND MANAGEMENT					(10)
Kyoto framework of disaster mitigation and management - disaster management policies and act - National and State Level - selected Global practices - disaster co-ordination centers - functions, logistics, operations and planning - Principles and methods of community based approaches for urban disaster management. Community based disaster management practice. Standard Emergency Warning Signal (SEWS) – Education and training on mitigation and emergency planning.					
TEXT BOOKS					

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

1	Rajib Shaw ,“Community-Based Disaster Risk Reduction (Community, Environment and Disaster Risk Management)”, Emerald Group Publishing Limited, 2012
2	Stronger Together: The Global Red Cross Red Crescent Response to the 2004 Indian Ocean Earthquake and Tsunami, International Federation of Red Cross and Red Crescent Society, 2013
3	Nancy Rushford
REFERENCE BOOKS	
1	Thomas Fisher, Designing to Avoid Disaster: The Nature of Fracture - critical Design, Routledge, 2012
2	Jenny Donovan, Designing to Heal: Planning and Urban Design Response to Disaster and Conflict, CSIRO, 2013.
3	Dr.Satendra, Vinod K. Sharma, Sustainable Rural Development for Disaster Mitigation, Concept Publishing, 2004.

COURSE TITLE	HOUSING AND TRANSPORTATION DESIGN			CREDITS	3
COURSE CODE	ARB3722	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 basics elements of transport design				6,7
2	To comprehend the current situation of transportation in India.				2,4,6
3	To be able to design transport infrastructure that is accessible				6,7,8
4	To understand the requirements of public transit systems and mobility.				4,6,8
5	To grasp the influence of transport on Housing				5,6
Module 1: HOUSING AND TRANSPORTATION					(9)
Relation and influence housing and transportation, Transportation as a necessary precursor to development, housing and transport demand, socio - economic condition and traffic characteristics, equity and equality in transport, Guidelines, codes and major legislations, and local conditions of the transport network. Roads and development control regulations					
Module 2 TRANSPORTATION IN INDIA					(9)
Status of existing Transportation System – Systems Approach to Transport Planning - Interdependence of the Landuse and Traffic – Stages in Transportation Planning – Transport Systems and Planning Considerations. Concepts of Zoning – O-D Surveys – Inventory of Transport and other activities – Travel Forecasting Process- Forecasting Process- Critical issues in Travel forecasting – Basics of Systems Simulation Modeling					
Module 3: DESIGN OF TRANSPORT INFRASTRUCTURE					(9)
Transport development: Economic, political and social significance and transport development. Characteristics and role of various forms of transport, road, railways, waterways and airways. Transport policies and programmes in India before and after independence. Transport co-ordination Road					

<p>development: Historical perspective of road development in India. Current trends in road development. Accessibility and priority index in traffic network planning. Geometric design: Urban and Rural road classification, design controlandcriteria,sightdistancesandcontrolofaccess.At-gradeandgradeseparatedintersections,junction improvement techniques, Design of Intersection – At grade intersection – Uncontrolled, Channelisation, Rotary,TrafficSignalControl,SignalCoordination,GradeSeparatedIntersection-Types,DesignandAnalysis.</p>	
<p>Module4: PUBLIC TRANSIT AND MOBILITY DESIGN (9)</p>	
<p>Urban Transport System – Public Transport System Re-genesis and Technology – Physical performance of Public Transport System – Public Transport and Urban Development Strategies - Characteristics of Rail Transit – Vehicle Characteristics, ITS, Paratransit systems - Intermediate Public Transport - BRTS, MRTS, LRTS, etc.Aesthetics, trend, style Analysis , Concept generation, creativity and innovation, Evaluation techniques. Peer review Understanding of the packaging concept and the problems connected with traveling space, technology, ergonomics and aesthetics/ styling. Readings and exercises in mobility</p>	
<p>Module 5:CASE STUDIES (9)</p>	
<p>Indian and international case studies that deal with future issues of transportation such as the ITS, AutomatedHighway Systems - Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries.</p>	
<p>TEXT BOOKS</p>	
1	CMDA, Second Master Plan for Chennai, Chennai 2008
2	Tumlin Jeffrey, "Sustainable Transportation Planning Tools for Creating Vibrant Healthy and ResilientCommunities", John Wiley And Sons, 2012.
3	Robert F Baker, (eds), "Hand Book of Highway Engineering, Van Nostrand Reinhold Company, New York, 1975
<p>REFERENCE BOOKS</p>	
1	John D.Edwards (Edr.), "Transportation Planning Hand Book", 2nd Edition, Institute of Transportation
2	Engineers, Prentice Hall Inc.,, Washington DC, USA, 1999
3	Intelligent Transport Systems, Intelligent Transportation Primer, Washington, US, 2001

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

COURSE TITLE		LAND DEVELOPMENT AND MANAGEMENT		CREDITS	3
COURSE CODE	ARB3723	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 structure of urbanization and their overall impact				2,4,6
2	To understand the various reasons for land values and the types of land tenure.				4,7,8
3	To understand the peculiarities of Indian land and its market.				4,5,7
4	To understand the various land policies brought out by the government of India.				3,4,6
5	To understand the various types of land management techniques and acts in India.				3,6,8
MODULE1:Introduction					(9)
Globalization and urbanization, Emergence of large cities; Impact of urbanization, land as a resource and urban land problems. Urbanization and its impacts in developing and developed countries – case studies.					
MODULE 2: Urban Land Values and LandTenure					(9)
Market determined values and social needs. Price mechanism and the inequalities of wealth Urban Land Tenure: Special characteristics of land and its tenure. Policy objectives and types of land tenure. Advantage and disadvantage of main form of tenure.					
MODULE 3: Peculiarities of Land in India					(9)
The status of land in the Constitution of India, peculiar nature of land markets; Factors affecting supply anddemand of land for housing; Role of Fiscal policies and development regulations of land market. Economic and social dimensions of urban land policy					
MODULE 4:Land Policies					(9)
Land policy objectives and policy options for public intervention; Techniques of land assembly and expropriation, development components and financing land development; Institutional and political concerns in land management. Urban land policy in India, instruments of urban land policies of government. Different acts related to land - Right to fair compensation & transparency in Land Acquisition Resettlement and Rehabilitation.					
MODULE 5: Types of Land Management					(9)
Various approaches viz. land pooling/land readjustment, TP Schemes, Public Private Partnerships for land assembly, role of the private sector in land assembly, land management thru" Township Policies of various state governments, international and domestic case studies. TDR / OSR incentives. Change in land use.					
TEXT BOOKS					
1	P.S.N. Rao Urban Governance and Management 2006 IIPA and Kanishka Publications, Delhi				
2	Sivaramakrishnan, K.C., et.al Handbook of Urbanization in India 2005 India Oxford University Press				
3	HabibullahWajahat Land Reforms in India 2005 Sage Publications				

ELECTIVE – II

COURSE TITLE		INFRASTRUCTURE DEVELOPMENT AND PROJECT FINANCE		CREDITS	3
COURSE CODE	ARA3724	COURSE CATEGORY	PE	L-T-P-S	3- 0- 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, Polices 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, tor, 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				

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

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	APPLICATION OF GIS MODELLING			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 current utilization of GIS software and its reach.				6,7,8
2	To learn the functions of GIS models in Urban and regional planning				6,8
3	To learn the Spatial data input using GIS software.				6,7,8
4	To understand the various attribute data input used in the GIS software.				5,6,8
5	To analyse the spatial aspects using GIS.				2,6,8
MODULE1:Introduction					(9)
Definition, map and map analysis, automated cartography, history and development of GIS, Hardware requirement, system concepts, co-ordinate systems, standard GIS Packages.					
MODULE 2: Data Entry, Storage and Maintenance – In Urban and Regional Planning					(9)
Sources of data, Types of data, spatial and non-spatial data, data structure, points, lines, polygon, vector and raster, files and file organization, database, data entry, digitizer, scanner, Dbase, files and data formats, data compression. Classification of spatial and non-spatial data – application of spatial data in urban and regional planning – objectives and functions of GIS models in urban and regional planning.					
MODULE 3: Spatial Data Input					(9)
Defining the objectives of a GIS planning problems – Identification of required spatial data layers – coding schemes – digitisation of spatial data – editing spatial data usable for the given planning problem.					
MODULE 4: Attribute Data Input					(9)
Role of attribute data in defining geographic features – adding attribute data file – topology generation – joining attribute data to its geographic features.					
MODULE 5: Spatial Analysis using GIS					(9)
Performing overlay functions – manipulating attributed data – GIS modeling – map and report generation – case problems on regional analysis, impact assessment study, project formulation and land suitability analysis.					
TEXT BOOKS					
1	Brail. K. R. (1990), “Integrating GIS into Urban and Regional Planning – Alternative approaches for				

CURRICULUM AND SYLLABUS M.Arch (Housing) (Executive)

	developing countries”, Regional development Dialogue, Vol. 11, No.3, UNCRD, Japan 1990.
2	Cartwright T.J. (1991), “Information Systems for Urban and Management in Developing countries. The concept and reality, computers, environment and urban systems”, Vol: 15, 1991.
3	Jeffrey Star and John Estes, “Geographical Information System – An Introduction”, Prentice Hall Inc., Engelwood cliffs, New Jersey, 1990.
4	Klosterman RE. (1990), “Micro Computer packages for planning analysis”, American Planning Association Journal, Autumn, 1990.
5	B. Bhatta, “Remote Sensing and GIS”, Oxford University Press, New Delhi, 2009
6	Ian Heywood, Sarah Cornelius and Steve Carver, “An Introduction to Geographical Information System, Longman, England, 2000.
REFERENCE BOOKS	
1	Earl Gose, Richard Johnson Baugh and Steve Jost, “Pattern Recognition and Image Analysis”, Prentice Hall of Indian Private Limited, New Delhi, 1999.
2	Itzhak Benenson and Paul. M. Torrens, “Geo-simulation – Automate based Modeling of urban Phenomena”, John Wiley and Sons Ltd, England, 2004.
3	Paul. A. Longey (et al), “Geographic Information System and Science”, John Wiley and Sons Ltd, New York, 2001.

COURSE TITLE		HOUSING SOCIOLOGY AND ECONOMICS			CREDITS	3
COURSE CODE		ARB3726	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, relate and apply the various concepts of sociology and economics to the housing.					2, 4, 7
2	To know the basics of sociology and Indian Society					4, 7, 9
3	Understand housing policies and financing mechanisms.					2, 8
4	To understand the relation between the built form and its implications on the economics and social interactions.					4, 7, 8, 9
5	To imbibe knowledge from various case studies where various types of economic, sociological and financing have been applied.					3, 6, 7, 8
Module1: POPULATION GROWTH AND ITS INTERRELATION						(10)
Population growth, development and urbanization, theory of demographic transition, population problems in the context of Indian experience, sources of demographic data in India, analysis of demographic data for housing migration and urban population forecast and projections.						
Module2 SOCIAL ASPECTS OF HUMAN SETTLEMENTS						(10)
Nature and scope of the field of sociology of man, environment and society, deterministic theories and their implication, sociological concepts, social norms, groups, structures and institutions, meaning of sociological perspective. Profile of structure of Indian society nature and change with particular reference to caste, kinship, village, community, family, culture and religion, human ecology. Role of socio-cultural aspects in housing, effect of urbanization in social life, urban sociology, role and						

significance of tradition and modernity in contemporary India. Urban social issues.	
Module3: SOCIAL ASPECTS OF HOUSING AND COMMUNITYPLANNING (7)	
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.	
Module4: THEORIES OF ECONOMIC DEVELOPMENT (8)	
Basic concepts of economics, economic principles and land use planning, location economics, environmental economics, urban economics, economic theory and urban development.	
Module5: URBAN LAND USE AND SETTLEMENT ORGANISATION (10)	
Land use determinants, Locational Dynamics of urban Land use spatial organization of urban settlement ,location decision for housing, theories of land values, economic issues in urban growth.	
TEXT BOOKS	
1	Norbert Schaneur, 6000 years of Housing
2	Chiara, J. D., Julius, P. and Zelnik, M., "Time Saver Standards for Housing and Residential Development", McGraw Hill.
3	Urban and Regional Development Plans Formulation and Implementation" (URDPFI) Guidelines, TCPO Publication
4	Government of India, National Housing and Habitat Policy, (Urban); 1998, 2007